

**Use of an Analytics and Electronic Health Record-Based Approach for Targeted COVID-19 Vaccine Outreach to Marginalized Populations**

Equity in vaccine outreach and delivery has been prioritized given the disproportionate harms of the COVID-19 pandemic on communities of color and those with lower socioeco-

conomic status.<sup>1,2</sup> Health systems have largely communicated availability or signup for vaccines to patients through electronic patient portal messages, emails, or online materials; however, rates of portal use and internet access are limited among rural populations, individuals with lower socioeconomic status, and racial and ethnic minority patients.<sup>3,4</sup> For purposes of this analysis, these groups are referred collectively as marginalized populations. Reliance on these media as the primary means for communication may inadvertently widen vaccination disparities.

Patients with cancer are at increased risk of COVID-19 complications; therefore, they are a priority for vaccination.<sup>5</sup> At the North Carolina Cancer Hospital of the University of North Carolina (UNC) Health System (Chapel Hill, North Carolina), we used an analytics-based approach to identify and contact patients who might benefit from targeted nonelectronic communication regarding COVID-19 immunization.

**Methods** | Using the electronic health record, we identified patients who received cancer therapy during the past year with follow-up scheduled, without an active patient portal account, no valid email on file, or who lived in a county with a greater than 20% poverty rate across multiple census points. We applied eligibility criteria for vaccination in North Carolina as they evolved, commencing with those older than 75 years. These criteria were developed over 3 weeks by the analytics and quality-improvement team within the cancer hospital, comprising physician and nursing leadership. A group of 4 nurses then placed scripted, informational telephone calls to each identified patient to provide standardized education about the eligibility, safety, and logistics of vaccination. Their approach was to aid patients in making informed decisions about vaccination, address identified barriers to vaccination when able, and respond to patients' questions or concerns. Institutional review board approval was performed, and the study was determined to be exempt because it was deemed non-human participants research. Race and ethnicity were self-reported.

**Results** | Between January and March 2021, we identified 536 potentially marginalized UNC patients who were eligible for COVID-19 vaccination (Table). Of these, 326 (61%) were non-Hispanic White and 172 (32%) were Black, with 70 (14%) from counties with persistent poverty. Nearly all identified patients were called (>99%), with 350 (67%) successfully reached and 46 (9%) who received voicemails. Among Black patients, 203 (75%) were reached, and 70 patients (93%) from counties with high levels of poverty were contacted. Overall, the mean (SD) duration of phone calls was 4.3 (4.1) minutes. As of April 2, 2021, 93 of 359 contacted patients (26%) were confirmed to have received vaccination via electronic health record review or self-report, with another 14 of 359 (4%) scheduled for a vaccination appointment at UNC.

**Discussion** | Our targeted outreach efforts identified and connected with patients who do not regularly use electronic communication and whose community networks may have been disrupted by the social isolation of the COVID-19 pandemic.

**Table. Characteristics of Outreach Patient Population**

Population	No. (%)
Total patients identified	536
Total outbound calls	555
Contacted successfully	350 (67)
Voicemail left	46 (9)
Confirmed vaccination	97 (18)
Unreachable after 3 attempts	19 (4)
Demographic characteristics	
Non-Hispanic White race and ethnicity	326 (61)
Reached successfully	203 (62)
Black race	172 (32)
Reached successfully	129 (75)
From counties with persistent poverty	75 (14)
Reached successfully	70 (93)
Counties reached in North Carolina (of 100)	59 (59)
Characteristics of outreach calls	
Mean (SD) duration of phone call, min	4.3 (4.1)
Individuals with a vaccine appointment or vaccination after follow-up call	107 (30)

This novel intervention demonstrated the potential benefits of an analytics-based strategy to reach marginalized patients at high risk for exclusion from electronic outreach and may be built on for future outreach programs. A limitation of this analysis is that this is likely an underestimation of vaccination rates, as vaccines received or scheduled at outside sites were not captured in the electronic health record. No control arm was included; thus, we do not know how many patients would have received vaccines without this initiative. However, these patients would likely have been missed by our electronic outreach efforts, and preliminary qualitative feedback from patients suggests that the calls aided them in their decision to proceed with vaccination. Additionally, our calls identified numerous patients with unmet clinical or social needs. While not the intended goal of this project, and thus not consistently tracked, mitigating barriers became an integral part of this effort and may have yielded positive patient experiences and increased the ability for patients to become vaccinated.

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**Author Contributions** Drs Basch and Stein had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

*Concept and design:* Stein, Fasold.

*Acquisition, analysis, or interpretation of data:* All authors.

*Drafting of the manuscript:* Stein, Fasold, Cheek.

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*Other - participated in the project work this article is referencing:* Cheek.

*Other - active participant in outreach; designed workflows; assisted with edits.:* Daguerre.

*Other - participated in outreach calls to patients regarding the COVID-19 vaccine:* Richardson.

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