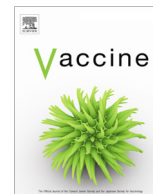




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Short communication

COVID-19 vaccine confidence and reasons for vaccination among health care workers and household members



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ABSTRACT

Background: The majority of healthcare workers (HCW) in the US report being fully vaccinated against COVID-19, yet little is known about vaccine decision-making for their household members, including children.

Methods: Cross-sectional survey July–August 2021 of HCW and their household members in Minnesota. **Results:** 94 % of eligible participants were vaccinated with the most common reasons being wanting to protect oneself, family and loved ones. Safety concerns were the most commonly reported reasons for not being vaccinated; a significantly higher proportion of unvaccinated compared to vaccinated HCW (58 % vs 12 %, $p = 0.0035$) and household adults (25 % vs 5 %, $p = 0.03$) reported prior SARS-CoV-2 infection. Nearly half of unvaccinated adults and two-thirds of unvaccinated children would be vaccinated if a vaccine mandate were in place.

Conclusions: Despite high COVID-19 vaccine acceptance among HCWs, more research is required to identify and address the needs and concerns of healthcare workers who decline COVID-19 vaccination despite availability.

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1. Introduction

By the early 2022, less than 80% of all healthcare workers (HCW) in the United States (US) reported being fully vaccinated against COVID-19 with a primary vaccine series. Coverage among HCW varies substantially by geographic region and HCW role, with vaccination consistently lower among non-physicians.[1–3]

Reasons for COVID-19 vaccination among HCW include a desire to protect oneself, loved ones, and patients.[4] Primary reasons for non-vaccination among HCW have included concerns about the novel mRNA vaccine technology, safety and efficacy concerns, and concerns about unknown long-term side effects.[5,6] However little is known regarding the level of concordance in COVID-19 vaccination uptake between HCWs and members of their household and motivations for vaccination in this population.

The primary objective of this paper is to identify reasons for choosing to receive or not to receive the COVID-19 vaccine among healthcare workers, their adult household members, and their children. We also aim to identify motivating factors for future COVID-19 vaccination among participants who were not vaccinated at the time of the survey.

2. Methods

2.1. Study population

A convenience sample of individuals working in healthcare facilities was recruited and enrolled into a seroprevalence survey in spring 2020 in Minnesota.[7] HCWs who participated in the original study ($N = 489$) were invited via email to participate between July–August 2021. HCWs were invited to enroll household children ages 6–18 into the study, and had the opportunity to refer an adult household member (≥ 18 years of age) to be invited to participate in the study.

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2.2. Survey

An online survey via Research Electronic Data Capture (REDCap) [8] was self-administered by adult participants and parents/guardians reported on behalf of their child(ren). Children < 12 years of age were not eligible for vaccination at the time of the survey. Participants self-reported demographics, whether they had received a COVID-19 vaccine, and COVID-19 disease history. Vaccinated participants reported the primary reason for choosing to receive a COVID-19 vaccine from a pre-populated list developed by the authors and their degree of confidence or hesitancy (extremely confident, somewhat confident, neither confident or hesitant, somewhat hesitant, extremely hesitant) in their decision to receive the vaccine. Parents/guardians also reported how involved their child was in their vaccination decisions (not involved, somewhat involved, or very involved).

Unvaccinated participants reported the primary reason why they had not yet received the vaccine, and the primary reason why they would choose to get the vaccine in the future. They also reported whether they would choose to receive a vaccine if required by an employer, school, or daycare.

2.3. Statistical analysis

Analysis was conducted in R version 4.1.0.[9] Proportions were calculated based on the number of respondents to each question and 95 % confidence intervals (CI) were computed with the normal approximation. Formal statistical comparisons were made with chi-squared or Fisher’s test, where appropriate.

All participants provided written informed consent. This study was approved by the University of Minnesota institutional review board.

3. Results

Two-thirds (n = 326) of invited HCW, 134 household adults, and 143 children (n = 65 ≥ 12 years) participated in the survey (Table 1). The average age of participants was 43 years (SD: 11.4)

among HCW, 45 years among household adults (SD: 11.8), and 11 years (SD: 3.4) among children. The majority (85.0 %) of HCW participants were female and the majority (77.0 %) of adult household members were male.

The majority (94 %) of HCW and eligible household members (91 % of adults and 74 % of children over 12 years) reported being fully vaccinated. All (100 %) physicians, physician’s assistants, and nurse practitioners in our study were vaccinated as were all of their eligible household members with the exception of one child ≥ 12 years who was likely to be vaccinated in the future. The vast majority (88 % of HCW, 91 % of household adults, and 90 % of children ≥ 12) of vaccinated individuals reported being extremely or somewhat confident in their vaccination decision. The most common reasons reported for choosing to receive the COVID-19 vaccine among HCW and adult household members was wanting to protect oneself, wanting to protect family and loved ones, and wanting to contribute to ending COVID-19 outbreaks (Fig. 1). The most common reason for not being vaccinated was concerns about safety. The most common primary reason reported by a parent/guardian for vaccination of children ≥ 12 years of age was wanting to protect the child (58.3 %).

A small proportion of HCW (n = 19), adult household members (n = 12) and children ≥ 12 (n = 17) were not vaccinated at the time of the survey. Safety concerns were the most commonly reported reason for not yet receiving the COVID-19 vaccine among health-care workers (63 %), adult household members (42 %), and children ≥ 12 (47 %). A significantly higher proportion of unvaccinated compared to vaccinated HCW (58 % vs 12 %, p = 0.0035) and household adults (25 % vs 5 %, p = 0.03) reported prior SARS-CoV-2 infection, while the difference among children ≥ 12 years was not significant (15 % vs 29 %, p = 0.273).

The majority of unvaccinated HCW and household adults reported being unlikely to be vaccinated in the future (Fig. 2). In contrast, most parents/guardians of unvaccinated children (≥12 and < 12) reported that they were likely to be vaccinated in the future (76 % and 87 %, respectively). Among unvaccinated children, the most common reasons for future vaccination was to protect

Table 1
COVID-19 vaccination decisions for index participant, adult household member, and children, by demographic characteristics and SARS-CoV-2 infection history.

COVID-19 Vaccination	Index Participant (HCW)		Adult household member		Child(ren)		
	Yes	No	Yes	No	Age 12–18		Age < 12
	N = 307 (94 %)	N = 19	N = 122 (91 %)	N = 12	Yes	No	N = 78
Age (mean, SD)	43.1 (11.5)	41.6 (11.0)	45.2 (11.7)	43.35 (13.1)	14.5 (1.5)	13.8 (1.8)	8.4 (1.8)
Sex							
Female	258 (93.1 %)	19 (6.9 %)	30 (96.8 %)	1 (3.2 %)	24 (77.4 %)	7 (22.6 %)	35 (100 %)
Male	46 (100 %)	0 (0 %)	92 (89.3 %)	11 (10.7 %)	23 (69.7 %)	10 (30.3 %)	42 (100 %)
Race^a							
African American or Black	2 (100 %)	0 (0 %)	2 (66.7 %)	1 (33.3 %)			
American Indian or Native American	3 (60.0 %)	2 (40.0 %)	0 (0 %)	0 (0 %)			
Asian	12 (100 %)	0 (0 %)	3 (100 %)	0 (0 %)			
Caucasian or White	285 (94.4 %)	17 (5.6 %)	115 (90.55 %)	12 (9.45 %)			
Other	4 (100 %)	0 (0 %)	3 (100 %)	0 (0 %)			
Hispanic/Latinx Ethnicity	6 (85.7 %)	1 (14.3 %)	2 (100 %)	0 (0 %)			
HCW role of index participant							
Physician, Physician’s Assistant, Nurse Practitioner	82 (100 %)	0 (0 %)	37 (100 %)	0 (0 %)	20 (95.2 %)	1 (4.8 %)	25 (100 %)
Nurse	167 (95.4 %)	8 (4.6 %)	67 (94.4 %)	8 (5.6 %)	20 (64.5 %)	11 (35.5 %)	34 (100 %)
Other ^b	51 (82.3 %)	11 (17.7 %)	14 (63.6 %)	11 (17.7 %)	6 (54.6 %)	5 (45.4 %)	18 (100 %)
Previous SARS-CoV-2 Infection	7 (100 %)	0 (0 %)	4 (100 %)	0 (0 %)	2 (100 %)	0 (0 %)	1 (100 %)
No	273 (96.1 %)	11 (3.9 %)	114 (92.7 %)	9 (7.3 %)	41 (77.4 %)	12 (22.6 %)	70 (100 %)
Yes	32 (82.1 %)	7 (18.0 %)	6 (66.7 %)	3 (33.3 %)	7 (58.3 %)	5 (41.7 %)	8 (100 %)
Unsure	2 (66.7 %)	1 (33.3 %)	2 (100 %)	0	0	0	0

Abbrev: COVID-19 = coronavirus disease 2019; HCW = health care worker; SD = standard deviation.

^a Race and ethnicity were not collected for children.

^b Other includes categories of laboratory technician, administration, paramedic or EMT, and other.

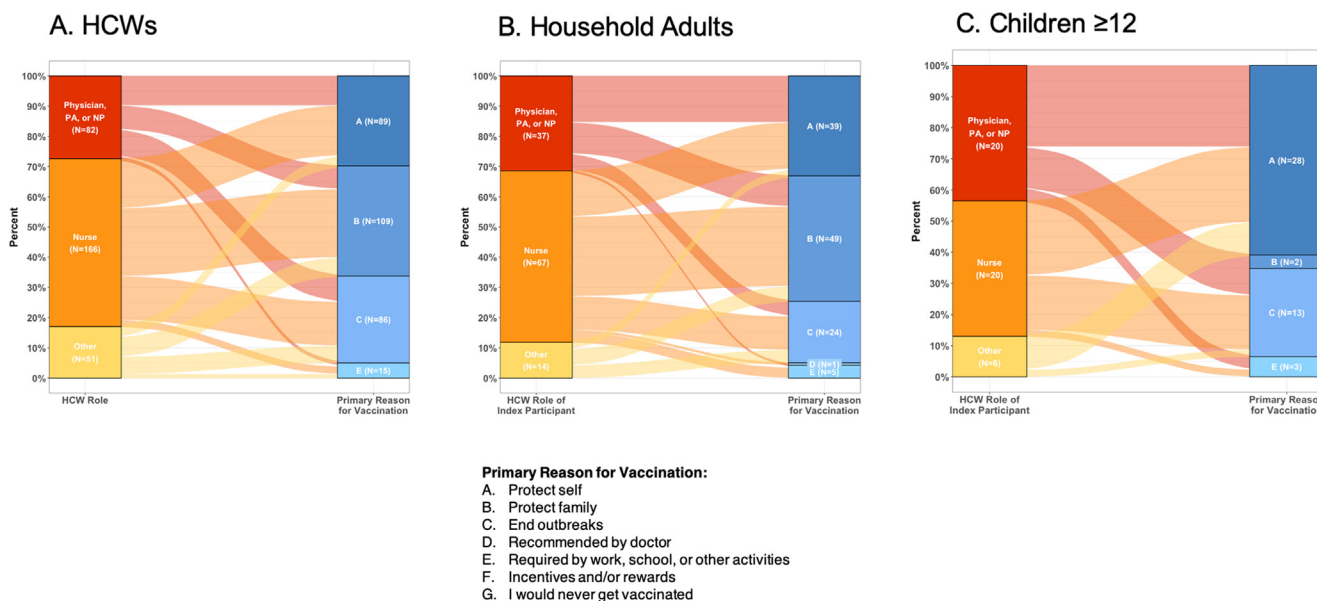


Fig. 1. Primary reasons for vaccination among healthcare workers (HCW), household adults, and children ≥ 12 years of age. In panels B and C, the first column refers to the index participant's HCW role.

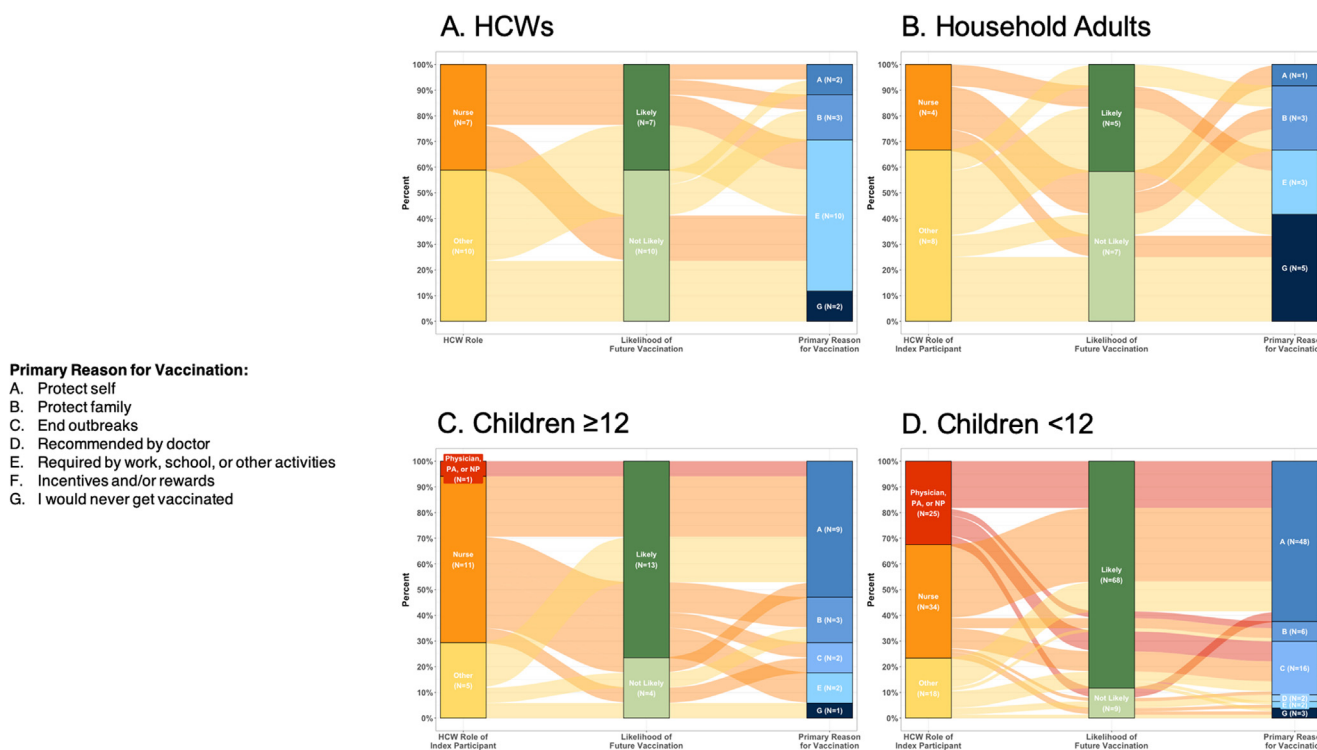


Fig. 2. Primary reasons for future vaccination among participants who were not yet vaccinated at the time of the survey. In panels B, C and D, the first column refers to the index participant's HCW role. "Likely" includes those who reported "Absolutely," "very likely," or "somewhat likely." Children < 12 years of age were not eligible for vaccination at the time of the survey. If the reason for vaccination is not shown in figure, no participants selected the corresponding option.

oneself, to protect family members, and to end outbreaks. Regardless of vaccination status, nearly half (49.7 %) of adults reported that their child over the age of 12 was very involved in their vaccination decision.

Among unvaccinated individuals, one-third of HCW and nearly half (45 %) of adult household members reported that they would choose to be vaccinated if required by their employer; 63 % of children would be vaccinated if required by their school or daycare.

Among unvaccinated HCW, vaccination requirements by their employer were the most common primary reason for future vaccination.

4. Discussion

This study was conducted in a highly-vaccinated sample of HCWs and their household members in Minnesota. We found that

the vast majority of vaccinated individuals were confident in their vaccination decision, and a small proportion of people decided to be vaccinated despite reporting hesitancy. The most common reasons for vaccination was to protect oneself, to protect family members, and to end outbreaks. We found that nearly half of unvaccinated adults and two-thirds of unvaccinated children would be vaccinated if a mandate were in place from the employer, school or daycare, yet vaccine mandates have been fraught with legal challenges.[10].

In our sample, prior infection with SARS-CoV-2 was more common among unvaccinated individuals compared to vaccinated individuals. Increasing data suggest that vaccination provides higher levels of protection compared to previous infection.[11] Formal recommendations from CDC's Advisory Committee on Immunization Practices (ACIP) regarding vaccination after infection may close this gap in the future.

To our knowledge, this is one of the first studies to assess the involvement of children in COVID-19 vaccine decision making and we found that over half of children were involved in making the decision about whether or not they were vaccinated. This may suggest that public health messaging could engage this age group through campaigns and educational materials to facilitate discussions regarding vaccination with their parent(s) or guardian(s).

Additional research is required to identify and address the needs and concerns of HCW who decline COVID-19 vaccination despite availability. Similar to other samples of HCW in the US, [12–14] we observed that nurses and other health professionals were less likely to be vaccinated compared to physicians, physician's assistants, and nurse practitioners. We also found that family members (both adult household members and children) of nurses and other health professionals were less likely to be vaccinated compared to family members of physicians, physician's assistants, and nurse practitioners. A systematic review regarding COVID-19 vaccination found that the most common reasons for vaccine hesitancy among HCWs were concerns about safety.[15] Understanding why individuals chose not to be vaccinated can help inform outreach activities, particularly as additional long-term data become available regarding COVID-19 vaccine safety.

Limitations of this study include a convenience sample that relied on self-report of vaccination and infection status. However, this sample of healthcare workers and their household members offers insight into reasons for COVID-19 vaccination in this unique population.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: All authors reports financial support was provided by Minnesota Department of Health. All authors reports financial support was provided by Centers for Disease Control and Prevention.

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