




Concise Communication

Does the coronavirus disease 2019 (COVID-19) vaccination rate among healthcare personnel reflect their community? An evaluation of a multistate healthcare system

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Abstract

Coronavirus disease 2019 (COVID-19) vaccination rates of a large health system reflected their respective service areas but varied by work role. Nurse vaccination rates were higher (56.9%) and rates among nursing support personnel were lower (38.6%) than those of their communities (51.7%; $P < .001$). Physician vaccination rates were highest (71.6%) and were not associated with community vaccination levels.

(Received 19 July 2021; accepted 4 November 2021)

The coronavirus disease 2019 (COVID-19) pandemic has resulted in marked morbidity and mortality. The introduction of vaccination in December 2020 promised to mitigate the risk for infection and protect vulnerable populations. Although the vaccine is readily available in the United States, variation in acceptance exists based on age and diversity of communities.^{1,2} Although vaccination among healthcare personnel (HCP) was prioritized, vaccination rates in this group have not been optimal. HCP vaccination is a critical element to provide a safe care environment for patients and for other workers.³ HCP have reacted differently to COVID-19 vaccination, with some fully supporting and advocating its administration to patients and their loved ones, and others expressing skepticism about vaccination safety and efficacy. Recent data show marked geographic variation in vaccine adoption in the United States, where some states adult vaccination rates exceed 75%; in others, rates are as low as 42%.¹ We examined vaccination rates of associates in a large US health system, the association between their vaccination rates and those in the communities they serve, and variation in rates by job function.

Methods

We evaluated the vaccination rates of HCP (defined as physicians, nurses, and nursing support) from a large multistate healthcare system comprising 146 hospitals and 2,600 sites of care, December 2020 through June 2021. Other associates included those in patient-facing (eg, guest and patient services, laboratory, imaging) and non-patient-facing roles (eg, administrative support, information technology). A standardized approach to encourage

associate vaccination was implemented across all regions in our health system, including an education campaign to promote vaccination and vaccination clinics to provide easy access for associates. Data on associate job title and site of work were gathered from human resources databases and vaccination status was established based on documentation in the Associate Health electronic health record. Facilities were categorized by state. The outcome of percentage of fully vaccinated associates was compared to the adult community vaccination rate from the respective work catchment area.⁴ At the time of the analysis, Texas county-level vaccination data were not available through the Centers for Disease Control and Prevention (CDC) COVID-19 tracker,¹ and data were obtained from the Texas state health department.⁵ Pearson correlation coefficients were calculated to assess the strength of the association between community vaccination rates and to associate vaccination rates within geographic units. We used χ^2 tests to determine the significance of the differences between community vaccination rate and to associate vaccination rate by job function. All statistical analyses were conducted in R version 4.0.2 software (R Foundation for Statistical Computing, Vienna, Austria). The study was reviewed and was deemed exempt from approval by the Ascension Seton Institutional Review Board.

Results

This analysis included 173,957 Ascension associates from 12 US states and the District of Columbia: 34% of these were nurses, 9% were nursing support staff, and 6% were physicians. The rate of fully vaccinated adult community members within all regions was 51.7% and ranged from 35.0% in Waco, Texas, to 66.6% in Washington, DC (Table 1). The associate vaccination rate of HCP was only slightly higher than their respective community members (55.3%; range, 42.2%–62.8%; $P < .001$). Vaccination rates for all associates were higher than community vaccination rates in

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Cite this article: Fakh MG, et al. (2021). Does the coronavirus disease 2019 (COVID-19) vaccination rate among healthcare personnel reflect their community? An evaluation of a multistate healthcare system. *Infection Control & Hospital Epidemiology*, <https://doi.org/10.1017/ice.2021.485>

Table 1. Percentage of Fully Vaccinated Adult Community Members and Healthcare Personnel

Service Area	Community		Associates, Total No. of Associates (% Fully Vaccinated)			
	Adult Population ^a within Market Catchment Area ^b	Catchment Area Average (% Adults Fully Vaccinated as of June 22, 2021) ^b	All Associates	Nursing	Nursing Support	Physicians
Birmingham, AL	1,728,255	36.4	5,947 (46.4)	2,614 (45.4)	639 (25.8)	102 (72.6)
Mobile, AL	694,497	35.2	2,149 (42.2)	795 (44.3)	204 (24.0)	81 (71.6)
District of Columbia, DC	2,093,920	66.6	251 (56.2)	25 (64.0)	Not applicable	36 (58.3)
Jacksonville, FL	1,410,530	46.1	9,347 (42.3)	2,599 (43.6)	759 (23.9)	1,287 (57.5)
Pensacola, FL	856,764	40.6	7,598 (48.6)	3,068 (48.9)	658 (30.7)	290 (81.7)
Arlington Heights, IL	6,616,631	56.4	24,196 (62.5)	9,129 (62.6)	2,525 (48.0)	1,533 (80.9)
Evansville, IN	344,020	50.2	3,498 (48.5)	1,240 (49.4)	462 (25.8)	199 (54.3)
Indianapolis, IN	2,405,099	50.1	13,705 (50.3)	5,261 (50.5)	1,081 (30.6)	1,024 (72.0)
Wichita, KS	994,599	42.8	7,601 (58.0)	2,766 (56.3)	857 (41.4)	205 (88.3)
Baltimore, MD	1,950,961	64.1	3,139 (53.8)	915 (61.2)	299 (34.1)	89 (71.9)
Detroit, MI	3,306,340	54.4	19,688 (56.3)	6,103 (56.4)	1,779 (37.2)	1,385 (86.4)
Grand Blanc, Saginaw, Tawas City, MI	1,113,507	48.4	6,339 (56.0)	2,289 (55.9)	657 (33.5)	475 (76.8)
Kalamazoo, MI	1,047,941	49.7	4,511 (62.3)	1,346 (63.3)	376 (48.9)	188 (86.7)
Binghamton, NY	472,076	56.7	3,530 (62.8)	886 (63.3)	307 (56.7)	172 (79.1)
Tulsa, OK	1,440,390	42.9	7,625 (48.1)	2,348 (46.7)	923 (24.1)	353 (79.3)
Nashville, TN	2,295,948	43.2	11,529 (53.5)	4,517 (55.8)	1,576 (36.9)	414 (75.1)
Austin, TX	2,019,496	55.2	17,416 (61.6)	5,771 (70.5)	1,147 (57.8)	1,074 (50.7)
Waco, TX	397,675	35.0	2,962 (48.3)	1,072 (43.8)	271 (40.2)	100 (89.0)
Appleton, WI	870,919	53.3	8,456 (51.0)	2,086 (58.2)	465 (40.9)	945 (50.1)
Milwaukee, WI	1,815,824	56.6	14,470 (62.6)	4,177 (65.9)	947 (44.8)	627 (88.7)
Total	33,875,392	51.7	173,957 (55.3)	59,007 (56.9)	15,932 (38.6)	10,579 (71.6)

^aAdults aged >18 y. ^bAdult vaccination data were obtained from the CDC COVID data tracker (except Texas). At the time of analysis, Texas vaccination data were only available from the State Health Department, for 12 years and older.

many geographic areas, with up to an absolute 15% greater rate in Wichita, Kansas.

When evaluated by job category, physicians had the highest vaccination rate (71.6%) compared to nurses (56.9%) and nursing support (38.6%; $P < .001$ for all comparisons). Physician vaccination rates, ranging regionally from 50% to 89%, were significantly higher ($P < .05$) than vaccination rates of community members in 15 of the 20 service areas. The largest difference between physician vaccination rates (89%) and community rates (35%) was observed in Waco, Texas. Overall vaccination rates among nurses ranged from 44% to 71% and were higher than community vaccination rates ($P < .001$), with a maximum absolute difference of 15% in Austin, Texas. Vaccination rates among nurses were significantly higher than community members vaccination rates in 18 of the 20 service areas. Nursing support had the lowest vaccination rates ranging from 24% to 58%, and these rates were lower than their corresponding community vaccination rates ($P < .001$). Overall vaccination rates for all other types of associates ranged from 40% to 63%, with the largest absolute percentage point difference of 28% higher than the corresponding community vaccination rate

occurring in Wichita, Kansas. Nursing support had the lowest vaccination rates ranging from 24% to 58%. There was a significant positive correlation between community vaccination rates and associate vaccination rates ($R = 0.61$; $P = .004$) (Fig. 1). A positive association was observed in nursing ($R = 0.79$; $P < .01$) and nursing support ($R = 0.51$; $P = .026$) job types; there was no significant association for physician vaccination rates ($R = -0.28$; $P = .239$).

Discussion

We report the experience of a large US health system with COVID-19 vaccination of associates during the pandemic. HCP were among the first to have access to vaccination, but vaccine hesitancy apparently remains a barrier despite communication campaigns, ease of availability, and leadership engagement in its promotion.⁶ In addition, none of the HCP in the 20 service areas evaluated within our system reached vaccination rates >90%, regardless of job category. Voluntary vaccination efforts of HCP in a single health system varied based on community acceptance of the vaccine and the associate job title.

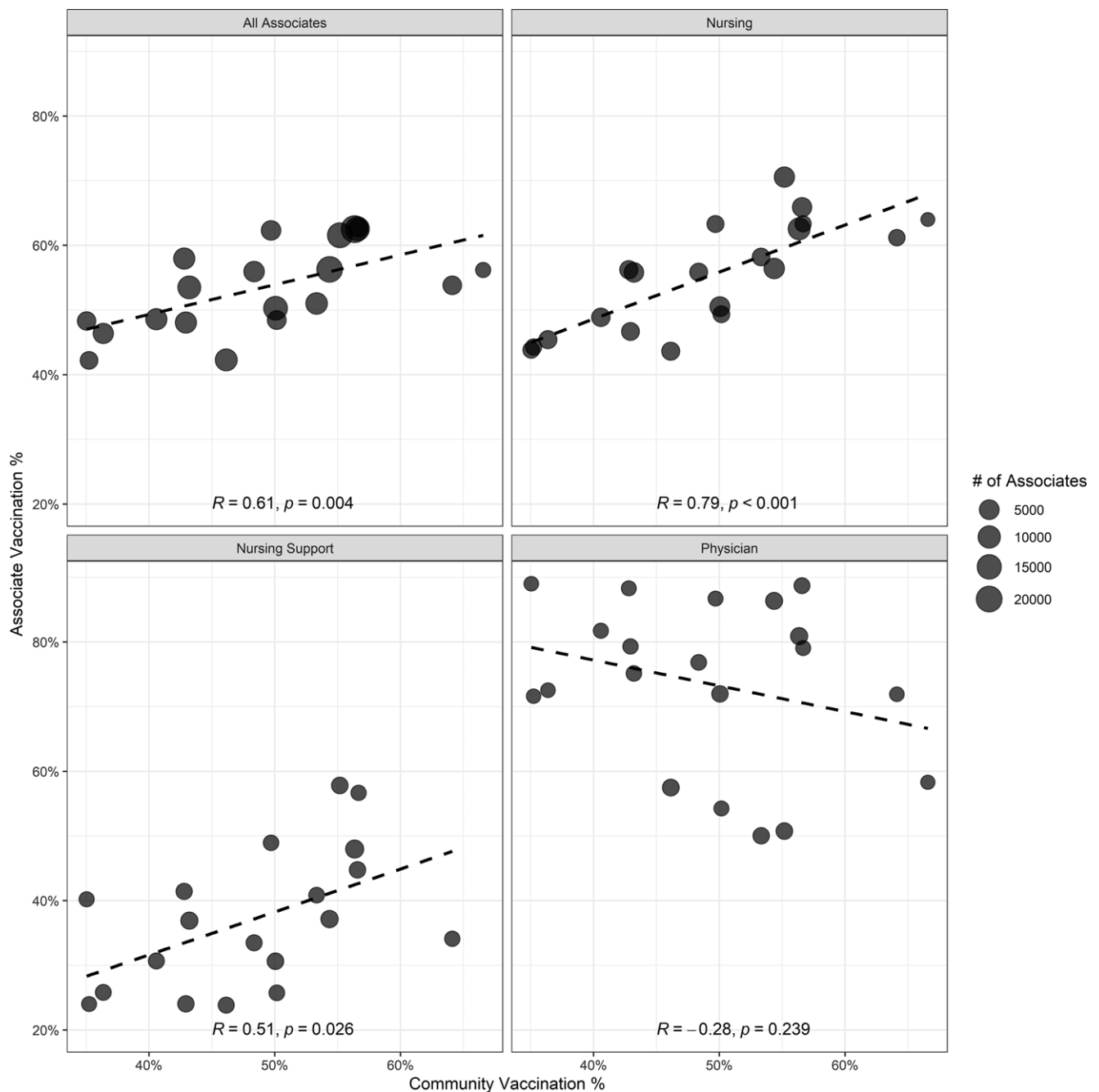


Fig. 1. Association between fully vaccinated adult community members and healthcare personnel by job type.

A unique finding of our study is the correlation between the community and associate vaccination rates, potentially reflecting regional prioritization or local population influence.⁷ In addition, within the clinical workforce, nursing support associates, representing more economically disadvantaged and socially vulnerable groups, had lower vaccination rates than their respective communities.⁸ On the other hand, we found an association between nurse vaccination rates and the community they serve. Additionally, physicians tended to be more accepting of vaccination compared to nurses.⁹ In July 2021, our system announced mandatory COVID-19 vaccination by November 2021 for all associates except for those with medical or religious exemptions. By mid-October

2021, 84% of all active associates were compliant with mandatory vaccination, and the disparities based on job categories were mitigated.

Our study had several limitations. In some cases, vaccinations received outside our system may not have been captured and documented into the database, potentially underestimating the associate vaccination rates. For example, HCP could have had access to vaccination outside the work setting. Some associates who had COVID-19 infection may be reluctant to get vaccinated or receive 2 doses. Notwithstanding these limitations, we conclude that vaccination of associates in healthcare reflect the communities they serve, with some variation based on job type. Achieving high

COVID-19 vaccination and protection to the workforce is a challenge based on our current approach of voluntary vaccination and the local community resistance to vaccination compliance. Despite a strong safety profile of COVID-19 vaccines, 1 vaccine FDA approved, and two-thirds of the US population received at least 1 dose of vaccine by late October 2021, we will unlikely reach adequate and sustainable vaccination levels to protect the health-care workforce and patients without vaccination mandates.¹⁰

Acknowledgments.

Financial support. No financial support was provided relevant to this article.

Conflicts of interest. All authors report no conflicts of interest relevant to this article.

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