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). Accordingly, the ED has a long history of administering preventive interventions such as screening for HIV, hepatitis C virus, and alcohol and drug misuse. 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. 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. 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. 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 ≥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. 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) 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?
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 (Unsure)/Pr (Intent)] and natural log [Pr (Nonintent)/Pr (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.
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,
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-1916-20 as well as the 2 previously published ED-based surveys.10,11 Furthermore, our findings suggest that, as community vaccination campaigns...
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.\(^{21,22}\) 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);

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

| Message                                         | No.\(^c\) | Acceptance, % (95% CI) | Difference (95% CI) | P value\(^d\) |
|-------------------------------------------------|------------|------------------------|---------------------|-------------|
| **Overall**                                     | 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         |
| **Prevaccine intent**                           | 305/334    | 91.3 (87.8 to 94.1)    |                     |             |
| Vaccine unsure (previously vaccinated or intended to be vaccinated) | 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         |

\(^a\)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?”

\(^b\)Cities were Albany, New York; Boston, Massachusetts; Buffalo, New York; Cincinnati, Ohio; and Syracuse, New York.

\(^c\)The numerator is the number of patients who accepted the message, and the denominator is the number of patients who received the message.

\(^d\)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.
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.22-24

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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Declaration of Conflicting Interests

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