

Living Organ Donor Perspectives and Sources of Hesitancy about COVID-19 Vaccines

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Abbreviations

US—United States
aOR—adjusted Odds Ratio
95% CI—95% Confidence Interval
IQR—interquartile range

Key Points:

- Compared to other sources, donors who prefer medical and public health information sources are more likely to accept a COVID-19 vaccine.
- Donors who rely on medical and public health information are likely to accept a COVID-19 vaccine regardless of their flu vaccine history.
- Donors not accepting of a COVID-19 vaccine are likely to question long-term safety and benefits of vaccination for healthy people.

Abstract

Background: Living organ donation declined substantially in the United States during the COVID-19 pandemic due to concerns about donor and transplant candidate safety. COVID-19 vaccines might increase confidence in the safety of living organ donation during the pandemic. We assessed informational preferences and perspectives about COVID-19 vaccines among US living organ donors and prospective donors.

Methods: We conducted a national survey study of organ donors and prospective donors on social media platforms between 12/28/2020–2/23/2021. Survey items included multiple choice, visual analog scale, and open-ended responses. We examined associations between information preferences, history of COVID-19 infection, influenza vaccination history and COVID-19 vaccine acceptance using multivariable logistic regression and performed a thematic analysis of open-ended responses.

Results: Among 342 respondents from 47 US states and the District of Columbia, 35% were between 51-70 years old, 90% were non-Hispanic white, 87% were women; 82% were living donors (94% kidney) and 18% in evaluation to donate (75% kidney). The majority planned to or had received COVID-19 vaccination (77%), whereas 11% did not plan to receive a vaccine, and 12% were unsure. Adjusting for demographics and donor characteristics, respondents who receive yearly influenza vaccinations had higher COVID-19 vaccine acceptance than those who do not (adjusted Odds Ratio [aOR] 5.06, 95% Confidence Interval [CI] 2.68-9.53). Compared to respondents who prioritized medical information sources (e.g., personal physicians and transplant providers), those who prioritized news and social media had lower COVID-19 vaccine acceptance (aOR 0.34, 95% CI 0.15-0.73). Low perceived personal benefit from vaccination and uncertainty about long-term safety were common themes among those declining COVID-19 vaccines.

Conclusions: Donor informational source preferences were strongly associated with the likelihood of accepting a COVID-19 vaccine. Vaccine guidance for organ donors who are unsure about COVID-19 vaccines could incorporate messaging about safety and benefits of vaccination for healthy people.

Introduction

Living organ donors provide an essential service in the face of the severe shortage of organs available for transplantation.(1) Essentially, donors are healthy adults who choose to undergo elective surgery for no personal medical benefits in order to provide another person with a life-saving organ transplant.(2) In recent years, living donors have accounted for a substantial number of all kidney and liver transplants performed in the United States (38% of all US kidney transplants and 5% of all US liver transplants in 2019, respectively).(3) However, at the onset of the COVID-19 pandemic, the majority of US transplant programs ceased performing living donor surgeries, and studies have cited both patient and provider concerns about the risks of COVID-19 transmission before and after living donation.(4-6) Although many programs resumed living donor surgeries as the pandemic progressed, there were 22% fewer living kidney and liver donations in 2020 compared to 2019.(3)

The United States (US) issued the first emergency use authorization (EUA) for a vaccine to prevent COVID-19 on December 11, 2020, ushering in a new phase of the pandemic response that is focused on vaccine production, distribution, and uptake. The availability of COVID-19 vaccines is also likely to alter care paradigms in solid organ transplantation. Experts have advocated for solid organ transplant candidates and recipients to be among those who are prioritized to receive COVID-19 vaccines, given the higher risks associated with immunosuppressed status.(7-9) In contrast, living organ donors, who are selected for donation because of their lack of high-risk health conditions,(10) are not likely to be prioritized under current vaccine distribution recommendations.(11) Yet, there are several potential benefits to promoting COVID-19

vaccination of living organ donors, both before and after donation. First, COVID-19 vaccines might mitigate prospective donor concerns about the risks of donation,(5) a key driver of the decline in donor evaluation volume during the pandemic.(4) Vaccinating donors could reduce the likelihood of COVID-19 infections before and after surgery(12, 13) and potentially prevent transmissions of COVID-19 from donors to transplant recipients who might be close contacts or live in shared households with their donors. However, evidence suggests that uncertainty about the COVID-19 vaccines is common in the United States(14), underscoring the need for providers to better understand vaccine-related informational needs and sources of COVID-19 vaccine hesitancy in key populations when determining vaccination protocols and patient education strategies.

The goal of this national study was to assess the perspectives of living organ donors (kidney and liver donors) and those in the evaluation process to donate on the acceptability of COVID-19 vaccines and the most important components of their vaccine-related decision-making. We also examined donor attitudes about potential transplant program requirements to be vaccinated. Finally, we explored whether donors' preferred information sources about COVID-19 vaccines, personal history of COVID-19 infection, and acceptance of yearly influenza vaccines were associated with their decision-making about accepting a COVID-19 vaccine.

Materials and Methods

Study Design

We conducted a national, online survey of living organ donors and those who are preparing for donation during the COVID-19 pandemic. The survey was designed by clinicians involved in living donor care with the feedback of a survey design expert, living organ donor, and kidney transplant recipient. Content was selected to capture the key features of vaccine hesitancy (i.e, “the 3 C’s” : high complacency, low confidence, and low convenience).(15) We used a concurrent mixed methods approach to interpret both structured and open-ended data.(16) The protocol was approved by the Drexel University Institutional Review Board (#2004007760). The requirement for written informed consent was waived due to the anonymous survey design. The clinical and research activities being reported are consistent with the Declaration of Helsinki and the Principles of the Declaration of Istanbul as outlined in the ‘Declaration of Istanbul on Organ Trafficking and Transplant Tourism.

Study Population

The survey link and introduction were displayed on multiple social media platforms (e.g., Facebook, Twitter) of transplant and donor advocates and organizations. Respondents were included in the analysis if they confirmed that they were a living donor or in work-up to donate and indicated a US state of residence.

Survey Conduct

The survey was available from December 28, 2020 to February 23, 2021. The online survey was hosted by RedCAP at Drexel University. Respondents did not receive compensation for their participation.

Survey Domains and Format

The 21-item survey included questions on plans to accept or decline COVID-19 vaccination, sources of information about COVID-19 vaccines, priorities for decision-making about COVID-19 vaccines, and attitudes about potential transplant program requirements for COVID-19 vaccination. Question formats included multiple choice and 100-point visual analogue scales,(17) with 0 indicating strong disagreement to statements and 100 indicating strong agreement to statements about COVID-19 vaccines. Respondents were asked to answer a question about whether they plan to receive a COVID-19 vaccine (choices: “Yes,” “No,” “Unsure,” and “Already Received It”). Respondents were also asked to respond to open-ended questions about their decision-making process for accepting or declining COVID-19 vaccine.

Data Analysis

We first tested associations between uptake of COVID-19 vaccines and other response items using chi-squared tests or Kruskal-Wallis tests, as appropriate. Next, we fit a logistic regression model for the outcome of donor acceptance of COVID-19 vaccines (i.e., answered “Yes” or “Already Received It” to the question of whether they plan to receive the vaccine), adjusted for respondent demographics (age category, sex, race/ethnicity, educational attainment), donor organ type (kidney or liver), prior or prospective donor status, and relationship to the transplant recipient (family member or not) (Model A). Then, in the fully adjusted model (Model B), we adjusted for all covariates in Model A and respondent preferred information source about COVID-19 vaccines (categorized as medical sources [personal physicians, transplant programs,

medical journals], public health officials, non-medical sources [news media, websites, social media, discussions with friends & family, political leaders], and other [knowledge of personal risk factors, information source not specified]), personal history of COVID-19 infection (yes/no), and history of yearly influenza vaccination (yes/no).

We *a priori* tested for interactions of COVID-19 vaccine uptake with preferred vaccine information source and history of yearly flu vaccination. We evaluated interaction terms in a separate model that was adjusted for all other covariates. We considered interaction terms to be significant at a pre-specified p-value threshold of ≤ 0.10 using Wald tests. To aid in the interpretation of findings, we used marginal standardization (using the ‘margins’ package in Stata(18)) to estimate predicted vaccine uptake probabilities by information source and influenza vaccine acceptance categories, adjusted for the cohort averages of other covariates. All covariates had less than 2% missing data; data were analyzed as complete case analyses.

Three authors reviewed and open-ended comments and sorted content by respondent characteristics to identify global themes and contrasting patterns. We purposively selected exemplar quotes to provide more in-depth insight to our quantitative findings and respondent perspectives about decision-making. Analyses were performed using Matlab R2020a (Mathworks) and Stata SE v14, (StataCorps, College Station, TX).

Results

After eight weeks, 372 individuals responded to the survey. Respondents were excluded if they did not indicate whether they were past or prospective donors (N=13),

lived outside the US (N=13) or did not indicate what organ they donated/planned to donate (N=4), yielding a final sample of 342 surveys for the analyses. When asked about their intention to receive a COVID-19 vaccine, 62% of respondents reported that they planned to receive the vaccine and 15% had already received it, compared to 11% who do not plan to receive the vaccine and 12% who were unsure. The majority of respondents were prior or prospective kidney donors (n=309, 90%) (**Table 1**). The cohort was 90% non-Hispanic white and 88% female. Respondents resided in 47 US states and the District of Columbia. Compared to those planning to receive a COVID-19 vaccine (262), those who will not or are unsure (n=80) had similar demographics, educational attainment, and were similarly likely to have donated/be donating to a family member (41% vs 40%, p=0.85). However, those not planning to receive vaccination were less likely to report relying on public health officials for vaccine information (34% vs 4%, p<0.001) and to receive an annual influenza vaccination (46% vs 83%, p<0.001) than those planning to receive vaccination or already vaccinated.

COVID-19 vaccines: confidence, complacency, and convenience

In free text responses, among donors accepting the vaccine, we identified the following themes: 1) risks of COVID-19 infection outweigh concerns about long-term safety of the COVID-19 vaccines, 2) a desire to protect organ recipients and other high-risk contacts from COVID-19 with vaccination, and 3) motivation for kidney donors to avoid COVID-19 infection due to concerns about the potential impacts on their remaining kidney (**Table 2**). Among those who were not planning to be vaccinated or were unsure about vaccination, themes included 1) concerns about vaccine safety,

particularly among people with a solitary kidney, and about long-term health effects from vaccination, 2) the perspective that COVID-19 was not a serious threat, and 3) that previous infection with COVID-19 was more protective than COVID-19 vaccines.

Compared to those accepting COVID-19 vaccines, those who will not or are unsure were less likely to agree with statements that COVID-19 vaccines are safe, effective, or should be required for transplant candidates and donors (**Figure**). Those not planning to be vaccinated or unsure were also more likely to strongly agree that their vaccination decision was based on side effects and long-term effects of vaccines. Agreement about the importance of convenience in decision-making about COVID-19 vaccines was similar between those who do and do not plan on accepting a COVID-19 vaccine.

Associations between Sources of Information, Personal Experience with COVID-19, and Influenza Vaccination History and COVID-19 Acceptance

There were no statistically significant associations between COVID-19 acceptance and respondent demographics, donor status, and organ type (Model A, **Table 3**). In the fully adjusted model (Model B, **Table 3**), those with a history of receiving yearly influenza vaccinations had higher odds of COVID-19 vaccine acceptance than those who do not receive yearly influenza vaccinations (adjusted Odds Ratio [aOR] 5.06, 95% Confidence Interval [CI] 2.68-9.53). Furthermore, compared to respondents who preferred medical information sources (physicians, transplant programs, or medical journals) about COVID-19 vaccines, those who relied on public health officials for information had higher odds of COVID-19 vaccine acceptance (aOR

5.72, 95% CI 1.56-21.01), whereas those who preferred non-medical sources including news and social media had lower COVID-19 vaccine acceptance (aOR 0.34, 95% CI 0.15-0.73). Having a personal history of COVID-19 infection and having a family member as a transplant recipient or intended recipient were not independently associated with the likelihood of COVID-19 vaccine acceptance. Influenza vaccination history did not modify the associations between information sources and COVID-19 vaccine acceptance (p-value 0.63). Respondents who do and do not receive yearly influenza vaccines were most likely to accept COVID-19 vaccines if they reported prioritizing public health officials for information about the vaccines (**Table 4**).

Discussion

In this national survey study of living organ donors and those in the evaluation process to become organ donors, the majority of respondents reported that they are planning to accept COVID-19 vaccination. Compared to those accepting of a COVID-19 vaccine, those who do not plan to be immunized or are unsure had similar demographics and were not more likely to be donors to family members or have a personal history of COVID-19 infection. However, those who are unsure or not planning to receive the vaccine were less likely than other respondents to rely on public health officials for vaccine information and receive yearly influenza vaccines. Those not planning to be vaccinated emphasized concerns about the lack of long-term safety data on COVID-19 vaccines, expressed uncertainties on the risks of vaccines for people with solitary kidneys, and questioned the need to receive a vaccine if their personal risk of severe COVID-19 was low. Several respondents not planning to be vaccinated

reported having previously experienced mild infections with COVID-19 and expressed confidence in their healthy status. These findings can help providers to frame discussions with donors and prospective donors about COVID-19 vaccines and the potential benefits of vaccination among those with previous COVID-19 infection and few or no comorbidities.

The results of our study underscore the need to evaluate sources of vaccine hesitancy and confidence among people with few or no known risk factors for severe COVID-19. Vaccine hesitancy is commonly conceptualized as “a delay in acceptance or refusal of vaccination, driven by the “3 Cs” (i.e, high complacency, low confidence, and low convenience).(15) In the US, vaccine hesitancy and other healthcare barriers likely explain why, despite the considerable healthcare costs, morbidity and mortality attributable to influenza,(19) less than 50% of the adult US population receives yearly influenza vaccinations.(20) Using qualitative and quantitative methods, researchers from the Kaiser Family Foundation estimate that 13% of US adults refuse to receive a COVID-19 vaccine.(14) Interestingly, a similar proportion of respondents in our study report that they do not plan to receive a COVID-19 vaccine, although acceptance of yearly influenza vaccines was higher in our cohort than in the overall US population. These differences point to distinct sources of hesitancy about COVID-19 vaccines among living organ donors that should be further explored. Aspects related to convenience of obtaining COVID-19 was likely be less salient for our respondents, as the question was framed around their plans “when it (the vaccine) becomes available.” At this time, prior to widespread distribution, factors related to the convenience of the vaccine were not rated to be as important for decision-making as concerns from living

donors and prospective donors about the lack of long-term data about COVID-19 vaccines. Strategies to specifically address these concerns could increase confidence in the vaccines and vaccine uptake among healthy individuals such as living organ donors, a necessary step to achieving population-level immunity and limiting the emergence of more harmful COVID-19 variants.

People who are accepted to become living donors are likely to be counseled that because they are healthy enough to donate, they have a low risk of experiencing severe adverse health outcomes from donation.(21) Indeed, donors are likely to be healthier than age-matched individuals in the general population. However, our study suggests that confidence in their own health status might lead some living organ donors to fail to obtain COVID-19 vaccination. Specifically, donors and prospective donors in our study who do not plan to receive the COVID-19 vaccine or are unsure were less likely than others to agree that COVID-19 vaccines are needed or should be required, and many cited their lack of risk factors or history of mild COVID-19 infection as justifications to decline the vaccine. Even donors accepting the vaccine prioritized the protection it could offer to at-risk contacts, although some donors expressed concerns about personal risks from COVID-19 infection and several kidney donors voiced a desire for to be vaccinated as a way to protect their remaining kidney. These findings suggest that discussions with vaccine-hesitant donors should reinforce public health guidance on the potential benefits of vaccination over natural immunity, which apply for those with and without pre-existing health conditions.(22)

Our study demonstrated that there was a strong and independent association between informational sources about COVID-19 vaccines and planned vaccine uptake.

Interestingly, compared to donors who prioritized medical sources of information including physician and transplant program guidance, donors who prioritized public health officials for information were much more likely to plan to receive a COVID-19 vaccine. In contrast, donors who relied on non-medical sources of information or considered their own risk factors as most important for decision-making were the least likely to plan to receive a COVID-19 vaccine. Importantly, we found that the association between informational sources and vaccine uptake was also seen in the subgroup of donors that do not receive yearly influenza vaccinations, suggesting that outreach and educational strategies can overcome some sources of vaccine hesitancy and other pre-existing barriers to vaccination.

This study has several strengths, including the geographic diversity of the respondent population and its inclusion of perspectives from recent donors and those in the evaluation process to donate. The limitations of the study should also be considered. One potential concern is generalizability, because although the majority of US kidney and liver donors are female and non-Hispanic white,⁽²³⁾ respectively, these demographic characteristics were overrepresented in our respondent cohort. Therefore, it is imperative that future research explores perspectives of donors that were not reached by this survey, including more racial/ethnic minority donors and those with limited internet access.

Conclusion

In a large, geographically diverse cohort of living organ donors and those in the evaluation process to donate, we found that the majority of respondents are accepting

of COVID-19 vaccines. Reliance on public health officials was strongly associated with COVID-19 vaccine acceptance, whereas those who do not plan to receive COVID-19 vaccines expressed confidence in their own healthy status for protection and expressed greater concerns about vaccine safety and usefulness. Providers that seek to promote vaccination of living donors and other healthy adults could consider incorporating public health guidance about vaccine safety and the individual and societal benefits of COVID-19 vaccines as part of their educational strategies.

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Table 1. Study Respondent Characteristics

Characteristic	Overall N=342	Will Not Receive Vaccine/Unsure 80	Have Received or Will Accept Vaccine 262
Age			
18-30 years	28 (8.2%)	8 (10.0%)	20 (7.6%)
31-50 years	184 (53.8%)	49 (61.3%)	135 (51.5%)
51-70 years	121 (35.4%)	23 (28.7%)	98 (37.4%)
71 years or older	5 (1.5%)	0 (0.0%)	5 (1.9%)
Missing	4 (1.2%)	0 (0.0%)	4 (1.5%)
Race/Ethnicity			
Non-Hispanic White	308 (90.1%)	70 (87.5%)	238 (90.8%)
Non-Hispanic Black	4 (1.2%)	2 (2.5%)	2 (0.8%)
Non-Hispanic Asian	3 (0.9%)	0 (0.0%)	3 (1.1%)
Hispanic	19 (5.6%)	6 (7.5%)	13 (5.0%)
Other race/ethnicity	6 (1.8%)	2 (2.5%)	4 (1.5%)
Missing	2 (0.6%)	0 (0.0%)	2 (0.8%)
Female Sex	298 (87.1%)	71 (88.8%)	227 (86.6%)
Educational Attainment			
Completed high school or GED	20 (5.8%)	4 (5.0%)	16 (6.1%)
Attended or graduated from college	191 (55.8%)	54 (67.5%)	137 (52.3%)
Beyond college	130 (38.0%)	22 (27.5%)	108 (41.2%)
Missing	1 (0.3%)	0 (0.0%)	1 (0.4%)
Donor Organ Type			
Donated/Will Donate a Liver Lobe	33 (9.6%)	10 (12.5%)	23 (8.8%)
Donated/Will Donate a Kidney	309 (90.4%)	70 (87.5%)	239 (91.2%)
Donation Status			
Living Organ Donor	281 (82.2%)	62 (77.5%)	219 (83.6%)
In Donor Evaluation Process	61 (17.8%)	18 (22.5%)	43 (16.4%)
Timing of Living Donation (Among Donors)			
Within the past year	84 (24.6%)	26 (32.5%)	58 (22.1%)
Within the past five years	122 (35.7%)	26 (32.5%)	96 (36.6%)
More than five years ago	75 (21.9%)	10 (12.5%)	65 (24.8%)
Recipient/Intended Recipient Relationship			
Non-Family Member	202 (59.1%)	48 (60.0%)	154 (58.8%)
Family Member	140 (40.9%)	32 (40.0%)	108 (41.2%)
Personal History of COVID-19 Infection			
Knows Someone with History of COVID-19	320 (93.6%)	73 (91.2%)	247 (94.3%)
Preferred Vaccine Information Source			
Medical: Physicians, Transplant Programs, Medical Journals	112 (32.7%)	19 (23.8%)	93 (35.5%)
Non-Medical: News, Social Media, other Non-Medical	73 (21.3%)	25 (31.2%)	48 (18.3%)
Public Health Officials	91 (26.6%)	3 (3.8%)	88 (33.6%)
Other/Personal Knowledge of Risks	66 (19.3%)	33 (41.2%)	33 (12.6%)
Receives Yearly Influenza Vaccine	252 (73.7%)	37 (46.2%)	215 (82.1%)

Table 2. Illustrative Quotes from Prior and Prospective Living Organ Donors Contrasting Different Perspectives and Concerns during the COVID-19 Pandemic

Themes	Perspectives from Donors Planning to Receive the COVID-19 Vaccine	Perspectives from Donors Not Planning to Receive or Are Unsure about COVID-19 Vaccines
Confidence	<p><i>"I trust the science in which it was built".</i></p> <p><i>"I was worried about safety at first with it being so new. But I have medical people and a microbiologist in my family who said the data seems good. So far 4 of my family members have received the vaccine."</i></p> <p><i>"Politicization of the federal government gives me pause about how well the vaccines have been vetted."</i></p> <p><i>"Concern and worries over the vaccine have kept me awake at night, but the risks of the virus hurting my one kidney catapulted me into getting the vaccine as soon as I could."</i></p>	<p><i>"Just worried about any extra auto immune responses from the vaccine."</i></p> <p><i>"How will it affect my remaining kidney long term?"</i></p> <p><i>"Do not trust, less than a year to create vaccine and all others take years. No thank you."</i></p> <p><i>"I only have 1 kidney left. I can't play around with my health, especially drug and vaccine safety. One wrong step could land me into kidney failure. A new vaccine needs to be proven safe for people in my situation."</i></p> <p><i>"Not taking or having my children take a vaccine that they whipped up in less than a year!"</i></p> <p><i>"I will safely social distance and wear a mask. I will not take unnecessary risks or allow people that do in my bubble. However I would prefer to get the vaccine last. I don't want to damage my lone kidney in any way and I have reacted poorly to many drugs."</i></p> <p><i>"The disease survival rate higher than [vaccine] efficiency rate."</i></p>
Convenience	<p><i>"Frustrating how long it is taking to get the vaccine out to those who want it!"</i></p> <p><i>"I want to guarantee that the second dose is available to me when i'm supposed to get it before i take the first dose."</i></p> <p><i>"Feds should distribute masks and vaccines in mass quantities no matter the cost."</i></p> <p><i>"Information about Covid vaccine availability is a complete mess. There's nowhere I can obtain information/schedule vaccinations for people I know who have underlying health conditions. Even the major hospital where I donated doesn't know when vaccines will be available for the general public."</i></p>	<p><i>"I am uninsured. Cost and availability are the issue."</i></p>
Complacency	<p><i>"The virus is more terrifying than the vaccine was what convinced me."</i></p>	<p><i>"I am a healthy 45 year old who donated [recently]...I don't get flu shots either. My husband and I choose not to."</i></p>

	<p><i>"My husband is my recipient, so I'm primarily doing it for him, but also for me".</i></p> <p><i>"I am afraid of COVID. I know how deadly it is."</i></p> <p><i>"As a donor, I don't want to risk injuring my remaining kidney if I get COVID"</i></p> <p><i>"I see my sister and recipient frequently and want to protect her."</i></p> <p><i>"I have had COVID and I don't want it again."</i></p> <p><i>"As many of my decisions in life, I think about how I can be an example for others that contributes to the overall community."</i></p> <p><i>"I am scheduled to donate my kidney in three weeks but I am considering putting the donation on hold until I receive the vaccine. The hospital and program I am going through said that I do not need it before the surgery because donating a kidney does not put you at an increased level of catching COVID. I'm not sure I believe this since, the operation is voluntary and I will be exposing myself further by spending that time in the hospital and traveling across the country."</i></p> <p><i>"Unfortunately our family got COVID last month. Although I had a mild case, my neurological symptoms have been concerning and ongoing. I never want to have to go through that again and I would never want to transmit covid to someone else."</i></p> <p><i>"My transplant coordinator has indicated that although living kidney donors are not at higher risk for contracting or developing severe symptoms of COVID-19, it is possible that if a living kidney donor did contract COVID and have severe symptoms, the medicines administered to them are ones that are filtered through the kidneys and therefore could cause our one kidney to be strained...for this reason, I think that living kidney donors should be prioritized above the general population to receive the COVID-19 vaccine."</i></p>	<p><i>"I had Covid and I was fine. I've had the flu in the past and I was fine. I rarely get sick so I don't feel the need for the vaccine right now. My mind could change later."</i></p> <p><i>"I am for freedom of choice when it comes to vaccinations."</i></p> <p><i>"I don't take the flu vaccine and would rather know more about long term impact of the new vaccine if I can."</i></p> <p><i>"I have had COVID and I believe my body can give me better immunity and or anti-bodies than a quickly manufactured vaccine."</i></p> <p><i>"I've already had COVID, I also have food allergies, including eggs, so I'm nervous to get the vaccine."</i></p> <p><i>"We need better education of real statistics with layman's explanations of current data. For example what were all the pre-existing health/lifestyle history of all COVID patients?"</i></p> <p><i>"I will not be taking the vaccine and will rely on staying healthy and my body's natural immune system ... the number of strains the vaccines cover is limited."</i></p>
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Table 3. Adjusted Associations between Donor Characteristics and Planned COVID-19 Vaccine Uptake

Covariates	aOR (95% CI) n=337	aOR (95% CI) n=337
Age		
≤50 years	ref	ref
>50 years	1.63 [0.91,2.89]	1.53 [0.77,3.02]
Race/Ethnicity		
Other	ref	ref
Non-Hispanic White	1.19 [0.51,2.77]	0.75 [0.28,2.02]
Sex		
Male	ref	ref
Female	0.76 [0.33,1.76]	0.47 [0.18,1.21]
Educational Attainment		
Completed HS/GED	ref	ref
Some college or graduated	0.74 [0.23,2.40]	0.82 [0.22,3.02]
More than college	1.58 [0.46,5.44]	1.29 [0.33,5.06]
Prior/Prospective Donor Status		
Living Organ Donor	ref	ref
Prospective Donor	0.67 [0.34,1.32]	0.62 [0.28,1.41]
Organ for Donation		
Kidney	ref	ref
Liver	1.37 [0.57,3.28]	1.19 [0.42,3.39]
Relation to Recipient		
Non-Family Member	ref	ref
Family Member	1.14 [0.65,1.99]	1.28 [0.66,2.49]
Personal History of Covid-19		
No	ref	Ref
Yes	0.79 [0.65,1.99]	0.67 [0.24,1.91]
Receives Yearly Influenza Vaccination		
No		ref
Yes		5.06***[2.68,9.53]
Preferred Sources of Information		
Medical Sources ^a		ref
Non-Medical Sources ^b		0.34**[0.15,0.73]
Public Health Officials		5.72**[1.56,21.01]
Personal Beliefs/Other		0.19***[0.09,0.42]

Abbreviations: aOR—adjusted Odds Ratio; CI—Confidence Interval

**p<0.01

***p<0.001

^aIncludes personal physicians, transplant program guidance, and medical journals

^bIncludes news media, social media, and conversations with family and friends

Table 4. Adjusted Predicted Probabilities of Covid-19 Vaccine Uptake by Yearly Influenza Vaccination History and Information Source. Estimates derived from logistic regression model and marginal standardization, adjusted for the cohort averages of other covariates.

Sources of Information	Predicted Probability of COVID-19 Vaccine Uptake	95% Confidence Interval
Does Not Receive Yearly Influenza Vaccine		
Medical Sources	56.9%	37.5%-76.3%
Non-Medical Sources	43.8%	22.8%-64.8%
Public Health Officials	94.1%	82.8%-100.0%
Other/Own Knowledge	26.9%	8.3%-45.6%
Receives Yearly Influenza Vaccine		
Medical Sources	91.3%	85.5%-97.1%
Non-Medical Sources	71.9%	59.3%-84.7%
Public Health Officials	97.1%	93.1%-100.0%
Other/Own Knowledge	63.3%	48.1%-78.4%

Figure 1. Perspectives of Living Organ Donors who Will and Will Not Accept COVID-19 Vaccines. Box plot depicts distribution of living organ donor agreement on statements about COVID-19 vaccines. Scale from 0 (strongly disagree) to 100 (strongly agree). Black bars in the middle of the boxes indicate the median values. The bottoms and tops of the boxes represent the interquartile ranges (IQRs). Blue boxes represent responses from donors who are planning to receive a COVID-19 vaccine, whereas orange boxes are responses from donors who are not planning to receive a vaccine or are unsure if they will receive a vaccine.

Figure 1

Living Organ Donor Perspectives about COVID-19 Vaccines

Scale: 0 (Strongly Disagree) to 100 (Strongly Agree)

Will Accept COVID-19 Vaccine Will Not Accept COVID-19 Vaccine/Unsure

