Addressing Persistent Vaccine Hesitancy in a Military Community Through a Physician-Led Intervention

Capt Joseph Glendening, USAF, MC; Capt Brant Bickford, USAF, MC*; Ronald Markert, PhD†; Capt Joseph Yuhas, USAF, MC*; Maj Andrew Berglund, USAF, MC*; Maj Devin Kelly, USAF, MC*; Lt Col Joshua Scott, USAF, MC*; Lt Col Kathryn Burtson, USAF, MC**

ABSTRACT

Introduction:

Following the identification of coronavirus disease 2019 (COVID-19) in China, the virus has spread rapidly around the world causing severe illness and death. Several vaccines were found to be safe and effective and made available first to those most at risk and then to the general public. Despite the safety and efficacy profiles, vaccine hesitancy remains a significant barrier to widespread immunity. Within the military community at Wright-Patterson Air Force Base, we provided multiple physician-led educational seminars to address vaccination concerns and decrease vaccine hesitancy.

Materials and Methods:

The authors presented a PowerPoint presentation of the available vaccinations, their safety data, and efficacy, followed by a town hall-style question-and-answer period where questions were presented from the previous submission, as well as real-time submissions through Facebook Live. The questions were fielded by specialists in Internal Medicine, Infectious Disease, Pulmonary-Critical Care, Obstetrics and Gynecology, and Rheumatology. The entire presentation was streamed through Facebook Live and was freely available. Following the presentation, an online survey was provided for willing participants to complete which included demographic data and addressed their previous and current attitudes toward COVID-19 vaccinations and their opinions on the presentation. Data from the survey were then analyzed through IBM SPSS Statistics 25.0 to find any associations or risk factors for hesitancy.

Results:

There were 73 respondents to the assessment, most of which were nonmedical. Of the 73, the majority (45) had already received a vaccine for COVID-19. Of those unvaccinated, 17 did not want a vaccination before or after the seminar. Two did change their mind about being receptive to vaccination, and one changed from receptive to hesitant. The only statistically significant risk factors for vaccine hesitancy were those with a moderate to great amount of trust in their health care provider compared to those with little to no trust (73% vs. 4%, $P < .001$).

Conclusions:

Our intervention was limited in its effectiveness to address vaccine hesitancy late in the pandemic, with our study limited by our small sample size. Regardless, it identified a peculiar discrepancy with those with the most trust in health care providers being the most likely to be vaccine-hesitant. This highlights the importance of the information that trusted health care providers are providing to their patients and may identify more effective routes to address vaccine hesitancy in the future.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) was first identified in the United States in January 2020, just over a month after the first cluster of symptomatic patients were identified in China. COVID-19 has since spread rapidly around the world with total confirmed cases reaching 221.6 million and deaths at 4.58 million as of early September 2021.[1,2] Several vaccines were produced, studied, and made available in nearly a year from the first reported cases. Despite this development of safe and effective vaccinations by several leading pharmaceutical and medical research companies, vaccine hesitancy has remained a major barrier to widespread population immunity. Released under Emergency Use Authorization, two messenger RNA vaccines (Pfizer-BioNTech and Moderna) were available in December 2020, and one viral-vector vaccine (Johnson & Johnson/Janssen) has been available since February 2021. After the vaccination of high-risk individuals early in 2021, most U.S. adults have had access to the vaccines at no cost. On August 23, 2021, the FDA fully approved the Pfizer-BioNTech messenger RNA vaccine. On August 24, 2021, the Secretary of Defense mandated full vaccination of all members of the Armed Forces under DoD authority on active duty or in the Ready Reserve, including the National

*USAF Internal Medicine, Wright-Patterson Medical Center, WPAFB, OH 45433, USA

†Department of Internal Medicine, Wright State University, Dayton, OH 45409, USA

The views expressed are solely those of the authors and do not reflect the official policy or position of the U.S. Army, U.S. Navy, U.S. Air Force, the DoD, or the U.S. Government.

doi:https://doi.org/10.1093/milmed/usac176

Guard. When the vaccines became available, multiple town hall seminars to address vaccine concerns and myths were hosted at Wright-Patterson Air Force Base (WPAFB). Previously, Li et al. presented survey data regarding vaccination acceptance and hesitancy at WPAFB.[3] With COVID-19 vaccination mandatory, the authors surveyed participants at a physician-led question-and-answer (Q&A) seminar with the goals of addressing vaccine hesitancy and improving vaccination rates among Air Force personnel in the future.

METHODS

Intervention

Nine informational seminars were given early in 2021 during the initial COVID-19 vaccination rollout to provide facts about the new vaccines. Approximately 6 months later, a follow-up seminar addressed concerns from those still resistant to receiving a COVID-19 vaccination despite the available information and previous seminars. This final seminar was presented online via Facebook Live through the 88th Airbase Wing. The seminar began with a PowerPoint presentation that discussed the current impact of severe acute respiratory syndrome coronavirus 2, available vaccinations, and their known side effects, risks, and efficacy. This was followed by a live Q&A session led by physician specialists. Questions were obtained from submissions before the event, gathered real-time submissions through Facebook Live, and presented to the Q&A panel of military physicians from Internal Medicine, Infectious Disease, Obstetrics and Gynecology, Rheumatology, and Pulmonary and Critical Care. The seminar included 10 minutes dedicated to the PowerPoint presentation and 45 minutes for the Q&A session. Upon completing the Q&A session, participants were encouraged to complete a follow-up survey via a QR code and a web link.

Selection Criteria

The seminar was available for anyone to view online via Facebook including active duty, Ready Reserve, and civilian employees. The seminar was delivered during a dedicated time for essential training so that personnel would not have other obligations preventing participation. There were no exclusion criteria. Those who participated in a previous seminar and the subsequent survey were not given a personal identifier to track their responses.

Survey Content

Post-intervention responses were collected through a questionnaire via the online software SurveyMonkey®. Questions included the demographics of age and occupation as well as specific concerns, opinions, plans for COVID-19 vaccination, trust in health care providers, adequacy of the seminar in addressing concerns, and recommendation of COVID-19 vaccination to family or friends.

TABLE I. Age and Occupations of 73 Respondents

Demographics	
Age (years), mean ± SD	47 ± 12
Occupation	
Nonmedical	65 (89%)
Medical	8 (11%)
Physician	2
Nurse	2
Other	2
Advanced practice	1
Technician	1

Outcomes

The primary outcome was a change from resistant to receptive to vaccination following the seminar. Secondary outcomes were risk factors associated with hesitancy—age, occupation, and trust in health care professionals.[3]

Survey Administration

The survey was delivered through the SurveyMonkey® platform on an elective basis. At the end of the presentation, a web link and a QR code were provided as options for participants to complete the survey. The survey questions were used in prior WPAFB educational seminars.

Statistical Analysis

Mean and SD are reported for age, and counts and percentages for categorical variables. The chi-squared test was used to examine the relationship between two categorical variables. Inferences were made at the 0.05 level of significance with no corrections for multiple comparisons. IBM SPSS Statistics 25.0 (IBM, Armonk, NY, USA) was used for analyses.

RESULTS

Seventy-three participants responded to the survey. Table I shows that the mean age was 47 and that most attendees were nonmedical personnel (89%).

Primary Outcome

In total, 45 individuals had already received the vaccine, whereas 28 respondents had not. Table II shows that most of these 28 respondents did not want the vaccine both before and after the seminar (17 or 61%), whereas 8 (29%) wanted the vaccine both before and after the seminar. Consequently, three respondents had a change of mind following the seminar, two of whom changed from hesitant to receptive to the vaccine (7%) and one who changed from receptive to hesitant (4%).

Secondary Outcomes

Younger participants (≤30 years) and older participants (≥31 years) did not differ on vaccine hesitancy (25% vs. 23%, $P = 1.00$) nor did medical and nonmedical occupations

TABLE II. Post-Seminar COVID-19 Vaccine Opinion

Which of the following best describes your current opinion regarding COVID vaccination now compared to before completing the seminar?	*N* (%)
Received COVID vaccine before seminar	45 (61.6)
Did not receive COVID vaccine before seminar	28 (38.4)
Did not want vaccine both before and after seminar	17 (60.7)
Wanted vaccine both before and after seminar	8 (28.6)
Changed from not wanting to wanting vaccine	2 (7.1)
Changed from wanting to not wanting vaccine	1 (3.6)

TABLE III. Risk Factors for COVID-19 Vaccine Hesitancy

Hesitancy risk factors	Hesitancy/total (%)	*P*[a]
Age (years)		1.00
30 or younger	2/8 (25.0%)	
31 or older	15/64 (23.4%)	
Occupation		.65
Medical	3/8 (37.5)	
Nonmedical	15/65 (23.1)	
Trust in health care provider		<.001
None or little	2/51 (3.9)	
Moderate to great amount	16/22 (72.7)	

[a]Chi-squared test.

(38% vs. 23%, $P = .65$), as shown in Table III. Those with a moderate to great amount of trust in their health care provider were more likely to be hesitant than those with none or little trust in their provider (73% vs. 4%, $P < .001$).

DISCUSSION

We found that of the 28 seminar participants who had not received the COVID-19 vaccination, only three changed their opinion, two from hesitant to receptive (7%) and one from receptive to hesitant (4%). The other 25 participants did not change their opinion, 17 remaining receptive and 8 remaining hesitant. In contrast, Li et al. reported a 36% change from hesitant to receptive.[3] We followed a similar presentation structure and used identical survey questions as Li et al. Their notably higher hesitant-to-receptive rate may be largely attributable to the seminars occurring close to the first availability of the vaccines when many seminar participants had less authoritative information and were in the incipient stage of formulating a decision on vaccination. Our seminar was conducted well after expert information was available in many modalities and participants had a number of months in which to solidify their perspective on vaccination.

Although age ($\leq$30 years vs. $\geq$31 years) and occupation (medical vs. nonmedical) were not associated with hesitancy, counterintuitively, participants with a moderate to great amount of trust in health care providers were much more likely to be hesitant than those with none or little trust (73% vs. 4%). This finding contradicts what would be expected and raises the question to what is driving this. The sample size of our brief study is quite small and although it could be chance, it may be that further data on what information participants are receiving from trusted health care providers would shed light on why this apparent discrepancy arose. Future studies evaluating vaccine hesitancy should also include questioning what information vaccine-hesitant individuals are hearing from their trusted providers. Regardless, it does highlight the need for accurate and meaningful data to come from a trusted source. It would also be beneficial to see if there were any differences in responses of subjects who were recently mandated vs. not, which could be assessed via adding demographics questioning such as active duty, reserves, guard, or civilian.

Prior research found other risk factors for COVID vaccination hesitancy—age, income, educational attainment, health literacy, rurality, and parental status.[4] Other reasons for COVID vaccine hesitancy have included a general stance against vaccines, lack of trust, concern about the speed of vaccine production, perception of disease severity, susceptibility to a given disease, and safety and effectiveness of vaccines.[5,6] The landscape of vaccine hesitancy is quickly evolving. The WHO has created the Increasing Vaccination Model, which relies heavily on patient motivation to increase vaccination rates.[7] "Trusted messengers" are community members such as pastors, government officials, and other acknowledged leaders who can engage with residents and create lasting relationships with harder-to-reach groups, especially populations resistant to vaccination because of race, religion, or locality.[7,8]

The persistently hesitant military community is a subset of the general population that includes a chain of command and special customs and courtesies. This community may be open to information from their own physicians with whom they have a trusted relationship. Lastly, social media has played a role in the spread of misinformation as content threads can be isolating, perpetuate false information, and facilitate ideological isolation.[9,10] Social media can be used to provide articles with the "Reviewed Content" status by medical experts and links to discussion of the current facts from reputable sources.[10]

Our study had two notable limitations. First, the study was conducted at a single institution, a military facility. Consequently, generalizability to other settings should be done with caution. Second, the total and subgroup sample sizes were small. Consequently, estimates were less precise than with larger numbers. For example, the 7.1% estimate for changing from hesitant to receptive (2 of 28) has a 95% CI of 0.1%-23.5%. Additionally, small sample sizes resulted in what were perhaps meaningful differences between groups not being statistically significant. For example, 38% of medical participants were hesitant vs. 23% of nonmedical participants. This 15% difference may be a substantive difference in practical terms, but one that we cannot claim was not attributable to chance. Other possible limitations include timing of the

intervention, which may have resulted in the majority of responders being already vaccinated. Increasing the power, along with collecting the above discussed mandate status, information received from trusted providers, and using unique identifiers to track responders through the course of the several seminars would likely clarify the validity of the findings and resolve several of the discussed limitations. Although this is impossible to add to our brief study in retrospect, these should be considered when designing further surveys to better understand vaccine hesitancy.

Vaccine hesitancy is a barrier to COVID-19 immunity and military readiness that can be overcome with a multifaceted and individualized approach. Physician-led Q&A seminars may be beneficial in the early phases of new vaccines and therapeutics to dispel myths and misconceptions. However, as time progresses, those who remain hesitant to vaccinations or treatments may need more tailored approaches given the range of risk factors and concerns associated with hesitancy.

ACKNOWLEDGMENT

None declared.

FUNDING

None declared.

CONFLICT OF INTEREST STATEMENT

None declared.

REFERENCES

1. Center for Disease Control and Prevention: CDC museum COVID-19 timeline. 2021. Centers for Disease Control and Prevention. Available at https://www.cdc.gov/museum/timeline/covid19.html; accessed December 3, 2021.
2. WHO: WHO coronavirus (COVID-19) dashboard. 2021. World Health Organization. Available at https://covid19.who.int/; accessed December 3, 2021
3. Li PC, Theis SR, Kelly D, et al: Impact of an Education Intervention on COVID-19 Vaccine Hesitancy in a Military Base Population. Mil Med 2021; usab363. 10.1093/milmed/usab363.
4. Hudson A, Montelpare WJ: Predictors of vaccine hesitancy: implications for COVID-19 public health messaging. Int J Environ Res Public Health 2021; 18(15): 8054.
5. Troiano G, Nardi A: Vaccine hesitancy in the era of COVID-19. Public Health 2021; 194: 245–51. 10.1016/j.puhe.2021.02.025.
6. Salmon DA, Dudley MZ, Glanz JM, Omer SB: Vaccine hesitancy causes, consequences, and a call to action. Am J Prev Med 2015; 49(6): 391–8.
7. National Academies of Sciences, Engineering, and Medicine, Health and Medicine Division, Board on Population Health and Public Health Practice, Board on Health Sciences Policy, Committee on Equitable Allocation of Vaccine for the Novel Coronavirus: Achieving acceptance of COVID-19 vaccine. 2020. Framework for Equitable Allocation of COVID-19 Vaccine. Available at https://www.ncbi.nlm.nih.gov/books/NBK564098/; accessed December 3, 2021.
8. Privor-Dumm L, King T: Community-based strategies to engage pastors can help address vaccine hesitancy and health disparities in black communities. J Health Commun 2020; 25(10): 827–30.
9. Puri N, Coomes EA, Haghbayan H, Gunaratne K: Social Media and vaccine hesitancy: New updates for the era of COVID-19 and globalized infectious diseases. Hum Vaccin Immunother 2020; 16(11): 2586–93.
10. Trethewey SP: Strategies to combat medical misinformation on social media. Postgrad Med J 2020; 96(1131): 4–6.