

Vaccine Uptake in the Era of COVID-19: Associations Between Willingness to Receive the Influenza and COVID-19 Vaccines

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Background

Acute respiratory infections, including seasonal flu, are the eighth leading cause of death in the United States (Healthy People, 2020). The influenza virus, the causative agent of the seasonal flu, is spread through coughing, sneezing, or contact with contaminated surfaces and then touching eyes, nose, or mouth (Keilman, 2019). Each year, the flu causes significant mortality and morbidity, especially amongst vulnerable populations, including older adults, the immunocompromised, and pregnant women (Keilman, 2019). In 2019–2020, the CDC estimated that the number of hospitalizations related to seasonal flu was between 410,000 and 740,000 leading to an estimated 24,000–62,000 deaths (Centers for Disease Control and Prevention, 2019). In addition to the significant mortality and morbidity, there is a tremendous societal cost imposed by the disease, exceeding billions of dollars (Putri et al., 2018).

In an effort to reduce the burden of the seasonal flu on the community and health systems, health authorities developed and implemented vaccination uptake policies. Vaccines against the influenza virus have proven to be cost-effective, particularly among high-risk individuals such as the elderly (D'Angiolella et al., 2018). Despite clear benefits, the uptake of the flu vaccine remains a challenge each year. In 2019–2020, the CDC estimated that the flu vaccine coverage among U.S. adults was 48.4%, an increase of 3.1% compared to the previous

flu season, however still well below the Healthy People 2020 national target of 70% (Centers for Disease Control and Prevention, 2020a; Healthy People, 2020). Specifically in Virginia, flu vaccination rates for adults aged 18 years and older have shown minor improvement from the 50.6% rate in the 2018–2019 season to the 55.7% rate in the 2019–2020 season. However, the rate reduced again slightly in 2020–2021 to 53% (Centers for Disease Control and Prevention, 2021).

Flu vaccination rates have been found to differ by racial and ethnic groups. Black adults have lower vaccine coverage compared to White adults (45.6% compared to 60.9% in the 2020–2021 season) (CDC, 2020a). Interestingly, both Black and White individuals saw a slight increase in flu uptake from the 2018–2019 season to the 2019–2020 season. However, both groups also saw a slight drop from 2019–2020 to 2020–2021. Notably, vaccination rates for Black individuals dropped below that of the 2018–2019 season, highlighting that gains made from the prior season should not be expected in the next without intentional effort to promote uptake. These rates also highlight that an individual choosing to become vaccinated one year is not guaranteed to seek or receive a vaccination in the following year, once again emphasizing the importance of promoting boosters and the need for annual vaccinations. The literature highlights a lack of trust in the healthcare system and greater vaccine hesitancy amongst Black adults as some of the reported reasons for the low

vaccination rates (Quinn, Jamison, Freimuth, An, Hancock, & Musa, 2017).

Similar to the seasonal flu, COVID-19 is a respiratory disease caused by the SARS-CoV-2 virus. COVID-19 was first reported in December 2019 and later declared a pandemic by the World Health Organization in March of 2020. The COVID-19 virus is spread in a similar way as the influenza virus and the disease typically manifests initially with fever, dry cough, muscle pain, and tiredness (Kumar et al., 2020). Most patients express mild symptoms. However, high risk groups such as elderly patients or those with pre-existing conditions can present with severe symptoms and significantly higher mortality (Kumar et al., 2020).

A little more than two years after the declaration of the pandemic, COVID-19 is considered the third leading cause of death in the United States behind cardiovascular diseases and cancer (Ahmad et al., 2021). The FDA approved the first vaccine against COVID-19 under emergency use authorization in December 2021. Early studies showed positive appeal towards receiving the COVID-19 vaccine, with racial discrepancies similar to those seen with the flu vaccine (Kelly et al., 2021). However, data published by the Virginia Department of Health shows a dramatic *decrease* in COVID-19 vaccine uptake in the first half of 2022 in comparison to the same period in 2021. Specifically, on April 1st, 2021, the 7-day average of COVID-19 vaccine doses administered per day was 85,487 compared to the 3,874 doses per day administered on April 1st, 2022 (Virginia Department of Health, 2022).

Nationally, Black adults report reduced willingness to receive the COVID-19 vaccine as compared to White adults (Kelly et al., 2021). Other characteristics

associated with reduced likelihood of vaccine uptake are gender (female), being uninsured, being younger, and not having received the flu vaccine in the previous year (Kelly et al., 2021). Despite the availability of vaccines at reduced cost, or no charge in some instances, the willingness to receive the recommended vaccines remains an issue among people with low income or uninsured individuals (Lu et al., 2015). In the current study, we investigated adult willingness to receive the seasonal flu and COVID-19 vaccines in the ambulatory care clinic setting during the COVID-19 pandemic. We also explored differences in willingness to receive these vaccines across racial groups and insurance status.

Methods

Participants and Procedure

Survey data was collected between December 2020 and March 2021. Adult patients aged 18 years or older, who attended one of two outpatient clinics in Southeastern Virginia during the study period, were eligible to participate. Participants were provided details about the study and were asked to complete an anonymous survey. Interested participants were provided the option of completing the survey electronically through a REDCap link or via paper and pencil. The surveys completed on paper were later entered into the same online database as the electronic survey. The study was reviewed and approved by the local institutional review board at Eastern Virginia Medical School in Norfolk, VA.

Materials

The survey used in the current study was developed after the Quinn et al. (2019) survey assessing vaccination uptake and vaccine hesitancy. The survey was reviewed and revised by a team of physicians and a health services researcher. The final survey

consisted of 24 questions. Participants first completed information about their demographics before completing two sections assessing perceptions of COVID-19 and its potential impact on health, and their history of receiving the flu vaccine. Participants responded to yes/no questions regarding whether they received the flu vaccine in the current and previous seasons and indicated their likelihood of receiving the flu and COVID-19 vaccines, which were measured on a 5-point Likert type scale from 1-*Highly Unlikely* to 5-*Highly Likely*. Notably, at the time of data collection, the COVID-19 vaccine was still under development and not yet authorized for use.

Statistical Analysis Plan

Data was first evaluated using descriptive statistics, with categorical data represented as frequencies and percentages, and continuous data presented as means, minimum, and maximum values, standard deviation, and normality distributions (skewness and kurtosis). To examine the impact of COVID-19 on the likelihood of receiving the flu vaccine, flu vaccination uptake was compared between the 2019-2020 season and the 2020-2021 season. Further, vaccination rates were compared to the reported national rates from previous years. Correlation analyses were then conducted to

examine the association between having received the flu vaccine and the likelihood of receiving the COVID-19 vaccine. Pearson correlations were conducted for continuous variables and Spearman Rho correlations were conducted for dichotomous variables. Finally, group differences were compared between racial groups and health insurance status with having received the flu vaccine (using chi-square analyses) and with the likelihood of receiving both the flu and COVID-19 vaccines (using independent samples t-tests).

Results

A total of 76 participants completed the survey. Participants were primarily Black (54.7%) or White (34.7%). Participants ranged in age from 25 to 86 years ($M = 55.42$, $SD = 17.19$). The average number of times participants received the flu vaccine in the previous five years was 3.57 ($SD = 1.92$). Two participants were previously diagnosed with COVID-19 infection, both of whom said that their disease course was mild, with symptoms lasting more than 14 days but not requiring hospitalization. The majority of participants (49.3%) reported that they were ‘*unsure*’ of the likelihood of them contracting COVID-19. Please see Table 1 for participant demographics and responses to questionnaire items.

Table 1

Participant Demographics and Survey Responses

Categorical Variables	<i>n</i> (%)
Gender	
Female	39 (52.7%)
Male	35 (47.3%)
Missing	2

Race/Ethnicity	
Asian	1 (1.3%)
Black/AA	41 (54.7%)
Hispanic/Latino	1 (1.3%)
Other	2 (2.7%)
Two or More	4 (5.3%)
White	26 (34.7%)
Missing	1
Clinic	
Primary care/insured	51 (69.9%)
Ambulatory care clinic/uninsured	19 (26.0%)
Not Applicable	3 (4.1%)
Missing	3
Insurance	
Medicaid	13 (17.8%)
Medicare	18 (24.7%)
Other	7 (9.6%)
Private/Commercial	17 (23.3%)
Uninsured/Self-Pay	18 (24.7%)
Missing	3
Previously diagnosed with Covid-19	
No	73 (97.3%)
Yes	2 (2.7%)
Missing	1
Likelihood of becoming infected with COVID-19	
N/A	2 (3.0%)
Highly unlikely	7 (10.4%)
Unlikely	13 (19.4%)

Unsure	33 (49.3%)
Likely	7 (10.4%)
Highly likely	5 (7.5%)
Missing	9
Likelihood to receive Covid-19 Vaccine	
Highly unlikely	9 (12.3%)
Unlikely	1 (1.4%)
Unsure	13 (17.8%)
Likely	6 (8.2%)
Highly likely	44 (60.3%)
Missing	3
Main Reason not to receive COVID-19 Vaccine	
Unsure if COVID-19 vaccine is safe	13 (56.5%)
Do not think that COVID-19 will cause significant risk on my health	4 (17.4%)
Other	6 (26.1%)
Received Flu Vaccine in 2019-2020	
No	20 (27.0%)
Yes	54 (73.0%)
Missing	2
Number of times received Flu Vaccine in the past 5 years	
0	12 (17.4%)
1	3 (4.3%)
2	5 (7.2%)
3	1 (1.4%)
4	10 (14.5%)
5	38 (55.1%)
Missing	7

Location of receiving Flu Vaccine	
Clinic/Doctor's Office	25 (47.2%)
Hospital	3 (5.7%)
Other	5 (9.4%)
Store Pharmacy	20 (37.7%)
Missing	23
Received Flu Vaccine in 2020-2021	
No	24 (33.3%)
Yes	48 (66.7%)
Missing	4
Likelihood to receive Flu Vaccine in 2020 - 2021 (If not yet received)	
N/A	2 (8.7%)
Highly unlikely	8 (34.8%)
Unlikely	2 (8.7%)
Unsure	4 (17.4%)
Likely	2 (8.7%)
Highly likely	5 (21.7%)
Missing	53
Main reason for not receiving Flu vaccine	
Unsure if flu vaccine is safe	3 (21.4%)
Unsure if flu vaccine works	3 (21.4%)
Do not think that the flu will cause significant risk on my health	5 (35.7%)
Other	3 (21.4%)
Belief that Flu Vaccine Protects from Covid-19	
No	58 (90.6%)
Yes	6 (9.4%)
Missing	12

Likelihood of Vaccination

The majority of participants (66.7%) had already received the 2020-2021 flu vaccine at the time of data collection. An additional 9% reported that they were likely or highly likely to receive the flu vaccine this season, which is similar to the reported flu vaccination rate of the previous season (73% in 2019–2020). Of those who reported not intending to receive the flu vaccine, the main reasons were the belief that ‘*The flu will not cause significant risk on health*’ and ‘*Concerns about the safety and efficacy of the vaccine.*’

The majority of participants (60.3%) indicated that they were highly likely to receive the COVID-19 vaccine. However, 13.7% indicated they were unlikely or highly

unlikely to receive the vaccine and an additional 17.8% indicated they were unsure. The main reason reported for COVID-19 vaccine hesitancy was ‘*Uncertainty about the safety of the vaccine*’ ($n = 13, 56.5\%$).

Receiving the flu vaccine in 2019-2020 was significantly associated with having already received the flu vaccine in 2020-2021 ($r = .713, p < .001$). Among those who had not yet received the vaccine, it was highly related to being willing to receive the flu vaccine in 2020–2021 ($r = .691, p < .01$). Having received the flu vaccine in 2019–2020 and having received the flu vaccine in the current 2020–2021 season, were both correlated with the likelihood of receiving the COVID-19 vaccine ($r = 0.546, p < .001$; $r = 0.545, p < .001$, respectively). See Table 2.

Table 2

Bivariate Correlations between Flu and COVID-19 Vaccination Variables

	1.	2.	3.	4.	5.
1. Flu Vaccine19-20	--	.713**	.824**	.691*	.546**
2. Flu Vaccine 20-21		--	.606**	.	.545**
3. Flu Vaccine-5yr			--	.794 _a **	.640 _a **
4. Flu Vaccine Likely				--	.614 _a *
5. COVID Vaccine Likely					--

Note: No correlation could be computed for variables 2x4 because those who already received the vaccine did not answer this item. *a* = Pearson correlation; all other results are based on Spearman rho correlation. * $p < .01$. ** $p < .001$.

Group Differences by Race and Insurance Coverage

Race

Given the limited number of respondents who identified as races other than Black or White (<10), group differences

by race compared Black and White respondents only and others were excluded from analyses. A chi-square test revealed no significant differences between Black and White participants regarding whether they had received the 2019-2020 flu vaccine ($\chi^2 = .073, p = .787$). Specifically, 70% of Black

participants and 73.1% of White participants reported having received the flu vaccine. Similarly, race was also not significantly related to having received the 2020-2021 flu vaccine, ($\chi^2 = 2.54, p = .111$), with 56.4% of Black participants and 76% of White participants having already received it. For those who had not yet received the 2020-2021 flu vaccine, an independent samples t-test revealed that intentions to receive the flu vaccine did not differ by participant race, $t(18) = -.426, p = .675, [95\% \text{ CI } -2.12, 1.41]$, (White, $M = 3.00, SD = 1.79$; Black, $M = 2.64, SD = 1.69$). Regarding the COVID-19 vaccine, White participants reported greater intentions to receive the vaccine ($M = 4.36, SD = 1.38$) compared to Black participants ($M = 3.73, SD = 1.38$). However, this did not reach statistical significance, $t(63) = -1.81, p = .076, [95\% \text{ CI } -1.34, .07]$.

Insurance Coverage

A chi-square test revealed that in the 2019-2020 season, a greater percentage of participants covered by medical insurance received the flu vaccine (78.4%) compared to the percentage of uninsured participants who received the vaccine (50%) ($\chi^2 = 5.23, p = .022$). Similar trends were observed in the 2020–2021 flu season, with 35 of 50 (70%) insured participants having received the flu vaccine compared to 8 of the 17 (47.1%) uninsured participants, although differences did not reach statistical significance during this season ($\chi^2 = 2.90, p = .088$). Independent samples t-tests revealed that for those individuals who had not yet received the 2020-2021 flu vaccine, insured patients reported greater intention of receiving the flu vaccine ($M = 3.29, SD = 1.64$) compared to uninsured patients ($M = 1.57, SD = 0.98$), $t(18) = 18.17, p = .008, [95\% \text{ CI } .513, 2.916]$. Greater intention to receive the COVID-19 vaccine was also reported by insured ($M = 4.12, SD = 1.32$) compared to uninsured

participants ($M = 3.50, SD = 1.65$). However, this did not reach statistical significance, $t(66) = 1.59, p = .12, [95\% \text{ CI } -.16, 1.40]$.

Discussion

Despite nationwide efforts to promote the uptake of the flu vaccine, the percentage of the U.S. population that is vaccinated remains below goal, with variation between race and ethnic groups (Rouw et al., 2020). The current study sought to examine flu and COVID-19 vaccination uptake intentions among a convenience sample of patients attending two clinics in Southeastern Virginia, and explore differences in this region by race and insurance status.

Compared to the national average, current study participants from Hampton Roads, VA indicated a much greater flu vaccination rate and intentions to receive the upcoming season's flu vaccine. The majority (66.7%) of participants had already received the flu vaccine at the time of the study, and many of those who had not yet received it were planning on receiving the vaccine (21.7%). This is much higher than the national average in current and previous flu seasons (48.4% and 59% in 2019-2020 and 2020-2021 flu seasons, respectively) (CDC, 2020b). As health fears increased during the COVID-19 pandemic, it may be that individuals wanted to be proactive about protecting their health. Those who had received the flu vaccine in the past, or had considered receiving it, were likely highly motivated to seek the flu vaccine in the 2020-2021 season. An individual who consistently received the flu vaccine in previous seasons likely more strongly endorses the vaccine's efficacy and safety, which may explain the strong association between previous vaccinations and the likelihood of receiving the flu vaccine in the upcoming season. This is consistent with previous studies suggesting that vaccine effectiveness and adverse

effects, in addition to perceived severity of the disease, are major factors in determining an individual's willingness to receive vaccines (Doornekamp et al., 2020).

The study also examined the association between receiving the flu vaccine and the intention of receiving a COVID-19 vaccine. Overall, there appears to be a strong association between having received, or the likelihood to receive, the flu vaccine and the likelihood of receiving the COVID-19 vaccine. This finding could be explained in several ways. First, individuals who received the flu vaccine during this or previous seasons could have easier access to healthcare services. The participants in the current study were patients who were present at a medical clinic to receive healthcare. These individuals may inherently be more likely to take proactive care of their health or be reminded by a provider about the importance of receiving their vaccines, more so than individuals who tend to not attend health clinics or healthcare appointments. Second, individuals who received the flu vaccine in previous seasons may do so because they perceive themselves to be at increased risk of complications from the season flu, due to older age or other health-related factors (Kumar et al., 2020). Although the same protective measures could apply to intentions to receive the COVID-19 vaccine, recent literature suggests otherwise. Kelly et al. (2021) found that although older individuals reported greater willingness to receiving the COVID-19 vaccine, individuals with underlying medical conditions and/or comorbid conditions were *not* more likely to get vaccinated for COVID-19 than those at low risk. This apprehension may be due to the relatively recent development of the COVID-19 vaccine compared to the flu vaccine and concerns about safety of the vaccine itself.

The study found no statistically significant differences in the likelihood to receive either the flu vaccine or COVID-19 vaccine between White and Black respondents. However, White individuals reported slightly higher intentions of receiving the COVID-19 vaccine compared to Black individuals. Similar studies have shown hesitancy in receiving the flu vaccine among the Black population related to distrust in the healthcare system (CDC, 2021; Freimuth et al., 2017; Quinn, Jamison, Freimuth, An, & Hancock, 2017). The willingness to receive the COVID-19 vaccine is also likely more complex to interpret given the politicization of the vaccination process (Kreps et al., 2020). The media and social media platforms have been major sources of misleading information that have likely promoted hesitancy among the public, particularly among those with an existing distrust of the healthcare system (Wilson & Wiysonge, 2020).

The study revealed that participants with medical insurance were more likely to report having received the flu vaccine in the previous 2019-2020 season compared to uninsured patients. With the cost of healthcare in the United States on the rise and the lack of universal health care coverage, there remains a large number of adults who are in need of quality and affordable health care (Osborn et al., 2016). In December 2020, the federal government developed a plan to provide the COVID-19 vaccine for free, regardless of health insurance. Similarly, many programs have been developed over the years to offer the seasonal flu vaccine for free or at a reduced cost. Despite these efforts, vaccination coverage among uninsured individuals remains lower than those who are medically insured (Lu et al., 2015). Lack of knowledge of the availability of vaccines at no cost is likely a contributing

factor. Interestingly, uninsured participants in the current study were seen in a primary care clinic with comparable access to healthcare services as those with health insurance. Still, these participants were less likely to receive the flu vaccine.

Vaccines against COVID-19 have shown great efficacy in mitigating the effects of the pandemic on the population and healthcare systems. However, as new variants of the virus continue to appear, there is a need for booster doses to maintain adequate protection against the virus, similar to the annual flu vaccine. Accordingly, more efforts are needed to promote vaccine uptake, especially while the rates of vaccine uptake are dropping. Addressing the main reasons behind vaccine hesitancy is essential to increasing vaccine coverage. This includes raising the awareness of the safety and efficacy of the flu and COVID-19 vaccines in communities with low vaccine uptake through public media platforms, including more diverse participants in studies conducted on the safety and efficacy of the vaccines, especially Hispanic, Black and women participants, in addition to making these studies available to the public with easy access to help improve the public trust in healthcare systems.

Limitations

The study is limited in terms of generalizability outside of Virginia but, due to the diversity in the sample population, findings can likely be generalized to regions across the state. It should be noted that participants were recruited in primary care clinics where they directly interact with healthcare providers and have greater access to healthcare services. Additionally, the mean age of participants was 55 years old. Given that older individuals have different perceptions of their health than younger individuals, vaccine uptake and related

intentions likely differ by age group. The difference in attitudes in vaccine uptake in this study should be interpreted with caution, as it did not reach statistical significance. It is imperative to continue to assess these potential differences in other regions as more Virginia patient data become available and more information about the vaccines becomes known.

Conclusion

The current sample of patients from Hampton Roads, VA reported high intentions to receive the flu vaccine compared to the national average. There were also strong positive correlations between receiving the flu vaccine in previous seasons and willingness to receive the flu vaccine and a COVID-19 vaccine in the upcoming season. Racial differences suggest that there is likely greater hesitancy among Black patients, though differences did not reach statistical significance. Novel findings suggest that the insured population is more likely to have received the flu vaccine in the 2019-2020 season despite comparable access to healthcare services and vaccine availability, suggesting the need for improved awareness of vaccine availability in the Hampton Roads region. Furthermore, although the majority of patients in this region of Virginia reported high likelihood to receive the COVID-19 vaccine, those who are vaccine hesitant emphasize a concern for the safety of the vaccine as the primary reason for hesitancy. This is an important target area for healthcare providers to discuss with their patients. The current study and similar studies that continue to investigate vaccine hesitancy are integral to understand vaccination intentions and predictors of uptake, particularly when annual vaccine and boosters are needed to promote herd immunity. Overall, this study adds to the growing body of literature on vaccination uptake during a time in which

willingness to receive a vaccine can be the difference between life and death.

Recommendations

Findings in the study suggest that while some populations may indicate greater intentions to receive the flu vaccine in the setting of the COVID-19 pandemic, more efforts are needed in upcoming flu seasons to

reach goal coverage. Increasing trust in the vaccine's efficacy and safety are major contributors to effective vaccine promotion. Larger scale studies are recommended to further investigate the difference in the willingness to receive flu and COVID-19 vaccines among different racial groups and greater effort should be taken to improve vaccine communication for trust building.

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