


# Patients' Perspectives on Emergency Department COVID-19 Vaccination and Vaccination Messaging Through Randomized Vignettes

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## Abstract

**Objectives:** Emergency departments (EDs) could play an important role in the COVID-19 pandemic response by reaching patients who would otherwise not seek vaccination in the community. Prior to expanding COVID-19 vaccination to the acute care setting, we assessed ED patients' COVID-19 vaccine status, perspectives, and hypothetical receptivity to ED-based vaccination.

**Methods:** From January 11 through March 31, 2021, we conducted a multisite (Albany Medical Center, Boston Medical Center, Buffalo General Hospital, University of Cincinnati Medical Center, and Upstate Medical Center), cross-sectional survey of ED patients, with embedded randomization for participants to receive 1 of 4 vignette vaccination messages (simple opt-in message, recommendation by the hospital, community-oriented message, and acknowledgment of vaccine hesitancy). Main outcomes included COVID-19 vaccination status, prior intention to be vaccinated, and receptivity to randomized hypothetical vignette messages.

**Results:** Of 610 participants, 122 (20.0%) were vaccinated, 234 (38.4%) had prior intent to be vaccinated, 111 (18.2%) were unsure as to prior intent, and 143 (23.4%) had no prior intent to be vaccinated. Vaccine hesitancy (participants who were vaccine unsure or did not intend to receive the vaccine) was associated with the following: age <45 years, female, non-Hispanic Black, no primary health care, and no prior influenza vaccination. Overall, 364 of 565 (64.4%; 95% CI, 60.3%-68.4%) were willing to accept a hypothetical vaccination in the ED. Among participants with prior vaccine hesitancy, a simple opt-in message resulted in the highest acceptance rates to hypothetical vaccination (39.7%; 95% CI, 27.6%-52.8%).

**Conclusions:** EDs have appropriate patient populations to initiate COVID-19 vaccination programs as a supplement to community efforts. A simple opt-in approach may offer the best messaging to reach vaccine-hesitant ED patients.

## Keywords

emergency department, preventive intervention, vaccination, COVID-19, vaccine hesitancy

As the United States expands COVID-19 vaccination, large numbers of people with barriers and hesitancy to receiving vaccination remain in the community. One of the best options to provide vaccination to such individuals would be capitalizing on encounters with health or social services that are already occurring for other reasons.

The emergency department (ED) is a unique setting that is widely recognized for broad access to all populations, including hidden and disadvantaged populations that have known

risk factors for health disparities, such as people who have substance use disorder or a mental illness, do not have a primary care provider or health insurance, are experiencing homelessness, live in rural areas, or are from certain racial and ethnic groups (eg, Black or Hispanic/Latino people).<sup>1,2</sup> Accordingly, the ED has a long history of administering preventive interventions such as screening for HIV,<sup>3-5</sup> hepatitis C virus,<sup>6,7</sup> and alcohol and drug misuse.<sup>8</sup> This combination of patient population along with successful models of

preventive interventions has led to the proposal of ED-based COVID-19 vaccination as a means to vaccinate members of populations at risk of experiencing health disparities.<sup>9</sup>

The limited published literature on patient perspectives on ED-based COVID-19 vaccination is thus far positive. Two prior ED surveys revealed that the ED might serve a substantial portion of patients who have hesitancy or barriers to vaccination elsewhere and that most ED patients are accepting of vaccination.<sup>10,11</sup> One other observational study reported on a successful experience delivering vaccinations to populations at disproportionate risk of poor outcomes from COVID-19 in an ED.<sup>12</sup> Despite these initial encouraging reports, gaps in knowledge remain in understanding ED patients' perspectives and willingness to accept vaccination according to their prior degree of vaccine hesitancy and in elucidating the optimal messaging to offer vaccinations in clinical settings.

This study aimed to determine ED patients' COVID-19 vaccination status, prior intention to be vaccinated, sociodemographic predictors of prior vaccine intention, and patient receptivity to a hypothetical vaccine when offered in the ED via 4 randomized vignette messages.

## Methods

### Study Design and Setting

This study was a cross-sectional survey of randomly selected ED patients from January 11 through March 3, 2021, at academic medical centers in 5 US cities (Albany, New York; Boston, Massachusetts; Buffalo, New York; Cincinnati, Ohio; and Syracuse, New York). We queried participants on COVID-19 vaccine status and prior intention for vaccination, and we randomized participants to 1 of 4 vignette messages offering a hypothetical COVID-19 vaccination in the ED. The institutional review board of each participating site (Albany Medical Center, Boston Medical Center, Buffalo General Hospital, University of Cincinnati Medical Center, and SUNY Upstate University Hospital) either considered the research exempt or approved the research study.

### Patient Selection and Recruitment

Participating sites were purposefully selected to include racial and rural/urban diversity and were recruited through outreach through 2 emergency medicine research networks (Emergency Medicine Transmissible Infectious Diseases and Epidemics

Interest Group and the Emergency Research Network in the Empire State).

Adult patients aged  $\geq 18$  years were randomly selected from EDs in each of the 5 study sites. Each site performed random sampling of ED patients using the time refreshed electronic tracker sampling technique, previously validated to yield a representative consecutive ED sample.<sup>13</sup> In this technique, the research assistant refreshes and sorts the electronic health record tracker by length of stay, including only patients in the ED with lengths of stay between 1 and 4 hours. The research assistant then selects the next potential participant via a data point that is unrelated to any patient characteristic and is randomly generated with each refresh of the electronic health record tracker (in this case, length of stay in the ED). Each successive patient then is excluded from the study, declines to participate, or participates in the study (Figure).

Potential participants were excluded if they were incarcerated, had limited English proficiency, were unable to complete the survey, were critically ill, or had other clinical circumstances limiting study involvement. Four study sites did not approach patients if they were identified as being acutely infected or under investigation for COVID-19.

### Survey Development

To determine receptivity to a hypothetical COVID-19 vaccine in the ED, participants were randomized to receive 1 of 4 vignette messages. Because standardized language to approach patients for COVID-19 vaccination in clinical settings does not yet exist, COVID-19 vaccination messages for the vignettes were created by members of the study team, including an emergency medicine physician/researcher with experience in opt-in and opt-out ED HIV screening, a survey methodologist, a mixed-methods researcher, and an anthropologist. The messages were intended to start with a simple opt-in message (adapted from prior experience with opt-in ED HIV screening)<sup>14,15</sup> and to have increasing strength of messaging in the next 2 messages. The final message was intended to portray empathy with the safety concerns.

Vignettes were delivered to patients using trained research personnel and standardized scripts:

1. Simple opt-in message: Here at X Medical Center, we offer the vaccine to all patients. Would you like one now?

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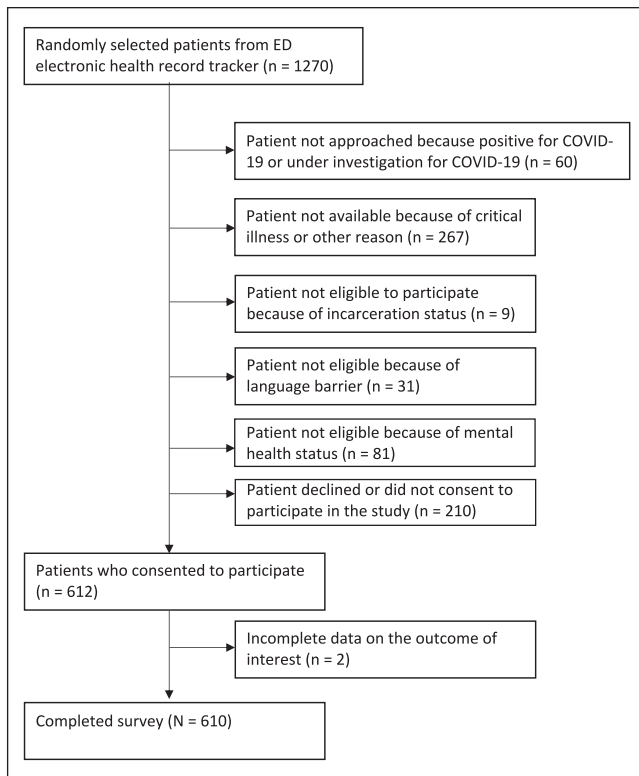
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**Figure.** Recruitment of emergency department (ED) patients to a study on COVID-19 vaccination status, perspectives, and hypothetical receptivity to ED-based COVID-19 vaccination at academic medical centers in 5 US cities, January 11–March 31, 2021. The medical centers were Albany Medical Center, Boston Medical Center, Buffalo General Hospital, University of Cincinnati Medical Center, and Upstate Medical Center.

2. Recommendation by the hospital: Here at X Medical Center, we recommend that all of our patients stay protected against COVID-19 by getting a vaccine. Can we give you a COVID-19 vaccine here today?
3. Strong, community-oriented message: Here at X Medical Center, our philosophy is that the COVID-19 vaccine helps keep yourself safe, your family safe, and your community safe. If you haven't already gotten one, we want to give you one today. Can we give you a COVID-19 vaccine here today?
4. Acknowledgment of vaccine hesitancy: Here at X Medical Center, we understand that some patients are skeptical of the COVID-19 vaccine. But our doctors believe that the vaccine is very safe and very effective. We recommend that we give it to all of our patients today. Can we give you a COVID-19 vaccine here today?

The survey data included self-reported demographic characteristics (age, sex, racial and ethnic identity, education, and area of residence [rural/suburban/urban]), whether the patient had a primary care provider, COVID-19 vaccine

status, prior intention to receive vaccine, influenza vaccination history, and responses to the vignette questions.

## Data Analysis

We determined sample size by considering the capacity of each study site to enroll within the study period, with at least 100 participants enrolled from each study site. The main outcomes of interest were (1) prior intention to seek vaccination and (2) acceptance of a hypothetical vaccine offered in the ED under the 4 vignette messages.

We categorized participants with prior intention to seek vaccination as *vaccine intent*, which included participants who were already vaccinated and participants who intended to seek vaccination. We categorized participants who were unsure about their intention to vaccinate as *vaccine unsure* and those who had no intention to be vaccinated as *vaccine nonintent*. We defined an additional designation of *vaccine hesitant* as *vaccine unsure* and *vaccine nonintent*. We estimated the association of influenza vaccination history (univariate) and other patient characteristics (multivariate) on the outcomes of *vaccine hesitant* versus *vaccine intent* using univariate and multivariate binomial logistic regression models with resulting odds ratios (ORs). Multinomial logistic regression models with resulting relative risk ratios (RRRs) estimated the associations on the outcomes of *vaccine unsure* versus *vaccine intent* and *vaccine nonintent* versus *vaccine intent*. We modeled both the natural log [ $\Pr(\text{Unsure})/\Pr(\text{Intent})$ ] and natural log [ $\Pr(\text{Nonintent})/\Pr(\text{Intent})$ ] as a function of participant characteristics, with  $P < .05$  considered significant. We conducted all analyses using SPSS version 27.0 (IBM Corp).

We compared the proportion of participants who accepted the hypothetical ED vaccination offer under the 4 vignette messages by calculating the difference in acceptance rates compared with a reference of a simple opt-in message, with 95% CIs and  $p$  values. We performed a post hoc subgroup analysis that compared acceptance rates among participants in each prior vaccine intent group.

## Results

### Study Flow and Population

Of the 1270 patients randomly identified, 822 (64.7%) were eligible to participate in the study. Of these 822 eligible participants, 610 (74.2%) completed the survey (Figure). Because of an early survey programming error, 43 participants were excluded from the vignette analysis but included in all other analyses. Of the 610 participants, 335 (54.9%) were aged  $\geq 45$  years, 321 (52.6%) identified as female, 203 (33.3%) identified as Black or African American (including 6 participants who identified as Black Hispanic), 67 (11.0%) identified as other race, and 340 (55.7%) identified as White

**Table 1.** Demographic characteristics of emergency department study participants by intent to be vaccinated for COVID-19 at academic medical centers located in 5 US cities, January 11–March 3, 2021

Characteristic	Intent to be vaccinated, no. (%)				Total (N = 610)
	Vaccine intent		Vaccine hesitant		
	Received vaccine (n = 122)	Intend to receive vaccine (n = 234)	Vaccine unsure (n = 111)	Vaccine nonintent (n = 143)	
Age, y					
18-44	34 (27.9)	87 (37.2)	56 (50.5)	98 (68.5)	275 (45.1)
≥45	88 (72.1)	147 (62.8)	55 (49.5)	45 (31.5)	335 (54.9)
Sex					
Female	74 (60.7)	102 (43.6)	61 (55.0)	84 (58.7)	321 (52.6)
Male	48 (39.3)	132 (56.4)	50 (45.0)	59 (41.3)	289 (47.4)
Racial identity					
Black or African American	32 (26.2)	63 (26.9)	51 (45.9)	57 (39.9)	203 (33.3)
Other	15 (12.3)	26 (11.1)	10 (9.0)	16 (11.2)	67 (11.0)
White	75 (61.5)	145 (62.0)	50 (45.0)	70 (49.0)	340 (55.7)
Education					
≤High school	42 (34.4)	97 (41.5)	42 (37.8)	82 (57.3)	263 (43.1)
≥Some college	80 (65.6)	137 (58.5)	69 (62.2)	61 (42.7)	347 (56.9)
Area of residence					
Urban	62 (50.8)	127 (54.3)	63 (56.8)	82 (57.3)	334 (54.8)
Rural	14 (11.5)	30 (12.8)	11 (9.9)	26 (18.2)	81 (13.3)
Suburban	46 (37.7)	77 (32.9)	37 (33.3)	35 (24.5)	195 (32.0)
Has a primary care provider					
No	8 (6.6)	34 (14.5)	21 (18.9)	41 (28.7)	104 (17.0)
Yes	114 (93.4)	200 (85.5)	90 (81.1)	102 (71.3)	506 (83.0)
Prior receipt of annual influenza vaccination (n = 609 <sup>a</sup> )					
Never	15 (12.3)	44 (18.8)	38 (34.2)	77 (53.8)	174 (28.5)
Sometimes	14 (11.5)	52 (22.2)	32 (28.8)	28 (19.6)	126 (20.7)
Always	93 (76.2)	137 (58.5)	41 (36.9)	38 (26.6)	309 (50.7)
Site					
Albany, New York	31 (25.4)	30 (12.8)	21 (18.9)	23 (16.1)	105 (17.2)
Boston, Massachusetts	28 (23.0)	54 (23.1)	33 (29.7)	28 (19.6)	143 (23.4)
Buffalo, New York	21 (17.2)	51 (21.8)	12 (10.8)	16 (11.2)	100 (16.4)
Cincinnati, Ohio	19 (15.6)	33 (14.1)	18 (16.2)	32 (22.4)	102 (16.7)
Syracuse, New York	23 (18.9)	66 (28.2)	27 (24.3)	44 (30.8)	160 (26.2)

<sup>a</sup>One participant was missing data on prior receipt of annual influenza vaccination.

(including 5 participants who identified as White Hispanic; Table 1).

### Main Results

Of the 610 participants, 122 (20.0%) were vaccinated, 234 (38.4%) intended to be vaccinated, 111 (18.2%) were unsure as to whether they intended to be vaccinated (*vaccine unsure*), and 143 (23.4%) intended not to be vaccinated (*vaccine nonintent*; Table 1). We categorized 254 (41.6%) participants as *vaccine hesitant* (*vaccine unsure* plus *vaccine nonintent*). In the binomial multivariate analysis, participants who were aged 18-45 years (OR = 2.50; 95% CI, 1.74-3.60), identified as female (OR = 1.51; 95% CI, 1.05-2.16), identified as Black or

African American (OR = 2.59; 95% CI, 1.65-4.08), and had no primary care provider (OR = 2.19; 95% CI, 1.36-3.53) were more likely to be *vaccine hesitant* than *vaccine intent* (already vaccinated plus previously intended to be vaccinated; Table 2). In the multinomial multivariate analysis, participants who identified as Black or African American were more likely to be *vaccine unsure* than *vaccine intent* (RRR = 2.96; 95% CI, 1.68-5.22), and participants with ≤high school education (RRR = 2.05; 95% CI, 1.31-3.20) and those who lived in a rural area (RRR = 2.53; 95% CI, 1.28-5.00) were more likely to be *vaccine nonintent* than *vaccine intent*.

Of the 565 participants who completed the hypothetical vignettes, 364 (64.4%) were willing to receive the hypothetical vaccination in the ED (Table 3). Acceptance of the strong,

**Table 2.** Multivariate analyses of demographic characteristics predicting the intent to be vaccinated of emergency department patients at academic medical centers in 5 US cities, January 11–March 3, 2021

Characteristic	Vaccine hesitant (vaccine unsure + vaccine nonintent) vs vaccine intent, <sup>a,b</sup> OR (95% CI)	Vaccine unsure vs vaccine intent <sup>a,c</sup> RRR (95% CI)	Vaccine nonintent vs vaccine intent <sup>a,c</sup> RRR (95% CI)
Age, y			
18-44	2.50 (1.74-3.60)	1.57 (0.98-2.50)	3.75 (2.37-5.92)
≥45	1 [Reference]	1 [Reference]	1 [Reference]
Sex			
Female	1.51 (1.05-2.16)	1.32 (0.84-2.08)	1.75 (1.12-2.72)
Male	1 [Reference]	1 [Reference]	1 [Reference]
Racial identity			
Black or African American	2.59 (1.65-4.08)	2.96 (1.68-5.22)	2.30 (1.33-4.00)
Other	1.48 (0.81-2.72)	1.24 (0.55-2.80)	1.72 (0.82-3.62)
White	1 [Reference]	1 [Reference]	1 [Reference]
Education			
≤High school	1.37 (0.95-1.97)	0.86 (0.54-1.38)	2.05 (1.31-3.20)
≥Some college	1 [Reference]	1 [Reference]	1 [Reference]
Area of residence			
Urban	0.81 (0.52-1.26)	0.73 (0.42-1.27)	0.88 (0.51-1.54)
Rural	1.71 (0.97-3.01)	1.01 (0.46-2.22)	2.53 (1.28-5.00)
Suburban	1 [Reference]	1 [Reference]	1 [Reference]
Has a primary care provider			
No	2.19 (1.36-3.53)	1.76 (0.95-3.24)	2.55 (1.47-4.44)
Yes	1 [Reference]	1 [Reference]	1 [Reference]
Site			
Albany, New York	1.04 (0.61-1.78)	1.33 (0.68-2.61)	0.83 (0.43-1.61)
Boston, Massachusetts	0.65 (0.38-1.11)	0.96 (0.49-1.88)	0.45 (0.23-0.87)
Buffalo, New York	0.53 (0.30-0.96)	0.53 (0.24-1.16)	0.54 (0.26-1.11)
Cincinnati, Ohio	1.04 (0.59-1.83)	1.03 (0.49-2.16)	1.04 (0.53-2.01)
Syracuse, New York	1 [Reference]	1 [Reference]	1 [Reference]

Abbreviations: OR, odds ratio; RRR, relative risk ratio.

<sup>a</sup>Vaccine intent refers to participants who were vaccinated or who previously intended to be vaccinated. Vaccine unsure refers to participants who previously were unsure of their intention to be vaccinated. Vaccine nonintent refers to participants who previously did not intend to be vaccinated. Vaccine hesitant refers to vaccine unsure plus vaccine nonintent.

<sup>b</sup>According to the binomial logistic regression model.

<sup>c</sup>According to the multinomial logistic regression model.

community-oriented message (84 of 144, 58.3%) was lower than acceptance of the simple opt-in message (109 of 157, 69.4%), with a percentage-point difference between groups of −11.1 (95% CI, −21.9 to −0.3). We found no other significant differences in overall acceptance rates between the vignette messages. Of the 231 participants categorized as *vaccine hesitant*, 59 (25.5%) were willing to receive the hypothetical vaccination in the ED. In this subgroup analysis of *vaccine hesitant* participants, the strong, community-oriented message (12.5%) and the acknowledgment of vaccine hesitancy message (19.6%) had significantly lower acceptance rates than the simple opt-in message (39.7%).

## Discussion

Our study found that most ED patients in multiple US academic EDs expressed a willingness to be vaccinated in the

ED, with nearly 40% of participants who did not intend to seek vaccination in the community receptive to ED-based vaccination when offered via a simple opt-in message. These study findings suggest that EDs have appropriate patient populations to initiate COVID-19 vaccination programs as a supplement to community efforts.

We found that ED patients who identified as Black or African American versus White, had a high school education or less versus some college, and had no primary care provider versus had a primary care provider were more likely to be hesitant to vaccination, and rural residents were more likely than suburban residents to have no prior intent to be vaccinated. Our findings largely confirm the findings of population-based surveys identifying similar trends among people who remain unvaccinated and vulnerable to COVID-19<sup>16-20</sup> as well as the 2 previously published ED-based surveys.<sup>10,11</sup> Furthermore, our findings suggest that, as community vaccination campaigns

**Table 3.** Acceptance of a hypothetical vaccine using 4 randomized vignette messages<sup>a</sup> in the overall population and subgroup analyses of emergency department patients at academic medical centers in 5 US cities, January 11–March 3, 2021<sup>b</sup>

Message	No. <sup>c</sup>	Acceptance, % (95% CI)	Difference (95% CI)	P value <sup>d</sup>
<b>Overall</b>	364/565	64.4 (60.3 to 68.4)		
Simple opt-in message	109/157	69.4 (62.2 to 76.6)	1 [Reference]	
Recommended by the hospital message	95/140	67.9 (59.4 to 75.5)	-1.6 (-12.1 to 9.0)	.77
Strong, community-oriented message	84/144	58.3 (49.8 to 66.5)	-11.1 (-21.9 to -0.3)	.04
Acknowledgment of vaccine hesitancy message	76/124	61.3 (52.1 to 69.9)	-8.1 (-19.3 to 3.1)	.15
<b>Prevignette vaccine intent</b>				
Vaccine intent (previously vaccinated or intended to be vaccinated)	305/334	91.3 (87.8 to 94.1)		
Simple opt-in message	84/94	89.4 (83.1 to 95.6)	1 [Reference]	
Recommended by the hospital message	79/87	90.8 (82.7 to 95.9)	1.4 (-7.3 to 10.1)	.75
Strong, community-oriented message	76/80	95.0 (87.7 to 98.6)	5.6 (-2.2 to 13.5)	.16
Acknowledgment of vaccine hesitancy message	66/73	90.4 (81.2 to 96.1)	1.0 (-8.1 to 10.2)	.82
Vaccine unsure	43/105	41.0 (31.5 to 51.0)		
Simple opt-in message	15/30	50.0 (32.1 to 67.9)	1 [Reference]	
Recommended by the hospital message	15/27	55.6 (35.3 to 74.5)	5.6 (-20.4 to 31.5)	.67
Strong, community-oriented message	4/23	17.4 (5.0 to 38.8)	-32.6 (-56.3 to -8.9)	.007
Acknowledgment of vaccine hesitancy message	9/25	36.0 (18.0 to 57.5)	-14.0 (-40.0 to 12.0)	.29
Vaccine nonintent	16/126	12.7 (7.4 to 19.8)		
Simple opt-in message	10/33	30.3 (14.6 to 46.0)	1 [Reference]	
Recommended by the hospital message	1/26	3.8 (0.1 to 19.6)	-26.5 (-43.8 to -9.1)	.003
Strong, community-oriented message	4/41	9.8 (2.7 to 23.2)	-20.5 (-38.7 to -2.4)	.03
Acknowledgment of vaccine hesitancy message	1/26	3.8 (0.1 to 19.6)	-26.5 (-43.8 to -9.1)	.003
Vaccine hesitant (vaccine unsure and vaccine nonintent)	59/231	25.5 (20.0 to 31.7)		
Simple opt-in message	25/63	39.7 (27.6 to 52.8)	1 [Reference]	
Recommended by the hospital message	16/53	30.2 (18.3 to 44.3)	-9.5 (-26.8 to 7.8)	.28
Strong, community-oriented message	8/64	12.5 (5.6 to 23.2)	-27.2 (-41.7 to -12.6)	<.001
Acknowledgment of vaccine hesitancy message	10/51	19.6 (9.8 to 33.1)	-20.1 (-36.3 to -3.8)	.02

<sup>a</sup>Simple opt-in message: "Here at Albany Medical Center, we offer the vaccine to all patients. Would you like one now?" Recommendation by the hospital message: "Here at Albany Medical Center, we recommend that all of our patients stay protected against COVID-19 by getting a vaccine. Can we give you a COVID-19 vaccine here today?" Strong, community-oriented message: "Here at Albany Medical Center, our philosophy is that the COVID-19 vaccine helps keep yourself safe, your family safe, and your community safe. If you haven't already gotten one, we want to give you one today. Can we give you a COVID-19 vaccine here today?" Acknowledgment of vaccine hesitancy message: "Here at Albany Medical Center, we understand that some patients are skeptical of the COVID-19 vaccine. But, our doctors believe that the vaccine is very safe and very effective. We recommend that we give it to all of our patients today. Can we give you a COVID-19 vaccine here today?"

<sup>b</sup>Cities were Albany, New York; Boston, Massachusetts; Buffalo, New York; Cincinnati, Ohio; and Syracuse, New York.

<sup>c</sup>The numerator is the number of patients who accepted the message, and the denominator is the number of patients who received the message.

<sup>d</sup>Risk difference and 95% CIs with respective P values were estimated using generalized linear regression models with a binomial distribution and identity link function;  $P < .05$  was considered significant.

experience challenges in engaging populations with hesitancy or barriers to vaccination, EDs might serve as an important access point to engage patients routinely encountered by EDs for other reasons.

We also found that the simple opt-in message (compared with longer or stronger vaccination messages) appeared most effective overall at encouraging vaccine acceptance in the ED, a finding that was even more striking in participants who had previously indicated that they were hesitant to seek vaccination in the community. This preference for a simple opt-in message is not surprising, given previous vaccine hesitancy literature demonstrating that educating patients and caregivers on the benefits of vaccines does not often translate to improved vaccine acceptance and may even lead to decreased

vaccination rates.<sup>21,22</sup> In addition, our study found that COVID-19 vaccine nonintent was strongly associated with prior influenza vaccination hesitancy, suggesting that vaccine skepticism may not be unique to the COVID-19 vaccine but rather related to issues of vaccine hesitancy in general.

### Limitations

This study had at least 3 limitations. First, despite our rigorous sampling procedure, prospective ED-based studies are subject to an inherent sampling bias. The study population likely excluded at least some patients from populations at disproportionate risk of poor outcomes from COVID-19 (eg, those experiencing mental illness and/or language barriers);

these groups may have higher rates of vaccine hesitancy or face additional vaccine barriers. Second, because of insufficient vaccine supply at the time of study initiation, we were not able to test the feasibility of COVID-19 vaccinations in the ED or record real-time ED vaccine acceptance rates. Third, COVID-19 population perspectives vary by region, and results from the selected study sites may not be generalizable to all EDs in the United States.

Finally, prior to implementation, COVID-19 vaccination programs in EDs would need to consider potential operational barriers, such as lack of health care provider buy-in, effect on ED overcrowding, billing and reimbursement, and vaccine supply. EDs might address these operational barriers by leveraging experience with other ED-based public health programs, such as nontargeted HIV and hepatitis C virus screening.<sup>23,24</sup>

## Conclusion

EDs have appropriate patient populations in which to initiate COVID-19 vaccination programs as a supplement to community efforts. Although a large portion of ED patients reported a prior hesitancy to COVID-19 vaccination (a finding that was particularly acute in demographic groups previously noted to be undervaccinated), many ED patients may be willing to receive a hypothetical vaccine when offered in the ED. In the absence of other empiric data, we recommend EDs use simple opt-in messaging when approaching ED patients for vaccination, as this messaging was straightforward and resulted in the highest receptivity to ED-based vaccination overall and among vaccine-hesitant participants.

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## References

- Richardson LD, Hwang U. America's health care safety net: intact or unraveling? *Acad Emerg Med.* 2001;8(11):1056-1063. doi:10.1111/j.1553-2712.2001.tb01115.x
- Primm K, Muraleetharan D, Gilreath T. Use of emergency departments for preventative care among adults in the United States: estimates from the 2017 National Health Interview Survey. *J Emerg Med.* 2019;57(4):578-586. doi:10.1016/j.jemermed.2019.06.004
- Rothman RE, Ketlogetswe KS, Dolan T, Wyer PC, Kelen GD. Preventive care in the emergency department: should emergency departments conduct routine HIV screening? A systematic review. *Acad Emerg Med.* 2003;10(3):278-285. doi:10.1111/j.1553-2712.2003.tb02004.x
- Haukoos JS, Lyons MS, Rothman RE. The evolving landscape of HIV screening in the emergency department. *Ann Emerg Med.* 2018;72(1):54-56. doi:10.1016/j.annemergmed.2018.01.041
- White DAE, Scribner AN, Schulden JD, Branson BM, Heffelfinger JD. Results of a rapid HIV screening and diagnostic testing program in an urban emergency department. *Ann Emerg Med.* 2009;54(1):56-64. doi:10.1016/j.annemergmed.2008.09.027
- White DAE, Todorovic T, Petti ML, Ellis KH, Anderson ES. A comparative effectiveness study of two nontargeted HIV and hepatitis C virus screening algorithms in an urban emergency department. *Ann Emerg Med.* 2018;72(4):438-448. doi:10.1016/j.annemergmed.2018.05.005
- White DAE, Anderson ES, Pfeil SK, Trivedi TK, Alter HJ. Results of a rapid hepatitis C virus screening and diagnostic testing program in an urban emergency department. *Ann Emerg Med.* 2016;67(1):119-128. doi:10.1016/j.annemergmed.2015.06.023
- Bogenschutz MP, Donovan DM, Mandler RN, et al. Brief intervention for patients with problematic drug use presenting in emergency departments: a randomized clinical trial. *JAMA Intern Med.* 2014;174(11):1736-1745. doi:10.1001/jamainternmed.2014.4052
- Schechter-Perkins EM, Rothman R, Faryar K, et al. Emergency departments can bolster influenza and COVID-19 vaccination programs. *SAEM Pulse.* 2021;36(1):46-47.
- Rodriguez RM, Torres JR, Chang AM, et al. The rapid evaluation of COVID-19 vaccination in emergency departments for underserved patients study. *Ann Emerg Med.* 2021;78(4):502-510. doi:10.1016/j.annemergmed.2021.05.026
- Fernandez-Penny FE, Jolkovsky EL, Shofer FS, et al. COVID-19 vaccine hesitancy among patients in two urban emergency departments. *Acad Emerg Med.* 2021;28(10):1100-1107. doi:10.1111/acem.14376
- Heinert SW, McCoy J, Eisenstein R, Rowley J. Reaching the hard to reach: characteristics of patients who received a COVID-19 vaccine in the emergency department. *Acad Emerg Med.* 2021;28(9):1081-1083. doi:10.1111/acem.14334
- Waxman M, Johnson C, Ata A, Frisch A, Chang AK, King CC. Random sampling through a time-refreshed emergency department tracker system accurately estimates the demographic and operational characteristics of consecutive sampling. Presented at the Society of Academic Emergency Medicine 2017 Annual Conference; May 18, 2017; Orlando, FL. Accessed May 1, 2021. <https://onlinelibrary.wiley.com/doi/epdf/10.1111/acem.13203>
- Waxman MJ, Merchant RC, Celada MT, Clark MA. Perspectives on the ethical concerns and justifications of the 2006 Centers for Disease Control and Prevention HIV testing recommendations. *BMC Med Ethics.* 2011;12:24. doi:10.1186/1472-6939-12-24

15. Merchant RC, Waxman MJ, Maher JG, et al. Patient and clinician ethical perspectives on the 2006 Centers for Disease Control and Prevention HIV testing methods. *Public Health Rep.* 2012;127(3):318-329. doi:10.1177/003335491212700312
16. Ruiz JB, Bell RA. Predictors of intention to vaccinate against COVID-19: results of a nationwide survey. *Vaccine.* 2021;39(7):1080-1086. doi:10.1016/j.vaccine.2021.01.010
17. Fisher KA, Bloomstone SJ, Walder J, Crawford S, Fouayzi H, Mazor KM. Attitudes toward a potential SARS-CoV-2 vaccine: a survey of U.S. adults. *Ann Intern Med.* 2020;173(12):964-973. doi:10.7326/M20-3569
18. Hamel L, Lopes L, Kearney A, Brodie M. KFF COVID-19 vaccine monitor: March 2021. March 30, 2021. Accessed May 1, 2021. <https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-march-2021/>
19. Nguyen KH, Srivastav A, Razzaghi H, et al. COVID-19 vaccination intent, perceptions, and reasons for not vaccinating among groups prioritized for early vaccination—United States, September and December 2020. *MMWR Morb Mortal Wkly Rep.* 2021;70(6):217-222. doi:10.15585/mmwr.mm7006e3
20. Khubchandani J, Sharma S, Price JH, Wiblishauser MJ, Sharma M, Webb FJ. COVID-19 vaccination hesitancy in the United States: a rapid national assessment. *J Community Health.* 2021;46(2):270-277. doi:10.1007/s10900-020-00958-x
21. Brewer NT, Hall ME, Malo TL, Gilkey MB, Quinn B, Lathren C. Announcements versus conversations to improve HPV vaccination coverage: a randomized trial. *Pediatrics.* 2017;139(1):e20161764. doi:10.1542/peds.2016-1764
22. McClure CC, Cataldi JR, O'Leary ST. Vaccine hesitancy: where we are and where we are going. *Clin Ther.* 2017;39(8):1550-1562. doi:10.1016/j.clinthera.2017.07.003
23. Giuliano KK, Perkins S. Implementing a point-of-care testing program in the critical care setting. *Clin Leadersh Manag Rev.* 2002;16(3):139-147.
24. Waxman MJ, Popick RS, Merchant RC, Rothman RE, Shahan JB, Almond G. Ethical, financial, and legal considerations to implementing emergency department HIV screening: a report from the 2007 Conference of the National Emergency Department HIV Testing Consortium. *Ann Emerg Med.* 2011;58(1 suppl 1):S33-S43. doi:10.1016/j.annemergmed.2011.03.021