



## Short communication

## COVID-19 vaccination program at a student-run free clinic: A descriptive study

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## ABSTRACT

People historically excluded from receiving medical care in the United States, in addition to being at greater risk for SARS-CoV-2 infection, have had slower vaccine uptake due to structural barriers to availability. We present one student-run free clinic's SARS-CoV-2 vaccination program from January 15 to August 1, 2021, in Nashville, Tennessee. We tracked SARS-CoV-2 vaccine primary series completion among 273 free clinic patients with the help of medical student volunteers, who scheduled appointments and answered vaccine-related questions. We worked with our academic medical center partner to host a single-dose vaccination event at our clinic. We compared vaccine series completion in our clinic to adult vaccine completion in Davidson County, Tennessee on August 1, 2021. Of the 273 free clinic participants, 144 identified as Spanish-speaking (52.7%) and 172 (63%) had at least one qualifying comorbidity per the December 30, 2020, Tennessee COVID-19 Vaccination Plan. As such, 183 (67%) were characterized as vaccine eligible in Phase 1a2, 1b, or 1c. On August 1, 2021, 63.1% of free clinic patients had completed their primary SARS-CoV-2 vaccination series compared with 58.9% of adults in Davidson County, Tennessee (RD 4.2%, 95% CI: -1.5% to 9.9%). Spanish-speaking free clinic patients were most likely to have completed their vaccination series. We describe a framework for a patient-centered vaccination effort to reach individuals traditionally missed by large vaccination campaigns. We highlight structural hurdles experienced by vulnerable populations, including language barriers, lack of technology or reliable internet access, inflexible working schedules, lack of transportation, and vaccine misinformation.

### 1. Introduction

Uninsured and underserved individuals suffer from a high chronic disease burden and have limited access to recommended vaccinations for communicable diseases (Figaro and Belue, 2005; Wiersma et al., 2010). Student-run free clinics (SRFCs) provide essential health services, including vaccinations, at no cost to these marginalized populations. Shade Tree Clinic (STC) is a SRFC associated with Vanderbilt University Medical Center (VUMC) in Nashville, TN that serves as the medical home for approximately 300 adult ( $\geq 18$  years old) patients without insurance. Over half of STC's patients speak a primary language other than English. In addition, many STC patients have at least one chronic medical condition, with approximately 36 % diagnosed with diabetes

and 45 % with hypertension (Shade Tree Clinic, Annual Report 2019–2020, 2021). Beyond providing primary and specialty care, STC has led vaccine outreach efforts for their patients and the wider Nashville community, with an emphasis on refugees, people without health insurance, and people without housing (Brown et al., 2021b; Shade Tree Clinic, Annual Report 2019–2020, 2021).

As the COVID-19 pandemic highlighted the longstanding health inequities that many SRFCs attempt to address (Wilkins et al., 2021), vaccination efforts have become central to the cause. We describe STC's COVID-19 vaccination program from January 1 to August 1, 2021. We compared STC's vaccine uptake to uptake among adults in Davidson County, Tennessee during the same period.

**Abbreviations:** COVID-19, Coronavirus Disease 2019; SARS-CoV-2, Severe Acute Respiratory Syndrome Coronavirus 2; STC, Shade Tree Clinic; TennIIS, Tennessee Immunization Information System; VUMC, Vanderbilt University Medical Center.

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## 2. Methods

### 2.1. Study sample and measures

This longitudinal descriptive study included all STC patients on our active panel, patients seen in clinic in the last calendar year, on January 3, 2021 (n = 273). We extracted age, sex, problem list, body mass index, and self-identified race, ethnicity, and preferred language (Spanish, English, Other) from the medical record. Race and ethnicity were combined into race/ethnicity (Hispanic/Latino/a, Non-Hispanic Black, Non-Hispanic White, Other) to avoid identifying patients. We used the Tennessee COVID-19 Vaccination Plan (December 30, 2020) (Fiscus, 2021) to categorize patients into eligibility phases based on their age and eligible comorbidities (Fig. 1). Phase 1a2 included all health care workers and those 75 +. Phase 1b included school and childcare staff, first responders, and those 65 +. Phase 1c included those 16 + with eligible comorbidities (kidney disease, diabetes, obesity, heart disease, smoking, autoimmune disease, liver disease, dementia, asthma, and chronic obstructive pulmonary disease) (Fiscus, 2021). We could not further characterize the patients in Phase 2 + because we did not have access to occupation data in the medical record. STC patients were followed from the start of Phase 1a2 (January 15, 2021) through August 1, 2021. Given the small number of STC patients vaccinated in Phase 1a1, we did not report on vaccinations prior to January 15, 2021, to avoid inadvertently identifying them. This project determined exempt from review by the VUMC Institutional Review Board (#211175).

Fig. 1 shows primary SARS-CoV-2 vaccine series completion (second dose of a two-dose vaccine or one dose of single-dose vaccine) among STC patients and 18 + year-old Davidson County residents (based on CDC data). The annotations represent when Davidson County residents (which includes Nashville) were eligible to receive vaccines as the rollout progressed and STC’s single-dose vaccine event. RD denotes risk difference and CI denotes confidence interval.

### 2.2. Vaccination tracking

We created a HIPAA-secure online tracking spreadsheet, and six

medical students (two bilingual) were assigned to schedule approximately 45 patients when eligible so that each student was responsible for following similar numbers of patients from January 15 to April 5, 2022 (the date of our on-site event, described below). We used interpreter services for language-discordant patients. Students recorded vaccine type, scheduled/completed dose dates, and vaccination location.

### 2.3. Patient scheduling

Schedulers coordinated with VUMC Patient Access Services to book appointments via phone and email. Patients who reported previous community vaccination were noted in the spreadsheet. Patients eligible for vaccination were scheduled at a VUMC vaccination clinic based on their availability. Students confirmed appointments with patients and provided reminders by phone call or text message for their appointments. When vaccinations became more broadly available, patients were presented with community-based options. Students maintained regular contact with patients who initially deferred vaccination to learn about barriers to vaccine access and answer their questions.

After the on-site vaccination event (described below), patients were scheduled for vaccine appointments at VUMC or community centers when they attended regular primary and specialty care appointments at Shade Tree Clinic (April 5 to August 1, 2022). The tracking spreadsheet allowed first year medical and nursing students to determine whether each individual patient was due for vaccination and record community vaccinations identified at clinic.

### 2.4. On-site vaccination event

In direct response to patient concerns about transportation and difficulty getting time off work to complete a two-dose vaccine series, we organized an on-site weekend event in April 2021 to provide the single-dose Johnson & Johnson Janssen vaccine. This event was modeled after STC Influenza Vaccine Outreach Program events (Brown et al., 2021b). Vaccine doses were supplied by the VUMC Adult Clinic Pharmacy, reconstituted by a licensed on-site pharmacist, and continuously monitored for temperature and time since reconstitution. Beyond scheduling

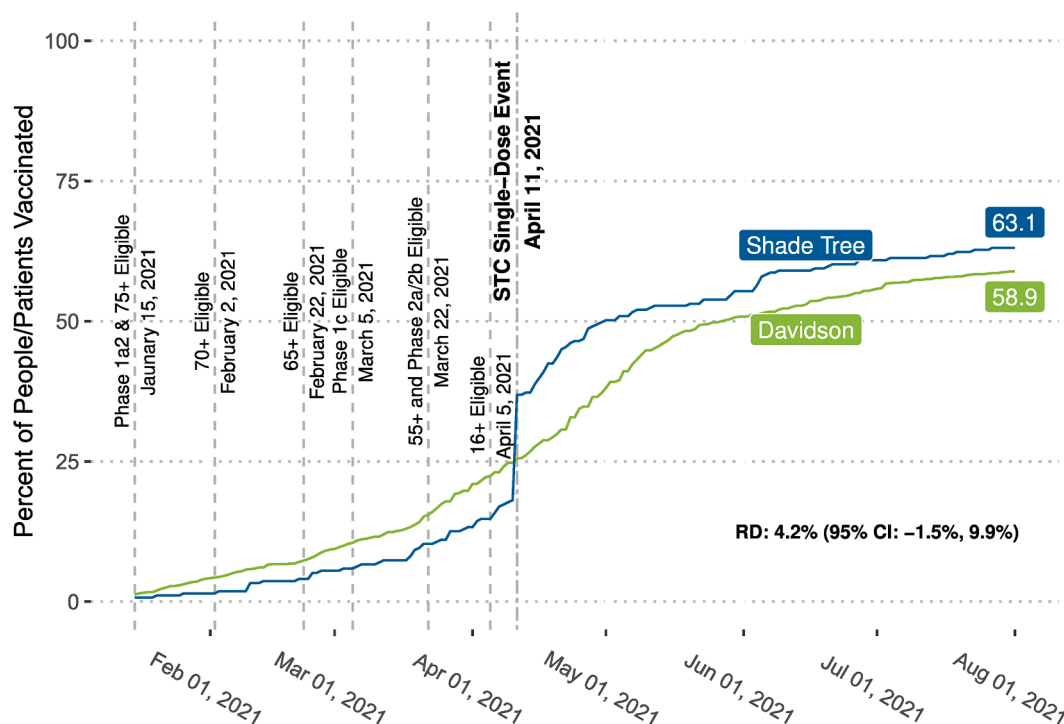


Fig. 1. SARS-CoV-2 vaccination series completion in Shade Tree patients and Davidson County adult residents.

the event at a convenient time and familiar location, a Sunday afternoon at STC, we did not provide additional patient incentives.

Ten medical students (three bilingual) were recruited for patient intake and consent, interpretation, vaccine administration, and record keeping. Under physician supervision, vaccines were administered by trained medical students and recorded in the patient’s electronic health record. For non-Vanderbilt patients, their vaccination information was manually entered into the state vaccination registry, Tennessee Immunization Information System (TennIIS) (“[TennIIS-Web Main Page](#),” 2022). Patients were monitored for 15–30 min following vaccination.

2.5. Data analysis

On August 1, 2021, we extracted de-identified data from the tracking spreadsheet. Primary series completion (receipt of the second dose of a two-dose vaccine or one dose of single-dose vaccine) – the primary outcome of interest – in STC patients was compared to series completion among adults (18 + years) in Davidson County, Tennessee from January 15 to August 1, 2021 (CDC, 2021). Vaccine series completion among adults in Davidson County, Tennessee was calculated from the number of people aged 18 + living in Davidson County who completed their primary vaccination series divided by the estimated Davidson County population aged ≥ 18 years old from 2019 census data (CDC, 2021). We calculated the risk difference and 95 % confidence interval between primary vaccination series completion in STC patients compared to adults living in Davidson County (Sullivan, 2022). We compared STC patient demographics and health status that of Davidson County residents with 2019 data from Nashville Health (Johnson et al., 2019). We also described STC patient vaccine series completion by age, gender, race/ethnicity, and language to assess vaccine accessibility across time

(TN Department of Health (TN DOH) Downloadable Database [WWW Document], 2022). All data cleaning and manipulation were conducted in R Statistical Software (4.1.0).

3. Results

Included patients (n = 273) had a median age of 49 (interquartile range: 40–59) and were 56 % (n = 153) female. Most STC patients identified as Hispanic (n = 140, 51.3 %), compared to 10.1 % of people living in Davidson County (Johnson et al., 2019), and/or Spanish-speaking (n = 144, 52.7 %). A majority of STC patients (n = 172, 63 %) had at least one qualifying comorbidity, most frequently obesity (n = 127, 46.5 %) and/or diabetes (n = 91, 33.3 %), and 183 (67 %) were characterized as Phase 1a2, 1b, or 1c per the December 30, 2021, guidelines in Tennessee. Data from Healthy Nashville suggest that 30.6 % and 11.6 % of Nashvillians carried a diagnosis of obesity and diabetes respectively in 2019 (Johnson et al., 2019).

A similar percentage of STC patients completed their primary SARS-CoV-2 vaccination series compared to 18 + year-old Davidson County residents through August 1, 2021 (63.1 % versus 58.9 %, Risk Difference [RD] 4.2 %, 95 % Confidence Interval [CI]: –1.5 % to 9.9 %, Fig. 1). We vaccinated 51 STC patients and 33 community members at our single-dose vaccination event on April 11, 2021. Following the STC vaccine event, a higher proportion of Hispanic-identifying and Spanish-speaking STC patients had completed their vaccine series (Fig. 2).

Fig. 2 shows the proportion of Shade Tree Clinic (STC) patients who had completed their primary SARS-CoV-2 vaccine series (second dose of a two-dose vaccine or one dose of single-dose vaccine) on the first day of each month from March 1, 2021, through August 1, 2021. Age categories (<55, 55–64, 65–69, 70–74, 75 + ) represent how eligibility



Fig. 2. Shade Tree patient SARS-CoV-2 vaccination series completion by age, gender, language, and race/ethnicity.

progressed during the study period. We also present data by sex, race/ethnicity, and language to allow an assessment of how equitable SARS-CoV-2 vaccine administration was at STC.

#### 4. Discussion

STC patients face numerous barriers to care, including lack of reliable transportation, language discordance, physical comorbidities, and inflexible working schedules. Despite these obstacles, as of August 1, 2021, we were able to vaccinate a similar percentage of our patients than the surrounding county (63.1 % versus 58.9 %, RD 4.2 %, 95 % CI: -1.5 % to 9.9 %) despite that our patients were more likely to identify as Hispanic and Spanish-speaking and more likely to be obese or have diabetes than Davidson County residents (Johnson et al., 2019). While we would have liked to compare STC demographic vaccine uptake data to data from the Tennessee Department of Health, they did not provide data on vaccination by language and used different classifications of race and ethnicity (Johnson et al., 2019; TN Department of Health (TN DOH) Downloadable Database [WWW Document], 2022). This was possible due to persistent and collaborative multidisciplinary efforts between medical student volunteers and VUMC's Health System Emergency Operations team.

While our efforts resulted in vaccination in most of our patients, we recognize our individual patient focus is not broadly scalable. Additionally, approximately 37 % of our patients had yet to be fully vaccinated. These elements highlight the need for structural solutions to address the numerous roadblocks patients experience, detailed below.

Like many early mass vaccination centers, VUMC vaccination appointment scheduling relied upon patient self-scheduling through an online portal. While this approach is scalable, it is inaccessible to individuals who are less technologically savvy, who lack the needed equipment or reliable internet access, or who do not read a portal-available language. In our case, STC patients could not utilize the VUMC patient portal due to the organizational structure of our clinic within the larger medical center. Additionally, though a Spanish version has recently become available, the portal remains inaccessible to patients who speak other languages. Our team therefore worked with VUMC Patient Access Services to individually schedule each patient.

Many patients declined early vaccination appointments due to transportation and work restrictions preventing them from making two workday appointments. For patients who were scheduled at a VUMC site, common barriers faced were lack of non-English directions from parking to administration center and lack of onsite interpretation for their appointment. Transportation and language-discordance have been reported as barriers to vaccination in multiple other cohorts (Butler et al., 2022; Balasuriya et al., 2021; Carter et al., 2022). These factors led us to host our on-site Johnson & Johnson vaccination event, which dramatically increased vaccination.

Lastly, vaccine misinformation and hesitancy prevented multiple patients from initially accepting vaccination. We observed a paucity of educational information and outreach for non-English speaking, non-literate, patients who do not engage with the traditional medical community. Fortunately, with regular patient contact over a sustained period, we were often able to address patients' concerns and help them feel comfortable receiving the vaccine.

Our experience demonstrates the numerous barriers many patients face to accessing healthcare through traditional means and emphasizes the need for programs specifically targeting vulnerable populations. This has become even more salient with the continued emergence of novel SARS-CoV-2 variants, highlighting the need to increase community vaccination. Furthermore, two recent studies have demonstrated significantly reduced vaccination rates among individuals living in counties with higher Community Vulnerability Indices and in materially deprived areas, respectively, emphasizing the need for targeted vaccination campaigns in marginalized communities (Carter et al., 2022; Brown et al., 2021a). We hope our report provides a blueprint for other

community clinics to implement patient-targeted vaccination programs and serves as a call to action for medical centers to address system-level obstacles in their efforts to increase equitable healthcare distribution.

#### CRedit authorship contribution statement

**Emilie L. Fisher:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Visualization, Project administration. **Daniel E. Sack:** Conceptualization, Methodology, Software, Formal analysis, Investigation, Writing – original draft, Visualization. **Tavia González Peña:** Investigation, Writing – original draft. **M. Cooper Lloyd:** Resources, Supervision, Writing – review & editing. **Eleanor O. Weaver:** Resources, Supervision, Writing – review & editing. **Tracy M. Hagemann:** Resources, Supervision, Writing – review & editing. **Robert F. Miller:** Resources, Supervision, Writing – review & editing.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data availability

The data that has been used is confidential.

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#### Author contributions

ELF and DES contributed equally to all components of this manuscript, including Conceptualization, Methodology, Software, Formal analysis, Investigation, Writing-Original draft preparation, Visualization, and Project administration. TGP contributed to Investigation and Writing – Original draft preparation. MCL, EOW, TMH, and RFM all contributed to Resources, Supervision, and Writing – Reviewing and Editing.

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### Further reading

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