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COVID-19 vaccine acceptance and hesitancy among dental and medical students

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ABSTRACT

Background. Dental students (DS) and medical students (MS) are exposed to COVID-19. It is important to achieve high COVID-19 vaccination coverage rates in both of these groups. The authors developed a survey to assess COVID-19 vaccine hesitancy among MS and DS.

Methods. The authors conducted the study at 3 US dental schools and 1 US medical school using an online survey that assessed previous immunization behavior, attitudes about and perceptions of COVID-19 vaccines, and personal experience with COVID-19.

Results. A total of 248 DS and 167 MS completed the survey. Forty-five percent of DS and 23% of MS were hesitant about receiving the COVID-19 vaccine. Results of bivariate analyses found that MS were 2.7 times more likely than DS to receive the vaccine (odds ratio, 2.74; 95% CI, 1.76 to 4.31; $P = .0001$). Although DS were more likely than MS ($P < .05$) to have had COVID-19 and to personally know someone who had COVID-19, MS were more likely to agree with mandates and trust information about the vaccines. In multivariable analyses, after controlling for demographic variables, experience with COVID-19, and personal vaccination behaviors, being a MS or DS was no longer predictive of willingness to get the vaccine.

Conclusions. These results highlight the need for profession-specific curricula designed to enhance student knowledge about the vaccines and vaccine counseling skills.

Practical Implications. The American Dental Association supports dentists administering vaccines, including the COVID-19 vaccines. Dentists and DS should be willing to receive the vaccines themselves. Education about the vaccines is needed to improve uptake.

Key Words. COVID-19 vaccine; vaccine hesitancy; vaccine adoption; dental students.

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As of January 2021, the COVID-19 pandemic has exacted a heavy toll in terms of the burden of disease and deaths worldwide. The United States alone has experienced more than 24 million cases and more than 400,000 deaths.¹ It is an impressive feat of modern science that within 1 year of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) being recognized and sequenced, several COVID-19 vaccines are now available in many countries around the world. The urgency for vaccination is growing every day, with increasing numbers of cases and reports of virus variants in the United Kingdom, Brazil, and South Africa spreading to other countries.

Although COVID-19 vaccines are still scarce, all frontline health care providers (HCPs) have been prioritized for vaccination in the United States. Vaccination of HCPs will ensure an adequate workforce to deal with infected patients. The guidelines from the National Academies of Science, Engineering, and Medicine have recommended the vaccination of all frontline HCPs, including dentists and dental hygienists, in the first phase of the COVID-19 vaccines rollout.²

The primary aim of our study was to ascertain attitudes, perceptions, and hesitancy regarding the COVID-19 vaccines among medical students (MS) and dental students (DS). The information obtained will help identify potential concerns that need to be addressed to ensure adequate uptake among these groups and enable the development of educational programs to teach these students skills to provide vaccine recommendations and counsel vaccine-hesitant patients. We also

compared the attitudes, perceptions, and hesitancy regarding the COVID-19 vaccines between these 2 populations of health professional students.

METHODS

The institutional review boards of the Oakland University and Nova Southeastern University approved our study, which we conducted at 3 dental schools in Michigan, Florida, and Utah, and 1 allopathic medical school in Michigan. All students at these schools were e-mailed a link to the Qualtrics XM online survey. MS completed the survey in September 2020, and DS completed the survey in November and December 2020. Informed consent was obtained at the beginning of the survey.

Survey items for the anonymous online assessment were developed on the basis of research involving attitudes and behaviors about vaccinations³⁻⁵ and included 4-point Likert scale (strongly disagree to strongly agree) and dichotomous (yes or no) items. The survey questions assessed previous immunization behavior, general attitudes and perceptions of vaccines, knowledge and interest about the COVID-19 vaccines, perceived likelihood of COVID-19 infection, and personal experience with COVID-19 illness. Demographic information was also collected, such as sex, race and ethnicity, and year in the program. MS and DS in years 1 and 2 were designated as preclinical and MS and DS in years 3 and 4 were designated as clinical.

Data analysis

The data analyses were performed using Epi Info, Version 7.2.4.0. Likert scale items were recategorized as strongly agree or agree and strongly disagree or disagree. Descriptive statistics included frequencies, percentages, and means to describe the distributions of responses to demographic and specific questions in the survey. Odds ratios with 95% CIs and χ^2 were used to identify statistically significant differences between DS and MS, students who would agree to receive or do not agree to receive (accept or decline, respectively) the COVID-19 vaccine on approval from the US Food and Drug Administration. Variables that were statistically significant in the bivariate analyses were included in the multiple logistic regression models to identify predictors of willingness to receive the COVID-19 vaccine and reporting COVID-19 vaccination should be mandatory for all HCPs. If variables were multicollinear, only 1 was included in the model. We reviewed free-text comments for emerging themes and patterns.

RESULTS

The surveys were sent to 494 MS and 1,481 DS and response rates were 34% and 18%, respectively.

Demographically, DS and MS were similar in sex, but there were more underrepresented minorities (Black, Hispanic) in the DS group (21.3%; 44 Hispanic and 8 Black students) than in the MS group (7.36%; 10 Hispanic and 2 Black students). Overall similarities and differences in attitudes, perceptions, and hesitancy regarding the COVID-19 vaccines between MS and DS are presented in Table 1.

Forty-five percent of DS and 23% of MS were hesitant to receive the COVID-19 vaccine ($P < .0001$). A higher proportion of DS (11%) compared with MS (3%) reported having had COVID-19 and a high proportion of DS (90%) compared with MS (76%) reported personally knowing someone who had had COVID-19 ($P < .01$).

MS and DS were statistically significantly ($P < .05$) different for the following, with MS more likely than DS to report COVID-19 vaccination should be mandatory for the general public, COVID-19 vaccination should be mandatory for HCPs, the importance of COVID-19 vaccination for themselves as HCPs, and willingness to be involved in a COVID-19 vaccine trial. In addition, MS were more likely to express concerns about the effectiveness of a COVID-19 vaccine and to trust the information received about the COVID-19 vaccines from public health experts. DS were more likely to have decided not to get vaccines in general as an adult for reasons other than illness or allergies and agreed that people get more vaccines than are good for them. DS were also more likely to indicate that the only reason they will get a COVID-19 vaccine is if it is mandated by the health systems or school.

On vaccine hesitancy, in those who reported they were not willing to receive the COVID-19 vaccine, associations were similar to those reported with overall results, as seen in Table 1.

ABBREVIATION KEY

CDC:	Centers for Disease Control and Prevention.
DS:	Dental students.
FDA:	US Food and Drug Administration.
HCP:	Health care provider.
mRNA:	Messenger RNA.
MS:	Medical students.
SARS-	Severe acute
CoV-2:	respiratory syndrome coronavirus 2.

Table 1. Survey responses according to profession: overall and for vaccine-hesitant and vaccine-accepting medical and dental students.

SURVEY ITEM	OVERALL		VACCINE-HESITANT STUDENTS			VACCINE-ACCEPTING STUDENTS			
	Participants Who Responded Affirmatively (Agree/Strongly Agree), %		OR [‡] (95% CI)	Participants Who Responded Affirmatively (Agree/Strongly Agree), %		OR (95% CI)	Participants Who Responded Affirmatively (Agree/Strongly Agree), %		OR (95% CI)
	MS* (n = 163)	DS [†] (n = 245)		MS (n = 37)	DS (n = 108)		MS (n = 126)	DS (n = 135)	
General Attitudes Toward the Vaccines									
People get more vaccines than are good for them	6.1	18.0	0.30 (0.14 to 0.60) [§]	10.8	26.8	0.33 (0.08 to 1.06) [§]	4.8	11.1	0.40 (0.14 to 1.05)
Vaccines are important for me to stay healthy as a future HCP [¶]	99.4	97.6	4.06 (0.49 to 188.20)	100.0	94.4	NA [#]	99.2	100.0	NA
It is my role as a future HCP to learn about vaccines for myself and my patients	99.4	98.8	2.01 (0.16 to 106.07)	100.0	97.2	NA	99.2	100.0	NA
COVID-19 Vaccines, General Opinions									
The COVID-19 vaccination should be mandatory for the general public	67.9	40.3	3.12 (2.06 to 4.76) [§]	48.6	8.3	10.18 (4.03 to 27.19) [§]	73.6	65.9	1.44 (0.84 to 2.47)
The COVID-19 vaccination should be mandatory for all HCPs	85.9	53.9	5.18 (3.15 to 8.76) [§]	64.9	16.7	9.04 (3.93 to 21.65) [§]	92.1	83.7	2.25 (1.03 to 5.17) [§]
Personal Views, COVID-19, and Vaccine									
I am likely to be exposed to COVID-19 as a future HCP	98.2	95.1	2.74 (0.72 to 15.37)	97.3	93.5	2.48 (0.30 to 115.53)	98.4	96.3	2.38 (0.38 to 25.40)
COVID-19 vaccination is important for me as an HCP	98.2	78.8	14.31 (4.50 to 72.96) [§]	94.6	52.8	15.43 (3.65 to 138.94) [§]	99.2	99.3	0.03 (0.01 to 73.80)
I would like to be involved in a COVID-19 vaccine trial	52.8	32.6	2.30 (1.53 to 3.47) [§]	10.8	0.9	12.69 (1.20 to 644.44) [§]	65.1	58.2	1.34 (0.81 to 2.22)
I will take the COVID-19 vaccine as soon as an FDA-approved vaccine is available	77.3	55.1	2.72 (1.75 to 4.28) [§]	NA	NA	NA	NA	NA	NA
I am concerned that a COVID-19 vaccine may not be effective	76.7	54.1	2.78 (1.80 to 4.36) [§]	83.8	68.5	2.36 (0.93 to 6.74)	74.6	42.2	4.00 (2.37 to 6.83) [§]
I am concerned about serious adverse effects from a COVID-19 vaccine	54.6	63.9	0.68 (0.45 to 1.02)	89.2	92.6	0.66 (0.16 to 3.20)	44.4	40.7	1.16 (0.71 to 1.91)
I need more information about the COVID-19 vaccine	94.5	90.2	1.86 (0.86 to 4.33)	100.0	96.3	NA	92.9	85.2	2.25 (0.9962 to 5.40)
I trust the information I am receiving about the COVID-19 vaccine from public health experts	87.0	65.6	3.51 (2.09 to 6.08) [§]	67.6	33.3	4.12 (1.87 to 9.41) [§]	92.8	91.1	1.26 (0.51 to 3.21)
The only reason I will get a COVID-19 vaccine is if it is mandated by health systems/ school	14.7	31.6	0.38 (0.22 to 0.62) [§]	37.8	64.8	0.33 (0.15 to 0.72) [§]	7.9	5.2	1.57 (0.57 to 4.51)

* MS: Medical students. † DS: Dental students. ‡ OR: Odds ratio. § Statistically significant, $P < .05$ ¶ HCP: Health care providers. # NA: Not applicable.

In those who reported they were willing to receive the COVID-19 vaccine, results of bivariate analyses show that MS were more likely than DS to report that COVID-19 vaccination should be mandatory for HCPs and concern that a COVID-19 vaccine may not be effective ($P < .05$). MS were less likely to personally know someone who had COVID-19 ($P < .05$). No state effect was observed because the responses of the Michigan DS mirrored those of the DS in the other states. In addition, no associations were found between Michigan MS and DS.

Table 1. Continued

SURVEY ITEM	OVERALL			VACCINE-HESITANT STUDENTS			VACCINE-ACCEPTING STUDENTS		
	Participants Who Responded Affirmatively (Agree/Strongly Agree), %		OR* (95% CI)	Participants Who Responded Affirmatively (Agree/Strongly Agree), %		OR (95% CI)	Participants Who Responded Affirmatively (Agree/Strongly Agree), %		OR (95% CI)
	MS* (n = 163)	DS† (n = 245)		MS (n = 37)	DS (n = 108)		MS (n = 126)	DS (n = 135)	
Experience With COVID-19									
I had COVID-19 infection	3.1	10.6	0.27 (0.08 to 0.73) [§]	2.7	17.0	0.14 (0.003 to 0.93) [§]	3.2	5.4	0.57 (0.12 to 2.32)
I personally know someone who has had COVID-19 infection	75.5	89.8	0.35 (0.20 to 0.60) [§]	70.3	92.4	0.20 (0.07 to 0.54) [§]	77.0	87.6	0.48 (0.24 to 0.92) [§]
I personally know someone who has died from COVID-19 infection	20.9	24.6	0.81 (0.50 to 1.31)	16.2	24.5	0.60 (0.21 to 1.55)	22.2	24.8	0.87 (0.48 to 1.55)
Personal Vaccination Behavior									
As an adult, have you ever delayed getting a vaccine for reasons other than illness or allergy?	24.1	21.6	1.15 (0.71 to 1.85)	33.3	30.2	1.16 (0.50 to 2.59)	21.4	14.7	1.58 (0.83 to 3.05)
As an adult, have you ever decided not to get a vaccine for reasons other than illness or allergy?	11.1	23.3	0.41 (0.23 to 0.73) [§]	13.9	40.6	0.24 (0.07 to 0.69) [§]	10.3	9.3	1.12 (0.48 to 2.61)
Do you plan on getting a flu vaccine this flu season (2020-2021)?	100.0	72.5	NA	100.0	52.8	NA	100.0	88.4	NA

In logistic regression analyses, after controlling for demographic variables, experience with COVID-19, and personal vaccination behaviors, those who thought the COVID-19 vaccine was important to them as HCPs, trusted COVID-19 information received from public health experts, and thought the COVID-19 vaccination should be mandatory for the general public were statistically significantly more likely to report willingness to get the COVID-19 vaccine ($P < .01$). Those concerned about serious adverse effects from a COVID-19 vaccine and reported willingness to get a COVID-19 vaccine only if it is mandated by the health systems or school were less likely to report willingness to get the COVID-19 vaccine on approval from the US Food and Drug Administration ($P < .0001$) (Table 2). Being an MS or DS was no longer predictive of willingness to get the COVID-19 vaccine. However, underrepresented minority students were 2.7 times more likely to report willingness to get the COVID-19 vaccine than White students (95% CI, 1.03 to 7.26).

In modeling whether the COVID-19 vaccination should be mandatory for all HCPs (Table 2), MS, those willing to receive the COVID-19 vaccination, and those who trusted COVID-19 information received from public health experts were more likely to agree or strongly agree that the COVID-19 vaccination should be mandatory for all HCPs ($P < .001$). Those concerned about serious adverse effects from a COVID-19 vaccine and who reported previously having decided not to get a vaccine for reasons other than illness or allergy were less likely to report vaccination should be mandatory for all HCPs ($P < .05$).

Themes identified in the comments reflected concerns about vaccine safety and efficacy, rapid development and implementation, trust in regulatory agencies, politicization, and resources and education for the public among both groups. Some DS comments minimized the severity of COVID-19 illness and more anti-COVID-19 vaccine comments were noted in this group than in the MS group (Table 3).

DISCUSSION

It has been hoped that vaccine acceptance from HCPs will enhance vaccine uptake by the public, as research has shown that patients are more likely to accept vaccination when they receive a strong recommendation from their HCP.⁶ Dentists were prioritized for vaccination because they account

Table 2. Logistic regression analyses and models.

SURVEY ITEM	PARTICIPANTS WHO RESPONDED AFFIRMATIVELY (AGREE/STRONGLY AGREE), ODDS RATIO (95% CI)	
	Willing to Receive a COVID-19 Vaccine When FDA*-Approved	COVID-19 Vaccine Should Be Mandatory for Health Care Providers
Demographic Characteristics		
Profession, medical student	NS [§]	3.67 (1.78 to 7.56) [†]
Sex, male	NS	NS
Race [§]		
Underrepresented minorities	2.73 (1.03 to 7.26) [†]	NS
Other	NS	NS
Student status, clinical	NS	NS
General Attitudes Toward Vaccine		
People get more vaccines than are good for them	NS	NS
COVID-19 Vaccine, General Opinions		
COVID-19 vaccination should be mandatory for the general public	3.13 (1.53 to 6.44) [†]	NA**
Personal Views, COVID-19, and Vaccine		
COVID-19 vaccination is important for me as a health care provider	12.77 (2.33 to 69.90) [†]	NA
I will take the COVID-19 vaccine as soon as an FDA-approved vaccine is available	NA	4.73 (2.21 to 10.14) [†]
I am concerned that a COVID-19 vaccine may not be effective	NS	NS
I am concerned about serious adverse effects from a COVID-19 vaccine	0.09 (0.03 to 0.22) [†]	0.38 (0.17 to 0.83) [†]
I trust the information I am receiving about the COVID-19 vaccine from public health experts	4.54 (2.00 to 10.32) [†]	6.43 (3.10 to 13.34) [†]
The only reason I will get a COVID-19 vaccine is if it is mandated by health systems/medical school	0.09 (0.04 to 0.20) [†]	NS
Experience With COVID-19		
I had COVID-19 infection	NS	NS
I personally know someone who has had COVID-19 infection	NS	NS
Personal Vaccination Behavior		
As an adult have you ever decided not to get a vaccine for reasons other than illness or allergy?	NS	0.35 (0.16 to 0.80) [†]

* FDA: US Food and Drug Administration. † NS: Not significant. ‡ P < .05. § Reference group: White. ¶ NA: Not applicable.

for one of the groups of HCPs most susceptible to this disease. The close proximity of the practitioner to the patient during a dental visit and the length of the visit, as well as the established evidence of transmission of virus through aerosols and droplets, make dentists fall into the high-risk category for potential exposure to the SARS-CoV-2 virus.^{2,7} In addition, some states have authorized dentists to administer the vaccines to their patients.⁸ These factors highlight the significance of dentists not only accepting COVID-19 vaccination, but also serving as advocates for the vaccines to their patients.

In our study, several differences have become apparent after comparing the attitudes and perceptions of MS and DS about the COVID-19 vaccines. Despite an almost universal personal belief of both groups of students that they would be exposed to COVID-19, more than 4 of every 10 DS compared with 2 of every 10 MS were hesitant to receive a COVID-19 vaccine. To our knowledge, there are no previous studies that have evaluated COVID-19 perceptions in these 2 groups of HCP students.

Table 3. Comments provided by medical and dental students.

THEME	REPRESENTATIVE QUOTES	
	Medical Students	Dental Students
Personal Concern About Vaccine Safety and Efficacy	<p>“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.”</p> <p>“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 affect people if at all.”</p>	<p>“I still don’t feel it is safe, as there has not been time to study the side effects, and possible complications of getting inoculated with it.”</p> <p>“Since it is the first mRNA* vaccine, I along with many others are less likely to get it because of this reason. I need more information on how the mRNA vaccine works.”</p> <p>“Personally, I would only take this particular vaccine after the first phase of patients take it and the second, third or even fourth batch is on the market. Under no circumstances am I going to take the first batch.”</p>
Rapid Development and Implementation of Vaccine	<p>“I think it is important to not release a vaccine before it has been thoroughly vetted and tested for both efficacy and safety.”</p> <p>“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.”</p> <p>“Furthermore, reading about how some vaccine trials skipped certain phases of testing makes me feel uncomfortable with taking the vaccine immediately after FDA† approval.”</p>	<p>“There is no way I would trust a vaccine that took only 6 months to make.”</p> <p>“I feel that due to the pandemic the COVID vaccine has been developed in a rush, and even when health specialists are recommending the vaccine, I still don’t feel it is safe.”</p> <p>“Past educational experience has taught me that it takes years or decades for new vaccines or medications to go through many failed attempts and trials to even get to the clinical trial stage and with the talk of a COVID vaccine already in clinical trials and possibly soon to be offered to the public makes me very skeptical.”</p>
Politicization	<p>“Many people don’t trust the CDC‡ and the FDA because President Trump might be pressuring these institutions to rush out a vaccine for his own political gain.”</p> <p>“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.”</p>	<p>“NO WAY DO I SUPPORT MANDATING A CHINESE VIRUS VACCINE.”</p> <p>“The public control by government regulations has been absolutely ridiculous.”</p> <p>“How is it 2 days after they declare Biden as new president he saves the day with vaccine announcements?”</p> <p>“The vaccine should be encouraged, but cannot be made mandatory. This would be a major breach of citizens’ rights and an overreach of government.”</p>
Trust in Regulatory Agencies	<p>“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.”</p>	<p>“The school or the CDC or any other reputable source could send information to health care professionals concerning the vaccine and the virus that contained peer-reviewed papers and studies with the most up-to-date news on this devoid of political agenda or rumors.”</p>
Education for Public	<p>“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.”</p> <p>“I think this knowledge needs to get out there to the general public and students, that speedy science doesn’t equal bad science. Once we understand this we can educate patients.”</p>	<p>“I believe if questions are answered with legitimate and persuasive facts then people will be more accepting of this vaccine.”</p> <p>“Get a clear idea of potential risks and benefits, inform the public on both and probability of each.”</p> <p>“Accessibility is huge—the easier it is to get the vaccines the more people will get them.”</p>
Anti-COVID-19 Vaccine	<p>“Take advice from other medical professionals who have different experiences with treating COVID patients in the US and other COVID diseases around the world to get a better understanding of treatments other than the vaccine.”</p>	<p>“I will NOT get a COVID-19 vaccine for ANY REASON!”</p> <p>“We are young and healthy and it is a violation of our rights to be demanded to take a vaccine that is largely untested and effects largely unknown. I will not take the vaccine no matter what the school decides to mandate.”</p> <p>“There is such a risk forcing people to take a vaccine for a virus that has a 96% survival rate”</p>
Minimization of Severity of COVID-19 Infection	Not applicable	<p>“My age demographic is not at risk. All my friends who had it said it was like having a cold and now they are fine with no residual effects.”</p> <p>“COVID in healthy individuals does not possess a risk of death (just like with the flu or influenza). A healthy individual’s immune system is capable of getting rid of the virus. Getting the disease does not put you at risk of having long-term disorders, disability or death.”</p> <p>“COVID-19 is not much more serious than the common cold or flu viruses.”</p>

* mRNA: Messenger RNA. † FDA: US Food and Drug Administration. ‡ CDC: Centers for Disease Control and Prevention.

There might be several factors playing a role in the lower acceptance of the vaccines among DS. It is possible that there is a perception among DS students that they would not likely be taking care of patients who were SARS-CoV-2 positive or that the infection control procedures in place are

sufficient to protect them from acquiring the virus from a patient. Dror and colleagues⁹ reported a similar finding that Israeli health care staff members involved in the care of COVID-19—positive patients and people considering themselves at risk of being infected with the disease were more likely to self-report acquiescence to COVID-19 vaccination. In contrast, Dror and colleagues⁹ also reported that parents, nurses, and medical workers not caring for SARS-CoV-2—positive patients expressed higher levels of vaccine hesitancy. Similarly, discrepancies among professions were noted in a study of French HCPs' intentions to get vaccinated against COVID-19, with physicians and pharmacists most inclined to get vaccinated compared with other hospital workers.¹⁰

Although the MS in our study were not directly involved in the care of COVID-19 patients owing to pandemic restrictions, it is possible that COVID-19 vaccination acceptance rates were higher because they identify with residents and physicians actively involved in the care of patients critically ill with COVID-19. Education about vaccines can also play a role in the higher observed acceptance in MS compared with DS, because vaccine education is incorporated into the curricula throughout the continuum from medical school to residency, and dental school curricula do not have a similar focus.

Vaccine acceptance in DS appears to be closer to that of the general US population. A Pew Research Center survey conducted approximately the same time that DS completed our survey found that 60% of people in the United States would definitely or probably get a vaccine for the coronavirus.¹¹

MS were more likely to be concerned that a COVID-19 vaccine may not be effective. This finding might be reflective of the fact that the MS were surveyed earlier in the course of vaccine development, when data about vaccine efficacy were not yet available. In spite of this finding, MS were more accepting of the vaccines, felt more strongly about the importance of the COVID-19 vaccines to HCPs and the need for it to be mandatory for HCPs, and were better advocates for vaccination of the general public. MS were also more likely to volunteer for a vaccine trial.

More DS reported a personal experience with COVID-19 infection, either from having had the illness themselves or personally knowing someone who had COVID-19. However, their comments about their personal experience with COVID-19 infection indicated that they thought COVID-19 was a trivial illness with a quick recovery and absence of long-term sequelae. Furthermore, several DS felt that younger, healthy people like themselves are at lower risk of acquiring severe COVID-19 infection and this might have affected their views on COVID-19 vaccination. In a 2012 study, Betsch and Wicker¹² found that risk perception in MS was a central predictor of intention to vaccinate and preventive health behaviors.

Underrepresented minority students were more likely to accept the vaccines, contrary to what has been in the news about the general US population and has been the historical trend with minority populations, particularly the Black population. However, in our sample, the larger proportion of underrepresented minority students were Hispanic (13.3%) and could have accounted for the difference in the results compared with that seen in the general public. Black students were only 2.5% of the sample.

Nearly one-half of DS and approximately one-quarter of MS were hesitant to receive the COVID-19 vaccine. These results highlight the need for a profession-specific curriculum designed to enhance student knowledge about the COVID-19 vaccines and teach them vaccine counseling. It is hoped that vaccinated students will share their experiences with their patients and encourage vaccine uptake. Medical schools need to expand their existing curricula relating to vaccine hesitancy and counseling and train future physicians to make strong vaccine recommendations and respond effectively to vaccine-hesitant people.

The 2020 American Dental Association House of Delegates passed Resolution 91H-2020 at its meeting in October 2020,¹³ and several states now support dentists administering vaccines, including the COVID-19 vaccines. However, before a dentist is allowed and willing to administer the vaccines to their patients, they should be knowledgeable about the vaccines and agree to receive the vaccine themselves. Our study's results indicate that DS do not meet these criteria. Because DS are future oral HCPs, training should be added to their curricula to improve their knowledge and attitudes and make them better advocates for vaccines, including the influenza vaccine, as has been reported in MS.¹⁴

Limitations

Our study has some limitations. First, as with any survey-based study, participants who did not respond might have been hesitant to be vaccinated, which can underestimate the true prevalence of vaccine hesitancy among this group of students. Data collection was done at a single medical school and 3 dental schools, so the differences seen might not be generalizable. The wide CIs for some of the variables could be considered a limitation of our study. Potential reasons for the wide CIs are sample size and lack of variability when the categories of strongly agree or agree and strongly disagree or disagree were collapsed. Survey respondents might have also been predominantly influenced by means of exposure to COVID-19 vaccine-related topics in the media and politics, as this was not a topic formally incorporated into the medical or dental curricula. The surveys were administered to the 2 groups of students more than 2 months apart (to MS in September and to DS in late November and early December), which could have biased findings, as results of the COVID-19 vaccine trials were being reported in the media and in the scientific literature. Although there was more vaccine information available, the DS were still more hesitant to receive the vaccine, suggesting that these are unbiased results. Finally, intentions are not the same as behavior, so we cannot predict whether those who indicated they would receive the vaccine will actually follow through.

CONCLUSIONS

In general, one of the strongest correlates of vaccine acceptability among patients is a recommendation from an HCP. There is an urgent need to get all health care students vaccinated to indicate their own confidence that the benefits of vaccination outweigh the risks. As Schaffer DeRoo and colleagues¹⁵ pointed out, HCPs should be taught how to make a strong vaccine recommendation, including sharing their own personal experiences with the COVID-19 vaccination. Dentists can play a critical role in advocating for and providing vaccinations to their patients and thereby contributing to the achievement of widespread vaccine delivery to the public. ■

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