COMMENTARY

Operationalizing Equity: A Rapid-Cycle Innovation Approach to Covid-19 Vaccination in Black Neighborhoods

Kathleen C. Lee, MD, Nida Al-Ramahi, MHA, Lauren Hahn, MBA, Terrilynn Donnell, Lillian J. Schonewolf, Neda Khan, Christina O’Malley, MHA, Utsha G. Khatri, MD, Ellen Pearlman, MS, Mohan Balachandran, MA, David A. Asch, MD, MBA, W. L. Herndon, Colleen Mallozzi, MBA, RN, Judith Green-McKenzie, MD, MPH, Nishaminy Kasbekar, PharmD, Christopher Cullom, MBA, Sharon Carney, MD, Reverend William Shaw, DMin, Patricia Sullivan, PhD, Phil Okala, MHA, Patrick J Brennan, MD, Eugenia South, MD, MS

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The Covid-19 vaccine rollout has been highly inequitable, with white individuals being vaccinated at higher rates than Black individuals in 38 states. Structural barriers, including Web-based scheduling and the location of vaccine clinics, underlie the inequity. A partnership in Philadelphia sought to overcome these barriers using a rapid-cycle innovation approach to design and implement a multi-health system, community-partnered rotating vaccination clinic. In just 2 weeks, they designed and launched a community clinic model. As of March 2021, they have run three 7-hour clinics, vaccinating a total of 2,821 people, of whom 85% were Black. Logistical innovations allowed the clinics to operate line-free throughout most of the day and with a Net Promoter score of 94, evidencing outstanding patient satisfaction. Here, the authors describe how they leveraged a novel no/low-tech strategy to enable community engagement toward equitable care delivery.

KEY TAKEAWAYS

» Achieving Covid-19 vaccine equity requires intentional and coordinated leadership, prioritization, and resourcing to overcome the inequitable inertia of the status quo.
Engage community leaders early to inform design, activate their networks, and build bridges of trust between health systems and the community around vaccination.

Embrace no/low-tech platforms to support vaccine ambassadorship and distribution.

Reimagine clinic flows to enable an on-time model with minimal to no wait to ensure an uncompromising patient experience.

The Challenge

As the Covid-19 vaccine rollout continues across the United States, a highly inequitable pattern of distribution by race has emerged. In 38 states where data are available, white individuals are being vaccinated at higher rates than Black individuals. In Philadelphia, as of the first week in March, Black residents make up 42% of the population but only 21% of those who have been vaccinated. Unless these vaccination trends are reversed, the disproportionate burden of Covid-19 disease and death borne by Black individuals will only worsen.

Several structural barriers underlie the inequitable vaccine distribution process. For example, age-based eligibility requirements disfavor Black individuals whose shorter life expectancies are themselves products of longstanding racial injustice. Many vaccine distribution centers have adopted a Web- and app-based scheduling approach less accessible to Black communities due to the racial digital divide and lack of time to scour the Internet for appointments. The location of vaccine clinics has been largely limited to health systems, chain pharmacies, and large venues like convention centers more easily accessed by white individuals.

The Goal

We sought to overcome the structural barriers preventing Black Philadelphians from getting vaccinated. We used a rapid-cycle innovation approach to design and implement the Mercy & Penn Medicine & The Community #VaccineCollaborative, a novel multi-health system, community-partnered Covid-19 vaccination clinic leveraging the strengths of each partner to:

- Enable grassroots community Covid-19 vaccine ambassadorship
- Locate rotating clinics in the heart of Black neighborhoods
- Leverage a no/low-tech hybrid automated text message and phone-based sign-up and intake platform
- Reimagine clinic flows for adaptable and scalable efficiency in a variety of community settings

The Execution

Penn Medicine (a large academic health system), Mercy Catholic Medical Center (a community teaching hospital), and Black community leaders joined together in an equal partnership to form
a Vaccine Collaborative. We leveraged the comparative strengths of each partner including experience mass vaccinating staff and using innovation to solve health care delivery challenges (Penn), a strong community health footprint (Mercy), and deep knowledge of the desires and preferences of residents (Community leaders) to resource and run a weekly free community vaccine clinic.

“**In Philadelphia, as of the first week in March, Black residents make up 42% of the population but only 21% of those who have been vaccinated.**"

The clinic was designed to rotate through different community sites in predominantly Black neighborhoods in West and Southwest Philadelphia. To date, we have operated three first dose Moderna clinics out of a church, a recreation center, and a high school gym, with second dose clinics scheduled in the same locations. While mass vaccination sites are important for vaccinating large numbers of Americans, smaller clinics located in Black communities will remain important for closing the racial vaccination gap.

Community faith leaders served a critical role in activating their networks and building a bridge of trust between the health systems and the community around vaccination. Our partnership began with conversations between senior health system leaders and a single pastor, who subsequently facilitated engagement with over 20 pastors from West and Southwest Philadelphia Black churches.

The team’s first priority was to ensure that the pastors themselves felt comfortable recommending the vaccine to their congregations. Initially, health system leaders met virtually with all pastors to answer questions about the vaccine and reach agreement on the vaccine clinic concept, scale, and initial clinic site. All the pastors took the vaccine at the first clinic, at their own suggestion, as a visible demonstration of their endorsement to the community (Figure 1).
Two faith leaders then cohosted a virtual event for all congregants with Black physician leads who recounted their own vaccine hesitancy, provided scientific information about the vaccine, and fostered a nonjudgmental space for vaccine questions to be answered. The event was recorded for repeated use by new community partners that have since joined the vaccine collaborative, including registered community organizations, senior centers, community health workers, and a network of Black barbershops and salons. Additionally, the Black Physician leads partnered with WURD, a Black-owned and operated talk radio station for a focused segment on the Covid-19 vaccine and the community clinics.

We sought to overcome the structural barrier associated with online vaccine appointment sign up through a no/low-tech, automated approach to self-scheduling and wait-list management. Early input from community partners during the design phase informed development of both a text message sign up (Figure 2) and a parallel no-tech phone-based strategy. Both platforms allowed patients to self-schedule and encouraged them to schedule on behalf of friends and family who were unable to do so themselves.
The automated text message program determines medical and city-based eligibility and collects demographics and allergy history. Individuals then pick a first and second dose appointment time. The phone-based interactive voice recording (IVR) sign up initially required volunteers to call eligible individuals to complete their registration. By the second clinic, the system was fully automated to allow for phone-based self-scheduling. To further ensure inclusivity, we worked closely with community leaders to identify individuals who struggled to sign up on either platform and performed phone-based outreach. The program also delivers automated appointment reminders and post-vaccination side effects guidance.

"The clinic was designed to rotate through different community sites in predominantly Black neighborhoods in West and Southwest Philadelphia."

The automated systems converted into “wait-list mode” when appointments were filled, and these individuals were either called the day of a clinic in the event of no-shows or added to an outbound sign-up campaign for the following clinic. The clinic also accommodated on-site wait-list sign up for walk-ins.

Streamlined and distinctive clinical documentation materials:
We designed a primarily paper-based on-site process to limit dependence on electronics and Internet connectivity. Patients received an oversized yellow double-sided clinic passport that consolidated all required consent and clinical documentation materials, thus eliminating the need for repeated transcription of patient identifiers. The distinct color and size helped staff across different stations easily document their critical actions, as well as ensured collection of the passport prior to patient departure.

Clinicians were provided with preprinted labels of their names, credentials, and vaccine lot numbers to decrease the effort required to repeatedly sign documentation.

**Harmonized sign-up platform and paper-based clinical documentation systems:**

A simple, automated Microsoft Excel–based system organized the clinic schedule and key reporting fields. Self-reported data from the automated sign-up systems were preprinted on clinic passports, eliminating the possibility of check-in bottlenecks caused by written form completion.

On arrival, patients were directed to check-in lanes by last name, and were asked to confirm their self-reported data.

The Excel program also labeled any patients reporting a high-risk allergy with a capitalized red “ALERT” directly on their passport.

Passports were logged in an electronic database at check-out. The consolidated process improved operational efficiency and reduced dependence on power sources and electronics.

**Modularized training and pods for increased adaptability:**

We engineered a flexible volunteer-based staffing model to eliminate the typical bottleneck occurring at the consent stages to manage both predictable and unpredictable surges.

We consented patients in groups of up to eight, to ensure a substantive consenting experience while simultaneously decompressing a traditional process bottleneck (Figure 3). While a consenter was engaging a group of patients, a clinic guide would seat, orient, and prepare the next group of patients (i.e., prompt patients to read their consents and take off their jackets in preparation for vaccination). As such, clinicians spent more overall time with patients compared with the 1:1 traditional model and leveraged individual questions to benefit the whole group. All patients had the option for individualized consent.
To assist patient flow, each vaccinator was provided with brightly colored paddles labeled “READY” to signal when they were ready for a new patient. Additionally, vaccinators could easily signal to the supply runner when supplies or vaccine was running low with color-coded signs.

Rotating non–health care community clinic sites required designing modularized pods and roles that could be rearranged, and scaled up or down as needed depending on the space and layout...
(Figure 4). For instance, consenters and vaccinators were paired together in a pod at our first clinic site to accommodate a closed space comprising small scattered classrooms and lengthy, but wide corridors. At our third clinic, in a large and open layout, we were able to group all consent pods in a generalized consent zone, which in turn fed into a consolidated vaccinator zone.

**FIGURE 4**

**Leveraging a Group Consent Model**

Volunteers completed mandatory role-specific online video-based training in advance of the clinic and same-day, in-person orientation and training immediately prior to the clinic opening. Clinician staffing requirements could be reduced considerably if volunteers had previously served in the role at a prior clinic.

**Align on the mission:**

Volunteers for each clinic day came from Mercy, Penn Medicine, and The Community, and as such many had never met prior to a given clinic day. At the start of each clinic day, leaders reviewed the mission to promote equity in vaccine uptake, and asked volunteers to respect and trust each other and the leaders of their assigned pods.

Volunteers portrayed both unity and commitment to the mission by donning team T-shirts denoting criticality of community partnership (Figure 5). The T-shirts also helped to clearly identify volunteers both internally and among patients.
Community faith leaders served a critical role in activating their networks and building a bridge of trust between the health systems and the community around vaccination.

Define and assign roles that synergize and promote accountability:

Roles were crafted to limit redundancy in responsibilities for volunteers, reinforcing the need for trust across different stations in the clinic.

After the initial group meeting, volunteers huddled in their assigned pods with on-site leads who emphasized the importance of open channels of constructive bidirectional feedback to ensure both a culture of safety and innovation. All stations were provided with “feedback notepads” and time-sensitive feedback was evaluated in real time to determine the appropriate corrective action.

Empower celebration:
All volunteers were encouraged to celebrate the patients’ vaccination journey throughout clinic progression and thank patients for placing their trust in our team. At check-out, patients encountered greeters who offered to take a photo of the patient within a life-size frame documenting their vaccine milestone (Figure 6).

**FIGURE 6**

**Life-Size “Social Media” Photo Frame**

![Life-Size “Social Media” Photo Frame](source)

**Hurdles**

Even when vaccine clinics have been located in predominately Black neighborhoods, white individuals have traveled to those clinics and bypassed local residents. We sought to reduce that diversion, without explicitly excluding individuals based on race. All engagement platforms first asked for active acknowledgement of the clinic’s mission in order to proceed with the sign-up process:

*IMPORTANT: The purpose of this clinic is to address the vast racial inequity in COVID outcomes and vaccine distribution by vaccinating our West & Southwest Philly "Black and Brown" communities hit hard by COVID. Here are the zip codes this clinic is designed to serve: 19104, 19131, 19139, 19142, 19143, 19151, 19153*
About 36% of individuals who started the text process abandoned their sign up following mission disclosure.

Community sites are not designed or resourced to be medical settings, and as such each had a unique set of supply and infrastructural challenges. At the recreation center, for example, we faced a lack of accessible entry points for our limited mobility patients. In response, health system employees engaged their networks to create and donate a custom ramp. We resourced and brought all the necessary expertise, equipment, and supplies on site, including refrigeration for vaccines, resuscitation and monitoring equipment, medical supplies, privacy partitions, wheelchairs, stretchers, tarps to protect floors, meals and refreshments for volunteers, tables, and chairs.

Over the course of 3 community clinic days, we experienced a 5%–15% same-day, no-show rate. We assessed no-shows every 30 minutes and called in wait-listed individuals to fill those spots. We initially assigned team members to first call the no-shows to ascertain if they were still coming but logged a less than 5% return in the effort. By the third clinic, we abandoned the effort to call no-shows but were still able to honor scheduled individuals presenting to appointments late.

The Team

In addition to the on-site volunteer roles outlined in Figure 3, the institution’s cross-disciplinary implementation team consisted of the senior health system, operational, innovation, technology, and clinical leaders listed alphabetically below. Teams with dual design and implementation roles are marked by an asterisk.

Senior Health System Leadership*:

- Associate Chief Informatics Officer
- Associate Director of Government Relations
- Chair of the Board of Trustees
- Chief Medical Officer
- Chief Operating Officer
- Chief Pharmacy Officer
- Chief Quality Officer
- Director of Strategic Operations

Public Safety:

- Captain and Commanding Officer of Diversity, Equity, and Inclusion
The majority of patients registered for the clinic via our text message-based program (52%), followed closely by our automated phone-based IVR program (31%), and manual phone-based outreach (6%).
• VP Community Health & Well Being

Communications:

• Associate Vice President of Communications
• Senior Medical Communications Officer

Clinical Expertise, Protocol Development, and Training:

• Chief, Division of Occupational & Environmental Medicine*
• Chief, Section of Allergy and Immunology
• Nursing Professional Development Specialist
• Penn Medicine On Demand
• Senior Counsel

Center for Health Care Innovation:

• Chief Operating Officer, Way to Health
• Director of Clinical Implementation*
• Engineering Lead, Way to Health
• Executive Director
• Innovation Manager, Acceleration Lab*
• Innovation Manager, Center for Digital Health*
• Senior Application Specialist, Way to Health*

Funding: The clinics were health-system funded with donated personnel time via a volunteer-based workforce. Infrastructure and logistics cost averaged $20,000/clinic.

**Metrics**

As of March, the #VaccineCollaborative has run 3 free community-located mass vaccination clinics, each running for 7 hours, vaccinating 2,821 individuals with a median age of 65. Eighty-five percent of vaccinated individuals were Black. The majority of patients registered for the clinic via our text message–based program (52%), followed closely by our automated phone-based IVR program (31%), and manual phone-based outreach (6%). Four hundred and sixty-eight (17%) individuals
signed up someone else, resulting in an additional 816 (29%) individuals signed up. Eleven percent of appointments were allocated to unscheduled patients. Eighty percent of patients resided in our target zip codes (Table 1).

In a brief post-vaccination experience survey (n=1609), over half of the respondents (56%) reported that their trust in health care organizers was a factor in deciding to get vaccinated, followed by ease of sign up (37%), proximity to home (26%), and trust in community and faith leaders (21%) (Figure 7). Logistical innovations allowed the clinics to operate on time for the entire clinic and line-free throughout most of the day and with a Net Promoter score of 94, evidencing outstanding patient satisfaction. Patients reported ease, organization, efficiency, friendliness, and positivity as highlights of their vaccination experience.

Table 1. Demographics and Sign-Up Mode of Vaccinated Individuals Across Three First-Dose Community Clinics Located in West and Southwest Philadelphia

| Location     | Clinic A | Clinic B | Clinic C | Overall |
|--------------|----------|----------|----------|---------|
| Location     | Church   | Recreation Center | High School Gym |         |
| Total clinic capacity | 500      | 750      | 1500     | 2750    |
| Total vaccinated* | 536      | 761      | 1524     | 2821    |
| Age, median  | 71       | 65       | 62       | 65      |
| Gender       |          |          |          |         |
| % Female     | 69       | 63       | 62       | 63      |
| Ethnicity    |          |          |          |         |
| % Hispanic/Latino | 0.4      | 5.0      | 7.9      | 6.0     |
| Race         |          |          |          |         |
| % African American or Black | 95      | 87       | 81       | 85      |
| % White      | 0.8      | 8.4      | 6.8      | 6.1     |
| % Asian or Pacific Islander | 0.2      | 2.1      | 6.3      | 3.6     |
| % Other      | 3.9      | 2.8      | 5.5      | 4.9     |
| Mode of Sign-Up |        |          |          |         |
| Pre-scheduled Phone | 26.3 | 5.1     | 0.1      | 6.4     |
| Pre-scheduled SMS | 62.9 | 52.1     | 48.9     | 52.4    |
| Pre-scheduled IVR** | --   | 25.1     | 44.2     | 30.7    |
| Wait List/Walk-in | 10.8 | 17.7     | 6.9      | 10.6    |
| Zip Code     |          |          |          |         |
| % W/SW Philadelphia*** | 60.6 | 85.5     | 84.5     | 80.2    |

SMS = Short Message Service; IVR = Interactive Voice Response. *Vaccine eligibility for the three clinics was determined by City of Philadelphia’s guidelines. In addition to being a Philadelphia resident, individuals had to meet either Phase 1a or 1b criteria. Total number of vaccinated residents exceeds original clinic capacity secondary to the ability to obtain an 11th full dose from the Moderna 10-dose vials at the time of Clinic A-C operation. **Option available for Clinics B and C only. ***West and Southwest Philadelphia zip codes: 19104, 19131, 19139, 19142, 19143, 19151, 19153. Source: The authors / Mercy & Penn Medicine & The Community #VaccineCollaborative.
At the time of publication, Clinic A, B, and C second-dose clinics have operated with an overall 0.6% no-show rate, and a Net Promoter Score of 96. In the coming months, the #VaccineCollaborative aims to sustain and scale efforts to continue to serve Black, Brown, and other underrepresented minority communities to ensure an equitable vaccine distribution.

Where to Start

Achieving equity for Black communities requires intentional efforts to overcome the inequitable inertia of the status quo. Senior health system leaders must prioritize equity by redeploying and resourcing operational, logistical, and innovation teams to address structural barriers in a scalable and sustainable manner. Black community leaders must be engaged early and often to play a central role in the design, implementation, and iteration stages. A rapid-cycle innovation approach is critical to transformative change.
Kathleen C. Lee, MD
Director of Clinical Implementation, Center for Health Care Innovation, Penn Medicine, Philadelphia, Pennsylvania, USA Assistant Professor of Emergency Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, USA

Nida Al-Ramahi, MHA
Director of Strategic Operations, Office of the Chief Medical Officer and Chief Quality Officer, University of Pennsylvania Health System, Philadelphia, Pennsylvania, USA

Lauren Hahn, MBA
Innovation Manager, Center for Digital Health, Penn Medicine, Philadelphia, Pennsylvania, USA

Terrilynn Donnell,
Chief of Staff, Church of Christian Compassion, Philadelphia, Pennsylvania, USA

Lillian J. Schonewolf,
Vice President, Community Health and Well Being, Trinity Health Mid-Atlantic Region, Philadelphia, Pennsylvania, USA

Neda Khan,
Senior Applications Specialist, Way to Health, University of Pennsylvania Health System, Philadelphia, Pennsylvania, USA

Christina O’Malley, MHA
Innovation Manager, Center for Health Care Innovation, Penn Medicine, Philadelphia, Pennsylvania, USA

Utsha G. Khatri, MD
Fellow, National Clinician Scholars Program, University of Pennsylvania, Philadelphia, Pennsylvania, USA

Ellen Pearlman, MS
Medical Student, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, USA

Mohan Balachandran, MA
Corporate Director, Way to Health, University of Pennsylvania Health System, Philadelphia, Pennsylvania, USA

David A. Asch, MD, MBA
Executive Director, Center for Health Care Innovation and John Morgan Professor, Perelman School of Medicine and Wharton School, University of Pennsylvania, Philadelphia, Pennsylvania, USA

W. L. Herndon,
Pastor, Church of Christian Compassion, Philadelphia, Pennsylvania, USA
Colleen Mallozzi, MBA, RN
Associate Chief Informatics Officer, University of Pennsylvania Health System, Philadelphia, Pennsylvania, USA

Judith Green-McKenzie, MD, MPH
Professor and Chief, Division of Occupational & Environmental Medicine, Department of Emergency Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, USA

Nishaminy Kasbekar, PharmD
Chief Pharmacy Officer, Penn Presbyterian Medical Center, Philadelphia, Pennsylvania, USA

Christopher Cullom, MBA
President, Mercy Catholic Medical Center, Trinity Health Mid-Atlantic Region, Philadelphia, Pennsylvania, USA

Sharon Carney, MD
Senior Vice President and Chief Clinical Officer, Trinity Health Mid-Atlantic Region, Philadelphia, Pennsylvania, USA

Reverend William Shaw, DMin
Chair of the Board of Trustees, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, USA Pastor, White Rock Baptist Church, Philadelphia, Pennsylvania, USA

Patricia Sullivan, PhD
Chief Quality Officer, University of Pennsylvania Health System, Philadelphia, Pennsylvania, USA

Phil Okala, MHA
Chief Operating Officer, University of Pennsylvania Health System, Philadelphia, Pennsylvania, USA

Patrick J Brennan, MD
Chief Medical Officer and Senior Vice President, University of Pennsylvania Health System, Philadelphia, Pennsylvania, USA Professor of Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, USA

Eugenia South, MD, MS
Faculty Director, Penn Urban Health Lab and Assistant Professor of Emergency Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, USA

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