COVID-19 Vaccination Telephone Outreach: A Primary Care Clinic Intervention Targeting Health Equity

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ABSTRACT

Introduction: Equitable COVID-19 vaccine access is essential to ending the COVID-19 pandemic. In many instances, COVID-19 vaccination notification and scheduling occurred through online patient portals, for which socially vulnerable populations have limited access. Our objective was to reduce disparities in COVID-19 vaccine access for the Black and socially vulnerable populations unintentionally excluded by our health system's patient portal-driven vaccine outreach through a telephone outreach initiative.

Methods: From February 1, 2021, through April 27, 2021, telephone outreach was directed towards patients aged 65 and older without patient portal access at a large urban academic general internal medicine clinic. Univariate and multivariate analyses between those who did and did not receive telephone outreach were completed to assess the odds of vaccination, accounting for outreach status, sex, age, race/ethnicity, payor status, social vulnerability index, and Elixhauser Comorbidity count.

Results: A total of 1466 patients aged 65 and older without active patient portals were eligible to receive the COVID-19 vaccine. Of these patients, 664 received outreach calls; 382 (57.5%) of them got vaccinated compared to 802 patients who did not receive outreach calls, of which 486 (60.6%) got vaccinated (P=0.2341). Patients who received outreach calls versus those who did not were more likely to be female, younger, non-Hispanic Black, from high social vulnerability index census tracts, and have higher Elixhauser Comorbidity counts. Logistical analysis revealed an odds ratio (OR) with a nonstatistically significant trend favoring higher vaccination likelihood in the no outreach cohort with univariate analysis with no changes when adjustment was made for age, sex, race/ethnicity, payor, social vulnerability index, and Elixhauser Comorbidity count (univariate analysis: OR 0.88 [95% CI, 0.71-1.09]; model 1: OR 0.89 [95% CI, 0.72 – 1.10]; model 2 – 0.89 (0.72 - 1.11); model 3: OR 0.87 (95% CI, 0.70 -1.09)].

Conclusions: While our telephone outreach initiative was not successful in increasing vaccination rates, lessons learned can help clinicians and health systems as they work to improve health equity. Achieving health equity requires a multifaceted approach engaging not only health systems but also public health and community systems to directly address the pervasive effects of structural racism perpetuating health inequities.

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INTRODUCTION

The COVID-19 pandemic has disproportionately affected minority communities, as evidenced by higher rates of infection, hospitalization, and mortality.[1,2] The pervasive effect of structural racism results in worse COVID-19 outcomes in minority communities.[3] Structural racism is embedded in the fabric of our systems of housing, education, employment, earnings, benefits, credit, criminal justice, and health care – ultimately manifesting in the creation and persistence of health and social inequities.[4,5]

With the development of highly effective and safe COVID-19 vaccines, it is imperative that communities of color and social vulnerability have equitable vaccine access. During the beginning of the US vaccine rollout, vulnerable populations – especially racial/ethnic minorities – did not have equitable vaccine access. Per data from the US Centers for Disease Control and Prevention (CDC), racial disparities in vaccination persisted even after July 23, 2021, when more than 187 million people had received at least 1 dose.[6] As reported by the Kaiser Family Foundation, there remained a consistent pattern across states of Black and Hispanic people receiving smaller percentages of vaccinations compared to the percentages of cases, deaths, and total population among these groups.[7]

Non-Hispanic Black populations comprise 7% of the Wisconsin population but, as of September 2021, had received only 3.9% of total vaccinations while representing 8% of cases, 12.2% of hos-

pitalizations, and 7.6% of deaths.[8] Milwaukee County, a county with a history of significant segregation,[9] has a higher percentage of non-Hispanic Black residents (27.2%);[10] however, this population received only 17.4% of total first vaccine doses, and just 43% of residents in high social vulnerability index (SVI) census tracts received at least 1 dose of the vaccine compared to 53.8% of the total population as of September 2021.[11]

Historically, minority communities have experienced lower rates of adult immunization compared to White communities.[12,13] The causes of disparities in adult immunization are multifactorial, and many are manifestations of the downstream effects of structural racism. Barriers to vaccination include, but are not limited to, problems with access and cost;[14,15] differences in knowledge, attitudes, and beliefs, including well-founded mistrust of the medical establishment by minority populations due to a long history of medical discrimination and abuse;[16,17] and poor health literacy; misinformation; and the antivaccine movement.[18,19]

COVID-19 vaccine immunization scheduling through patient portal notification is cost-effective but has the potential to worsen health disparities. People who are older, less educated, economically disadvantaged, and from racial/ethnic minorities are less likely to have access to digital health information[20-22] and, thus, are put at a distinct disadvantage when these notification methods are used.

Leveraging the eagerness to contribute toward combating disparities during the COVID-19 pandemic and building off successful telehealth interventions across the nation,[23-24] our general internal medicine (IM) clinic created a telephone outreach initiative for patients aged 65 and older who lacked patient portal access. Our objective was to reduce disparities in COVID-19 vaccine access for the Black and socially vulnerable populations unintentionally excluded by our health system's patient portal-driven COVID-19 vaccination outreach.

METHODS

Setting and Participants

The study setting is a large urban academic general IM clinic serving over 12 000 patients, with 19 faculty physicians, 7 advanced practice providers, and 45 residents. The clinic employs 2 community health workers (CHW) who assist with community outreach to the most vulnerable patients. It is part of a large nonprofit health system consisting of 1 tertiary care hospital, 4 community hospitals, and nearly 40 outpatient clinics providing 1.1 million outpatient visits per year. The clinic serves a high share of patients who are non-Hispanic Black (32.7%), rely on Medicare/Medicaid (27.8%/15.6%, respectively), and live in ZIP codes with majority high SVI census tracts (36.8%).

The clinic cares for 4296 patients aged 65 and older, including 25.6% who do not have access to their patient portal. For these patients, significant disparities exist in patient portal access between non-Hispanic White and non-Hispanic Black patients (87.9% vs. 42.9%), ZIP codes composing majority high versus low SVI census tracts (51.9% vs. 85.2%), and those with Medicaid and/or Medicare versus those with commercial insurance (89.7%) (Table 1).

Table 1. Patients Age 65 and Older With Portal Access

Demographic	Category	Active Patient Portal
Race/Ethnicity	Non-Hispanic Black	42.9%
	Non-Hispanic White	87.9%
Neighborhood	High social vulnerability index	51.9%
	Non-high social vulnerability index	85.2%
Payor	Medicare only	82.0%
	Medicaid only	51.6%
	Medicare + Medicaid	43.2%
	Commercial	89.7%

Our institution granted this project an Institutional Review Board exemption as a quality improvement project.

Intervention

Beginning January 22, 2021, the health system deployed a COVID-19 vaccination strategy driven by patient portal notification and scheduling, which was supplemented by other means of access for those without portal access. A message with a link to schedule a vaccination appointment electronically was sent to all patients aged 65 and older who receive primary care within the health system. Letters with scheduling phone numbers were sent out via US mail to those without patient portal access.

From February 1 through April 27, 2021, medical students, CHWs, primary care physicians, internal medicine residents, clinic staff, and advanced practice providers provided telephone outreach to patients aged 65 and older without patient portal access. After the first 3 to 4 weeks of phone calls, staff also called patients with patient portal access who had not received their COVID-19 vaccine, when it was believed that the majority of patients without portal access had been called. Of note, in subsequent waves of vaccine allocation, the health system intentionally delayed the release of patient portal messages several days to allow for more high-risk patients to be contacted first.

Medical student volunteers were recruited from clerkships and via mass emails through the Medical College of Wisconsin. Students worked 4-hour shifts from a shared patient list in the electronic health record. A detailed workflow was created to standardize outreach between staff members, and backup support from attending clinicians was available via telephone.

During the calls, project staff discussed vaccination for eligible patients. Unsure patients were counseled about the safety and efficacy of the vaccine using information from evidence-based government and health system websites. Patients who declined vaccination were referred to their primary care provider if they had more questions. CHWs were able to schedule patients for vaccination

directly. For non-CHW callers, if during business hours, a vaccine scheduler from the clinic contacted patients; if after business hours, patients were provided the COVID-19 hotline number to schedule vaccination themselves. Some limited resources were available to provide vaccines to homebound patients, including home visits by emergency medical service personnel.

Data Analysis

A retrospective analysis was conducted on patients completely without or without an active patient portal (ie, portal use within the last year) who received the COVID-19 vaccine from February 1 through April 30, 2021. Patients also had to have a Wisconsin address and have completed a visit (ie, office visit, home health, virtual checkin, telemedicine) with a primary care clinician in our health system within 36 months of February 1, 2021. Descriptive statistics of patient characteristics were assessed between the patient populations that did and did not receive telephone outreach. The odds ratio of vaccination was compared between those who did and did not receive outreach. A univariate analysis was completed, followed by adjusted multivariate models: sex, age, and race/ethnicity in model 1, adding primary payor and SVI in model 2, and adding Elixhauser Comorbidity count[25] in model 3. Complete statistical analyses were performed using SAS statistical software. A P value <0.05 was considered statistically significant. SVI is a measure adopted by the CDC that uses 15 variables to reliably predict a community's risk from a natural or human-caused disaster and that community's potential resource need.[26] The SVI is based on census tract, and geomapping was utilized to determine SVI based on patients' addresses.

RESULTS

Forty medical students volunteered to engage in outreach and signed up for a total of 139 shifts. Two CHWs devoted approximately 50% of their 40-hour workweek to outreach over the initial 3 weeks, then approximately 25% of their workweek thereafter. A total of 2018 patients received outreach calls, the majority of which were completed by CHWs (941 calls) and medical students (863 calls). Some outreach calls were made to individuals with patient portal access as outlined in the program description above, and some of the individuals who received calls had already received vaccination (9%). Intervention outcomes and documented reasons for vaccination denial are in Tables 2 and 3. Overall, 23% of patients were reached and willing to schedule vaccination, 38% could not be reached directly or a message was left, and 13% refused vaccination. Reasons for refusal included the following: no reason (23%), desire to talk with family or primary care clinician (22%), concern about side effects (13%) and physical health effects (10%), location (10%), and lack of trust in the vaccine (10%).

From February 1, 2021, though April 30, 2021, a total of 1466 patients aged 65 and older and without active patient portals were eligible to receive the COVID-19 vaccine. Of these patients, 664 received telephone outreach, including 382 (57.5%) who got vaccinated compared to 486 who got vaccinated out of 802 patients who did not receive outreach (60.6%) ($P=0.2341$) (Table 4). Those who received outreach were more likely to be female (70.2% vs 64.8%; $P=0.03$), younger (age 74.5 vs 76.6; $P<0.0001$), non-Hispanic Black (68.8% vs 49.3%; $P<0.0001$), from a high SVI census tract (68.8% vs 52.7%; $P<0.0001$), and have higher Elixhauser Comorbidity Counts (8.3 vs 7.2; $P<0.0001$) (Table 4).

Logistical analysis revealed an odds ratio with a nonstatistically significant trend favoring higher vaccination likelihood in the no outreach cohort; univariate analysis revealed no changes when adjustment was made for age, sex, race/ethnicity, payor, SVI, and Elixhauser Comorbidity count. (See Table 5.) We examined the impact of the intervention, stratified by the factors in the model, and saw no differences.

Table 2. Outcomes of Outreach Calls

Outcome	% (n = 1205)
Reached, willing to schedule	23%
Did not answer, unable to leave message	20%
Did not answer, spoke with family member, or left message	18%
Reached, refused	13%
Reached, already vaccinated	9%
Reached, unsure, not willing to schedule	8%
Reached, unsure, willing to schedule	3%
Other	3%
Already scheduled	2%
Unknown	

Table 3. Reasons for Refusal of Vaccination

Reasons	% (n = 290)
Adamantly refused, no reason given	23%
Want to discuss with family member or primary care clinician	22%
Side effects and safety	13%
Health concerns	10%
Location (access, convenience)	10%
Don't trust or believe in vaccines	10%
Want more people to get vaccinated	9%
"I'm healthy," "don't go out," or "had COVID already."[a]	6%
Out of state	6%
Waiting for another type of vaccine available (Johnson and Johnson)	4%

[a]Patients may have selected multiple reasons

DISCUSSION

The program described here is a novel method of augmenting modern patient portal outreach with telephone outreach aimed at improving health outcomes for patients without patient portal access. Of note, 802 COVID-19 vaccination-eligible patients without patient portals did not receive outreach calls, which became evident only during our retrospective analysis, indicating a program oversight. Based on the analysis above, the telephone out-

reach did not lead to a higher likelihood of vaccination. However, lessons learned can help clinicians and health systems as they work to improve health equity—a key focus of current population and public health efforts in the United States and in medical education. We learned about the importance of convenience in vaccine scheduling and locations, the importance of trusted messengers, the limitations of telephone outreach, and the multiple structural barriers preventing vaccination.

There are myriad reasons for the outreach program's lack of efficacy. Medical student volunteers could not directly schedule patient vaccinations. If a medical student was able to successfully convince a patient to receive the vaccine, the additional step of waiting for another scheduling call or calling the scheduling number themselves created an additional structural barrier to vaccination. CHWs were able to directly schedule vaccinations, so further analysis could investigate the difference between medical student and CHW outreach in the likelihood of vaccination. Allowing for all callers to have the ability to directly schedule appointments would be an important change for future telephone interventions. Additionally, the general IM clinic itself was not a vaccination site at the time of the telephone outreach initiative; instead, patients were directed to other institutional vaccination sites. The loss of a familiar location to get vaccinated may have contributed to vaccine hesitancy and was noted in 10% of the responses from patients who refused vaccination.

Table 4. Patients Age 65+ Without Patient Portal Access Eligible for COVID-19 Vaccine: Outreach Characteristics

	Received Outreach		
	No	Yes	*P* value
Count (n = 1466)	802	664	
Sex			0.0300
Female	520 (64.8%)	466 (70.2%)	
Male	282 (35.2%)	198 (29.8%)	
Age			< 0.0001
Mean ± SD (minimum–maximum)	76.6 ± 8.4 (65.0 – 100.0)	74.5 ± 7.4 (65.0 – 97.0)	
Median (IQR)	75.0 (70.0 – 82.0)	73.0 (69.0 – 79.0)	
Race/Ethnicity			< 0.0001
Non-Hispanic White	357 (44.5%)	177 (26.7%)	
Non-Hispanic Black	395 (49.3%)	457 (68.8%)	
Hispanic	33 (4.1%)	23 (3.5%)	
Asian/Other	17 (2.1%)	7 (1.1%)	
Primary payor			0.1292
Medicare	722 (90.0%)	602 (90.7%)	
Medicaid	37 (4.6%)	40 (6.0%)	
Commercial	23 (2.9%)	9 (1.4%)	
Other/no insurance	20 (2.5%)	13 (2.0%)	
Social vulnerability index (SVI) status			< 0.0001
Low SVI < 0.75	379 (47.3%)	207 (31.2%)	
High SVI 0.75+	423 (52.7%)	457 (68.8%)	
Elixhauser Comorbidity Count			< 0.0001
Mean ± SD (minimum–maximum)	7.2 ± 4.6 (0.0 – 24.0)	8.3 ± 4.5 (0.0 – 22.0)	
Median (IQR)	6.0 (3.0 – 10.0)	8.0 (5.0 – 11.0)	
COVID-19 Vaccination			0.2341
No	316 (39.4%)	282 (42.5%)	
Yes	486 (60.6%)	382 (57.5%)	

Table 5. General Internal Medicine Patients Age 65+ Without Patient Portal Access Eligible for COVID-19 Vaccine – Vaccination Logistic Analysis (Primary Predictor: Received GIM Outreach)

	Univariate Model		Multivariable Model (Sex, Age, Race/Ethnicity)		Multivariable Model 2 (Model 1 + Payor, SVI)		Multivariable Model 3 (Model 2 + Comorbidity Count)	
Variable	OR (95% CI)	*P* value	OR (95% CI)	*P* value	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Outreach		0.23		0.28		0.30		0.22
No	Ref		Ref		Ref		Ref	
Yes	0.88 (0.71 – 1.09)		0.89 (0.72 – 1.10)		0.89 (0.72 – 1.11)		0.87 (0.70 – 1.09)	

Through a separate qualitative analysis of the medical student experience providing this telephone outreach, medical student volunteers noted the importance of the "trusted messenger" role.[27] An additional hurdle of telephone outreach is that callers were cold-calling patients. Lacking a prior relationship with the patient may dramatically increase the difficulty of changing the mind of a patient who has concerns regarding vaccination.

It is also clear that telephone outreach alone will not eliminate structural barriers preventing vulnerable populations from getting vaccinated. There are many structural barriers to effective care for Black and vulnerable populations—especially in Milwaukee—including, but not limited to, structural racism, historical redlining, medical racism, health literacy, transportation, distance to health care facilities, health insurance, safety, finances, lack of sick and vacation time, and lack of childcare.[28-34] Telephone outreach only serves to create awareness of the vaccination opportunity and improve health literacy, while having minimal effect on the other aforementioned barriers. This would need to be addressed through other interventions.

Similar to our study—which showed that among people who declined the vaccine, 13% were worried about side effects and safety, 10% did not trust or believe in vaccines, and 9% wanted

more people to get vaccinated first—a survey of over 5 million people demonstrated that fear of side effects, not trusting the vaccine, not trusting the government, and waiting to see if vaccinations were safe were the primary reasons to not get vaccinated.[28] For Black, Latinx, Indigenous, and Asian American populations in this country, a long history of medical mistreatment has resulted in a deep-seated generational mistrust of medicine and science.[29] Thus, the role of trusted messengers highlighted above may be minimal in relation to the myriad other structural barriers our patients face toward equitable health care.

For many of our patients, the specific ZIP code in which they live in Milwaukee directly affects their health.[30] Due to historical redlining—discriminatory practices of denying minority populations access to equal loan and housing opportunities—Milwaukee is one of the most segregated metropolitan areas in the United States.[31] Racially hypersegregated neighborhoods in Milwaukee led to lack of investment and infrastructure in predominately Black communities, directly resulting in worse educational opportunities and health care access and food deserts—all leading to worse health outcomes among many other persisting downstream effects. Not only does Milwaukee rank consistently worst or near-worst across 30 indicators of racial inequality and last on a composite index of Black community well-being,[32] inequalities for Milwaukee's Black communities are worse today than they were 40 or 50 years ago.[33]

Ensuring access to transportation or bringing vaccination directly into the communities is vitally important to achieving health equity. The local community did provide a few resources to mitigate these factors. Fire departments provided home visits to vaccinate homebound patients, but significant delays of up to a month reduced the service's efficacy toward lowering disparities. The city health department deployed mobile vaccination clinics and local vaccine clinics at schools throughout metropolitan Milwaukee that likely had an impact. However, more can be done. Improving these structures and systems in the city could have profound effects on population health. During efforts locally and nationally to improve vaccine access, it is crucial to not use vaccine hesitancy as a scapegoat for structural racism and mask the fundamental inequalities of vaccine access, putting the focus on the individual rather than the systems perpetuating inequality.

Successful interventions both in Milwaukee and around the United States took the vaccines directly into the communities where patients live, work, and play. Mobile units, pop-up clinics, and partnering with local faith-based organizations, barber shops, and sports teams all have been shown to be effective. Partnering with trusted individuals and organizations has proven to be an essential component of any community intervention.[34] These are important lessons that should be applied to any future public health equity-focused intervention.

In terms of achieving health equity, a limitation of telephone outreach is the obvious exclusion of patients without telephones. Despite standardization of our outreach and formal training, inter-interview differences in approach may have introduced additional variability in vaccine uptake. Limitations to our logarithmic analysis include a stark difference between the population without patient portal access that did and did not receive outreach—most notably in race/ethnicity ($P<0.0001$) and SVI status ($P<0.001$), with more non-Hispanic Black patients (68.8% vs 49.3%) and high SVI (68.8% vs 52.7%) (Table 4). This, in part, was an intended effect of the telephone outreach as some outreach days were dedicated to call non-Hispanic Black patients and those living in high SVI census tracks. Further, our study was completed at a single institution for a single type of preventive health outreach; thus, data may not be applicable to other health equity focuses or other locations or health systems.

CONCLUSIONS

Our study attempted to address COVID-19 vaccination patient portal health disparities through telephone outreach but was not successful in increasing vaccination rates. Through our outreach program, we discovered vaccination site convenience, vaccine appointment scheduling, and cold-calling and lack of trust as significant barriers for vaccination. Through further reflection, we highlight the various ways in which effects of structural racism creates obstacles to vaccination and suggest solutions to overcome these obstacles. One of the most important lessons learned from our institutional and national efforts to achieve COVID-19 vaccination equity is the necessity of a multifaceted approach engaging not only health systems but also public health and community systems to directly address the pervasive effects of structural racism perpetuating health inequities.

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