

# Improving Access to Syphilis Screening Among Unhoused People in Yolo County, USA

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## Abstract

**Background:** This study aimed to increase syphilis screening rates amongst unhoused residents of Yolo County, California, through the implementation of plan-do-study-act (PDSA) cycles. Yolo County has a strategic goal to eliminate congenital syphilis cases. Homelessness is a known risk factor for syphilis. **Methods:** The primary researcher was embedded in a street medicine team. Using quality improvement tools like stakeholder interviews, workflow diagrams, and best practices from literature, we outlined the team's workflow for syphilis screening and developed ideas to improve uptake and expand capacity. The most effective cycle implemented gift card incentives for syphilis screening. During the patient intake we offered the option to receive a syphilis test, informing the patient of the gift card incentive. **Results:** Prior to gift card incentives, the team screened 1.6 patients on average per clinic for a total of 30 patients screened in April to June of 2022. After the gift card incentive was implemented, the team screened 3.0 patients on average per clinic, screening a total of 223 patients from July 2022 to May 2023. The intervention produced an 87.5% increase in screening rates ( $P=0.0094$ ). The data showed a significant increase in syphilis testing upon implementing the gift card incentive program. **Conclusion:** These findings contribute to evidence supporting the use of patient incentives for public health prevention measures. This model could be applied to other populations to increase health screening participation. More research is needed on the effect of gift card incentives on confirmatory testing and treatment rates for syphilis.

## Introduction

Syphilis is a systemic, sexually transmitted infection (STI) caused by the spirochete bacterium, *Treponema pallidum*. Syphilis infections in the United States increased by 17.3% from 2021 to 2022 and, notably, congenital syphilis cases rose 30.6% during that time.<sup>1</sup> One in 1300 live births are affected by congenital syphilis.<sup>2</sup> If left untreated, syphilis can cause irreversible neurological damage, including cognitive impairment, paralysis and deafness. In neonates, the infection can cause seizures, vision problems and cranial nerve palsy.<sup>2,3</sup> Worse still, 2 of every 5 infants born with congenital syphilis will die from the infection soon after birth.<sup>4</sup> Most surviving infants face lifelong neurological deficits. Individuals with remote exposures and asymptomatic infections can still spread the disease, making screening a critical approach to controlling transmission.<sup>5</sup> Screening is particularly important in groups that account for disproportionate rates of syphilis and congenital syphilis cases, such as people experiencing homelessness.<sup>6</sup> Unfortunately, obtaining medical care, including screening and treatment for syphilis, is challenging for this vulnerable patient population.<sup>7</sup> People experiencing homelessness face unique barriers in accessing public services.

For example, a trip to the clinic involves arranging help to guard belongings and watch over pets, coordinating timing to align with distribution of food and other essential needs and ensuring one's phone is charged, paid for, and has reception. Once these logistical barriers are overcome, the patient may face abuse from clinic staff. People experiencing homelessness delay or avoid medical care because of prior negative experiences with the health care system.<sup>8</sup> Homelessness also increases the risk of syphilis transmission because people are more likely to engage in transactional sex for survival and safety.<sup>9</sup> In addition, lack of transportation often impedes testing and treatments that require multiple clinic visits. Thus, people experiencing homelessness need a tailored approach for syphilis screening that is immediate, flexible, and overcomes trust barriers. Street medicine is a way to provide low-barrier care to unhoused patients. Our team sought to leverage the unique role of a street medicine team to increase syphilis screening for unhoused patients in Yolo County, California.

Yolo County, California is seated north of the Bay Area and west of the state capitol, Sacramento. Yolo has three major towns:

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Davis, Woodland, and West Sacramento. It has about a quarter of a million residents, half of whom are white and one third of whom are Hispanic.<sup>10</sup> About one in five residents live in poverty.<sup>11</sup> The county is geographically diverse with over 250,000 acres of farmland, a large state university (University of California at Davis) and an urban center, West Sacramento. The street medicine team we partnered with serves patients throughout the county in both rural and urban settings. Locations of service include farm worker housing, encampments, homeless shelters, day programs and temporary supportive housing units. The team also partnered with county public health officials and a homeless outreach team. Additionally, the county holds regular stakeholder meetings to monitor progress towards its strategic goal of congenital syphilis elimination. We attended these stakeholder meetings with the street medicine team to understand the challenges facing service providers.

The street medicine team we partnered with consists of a nurse, medical assistant, health coach, peer advocate, and prescriber. Services provided by the team include management of chronic and acute conditions, substance use treatment, and wound care. Listening to the street medicine team and county stakeholders, we realized that the street medicine team could increase capacity and uptake of its existing syphilis screening. We used the "Quality Improvement Essentials Toolkit" to identify targets for improvement and make systematic adjustments in workflows.<sup>12</sup> By working closely with stakeholders, and though a generous grant for incentives, we were able to increase syphilis screening by 87.5% per clinic day.

## Methods

Our quality improvement project consisted of conducting interviews with stakeholders, characterizing the current workflow, and executing a series of Plan-Do-Study-Act (PDSA) cycles. Our stakeholders had hypothesized many reasons for why the team had low syphilis screening rates. These reasons included patient hesitancy, staffing and supply variables and environmental challenges. PDSA cycles allowed us to assess the impact of a particular change on screening update and capacity.

We conducted informal interviews with a variety of stakeholders including clinic managers, front-line staff, public health officers and patients, asking how to improve uptake of syphilis screening. We used their input to develop a cause and effect diagram and workflow. We drew on these documents to develop interventions for each PDSA cycle. For each PDSA cycle, the team decided on an intervention aimed at increasing the rates of syphilis screening, implemented it for 1-3 weeks, and observed whether it impacted the screening rate. Interventions included: altering patient flow, adjusting how the STI tests were offered (verbally vs nonverbally), developing a script for staff and using a rolling cart to transport testing materials to make them more accessible. However, none of these workflow adjustments significantly increased screening rates.

In our last and most successful PDSA cycle, we implemented an incentive system which provided patients with gift cards upon receiving STI testing for syphilis, human immunodeficiency virus (HIV), and hepatitis C. Patients were also offered chlamydia and gonorrhea testing, however these tests were not associated with the gift card incentive. This approach was inspired by the health teams' improved uptake of COVID-19 vaccines with gift card incentives. Furthermore, literature shows that incentivizing HIV/STI testing increases screening rates, especially when tailored to the specific population being screened.<sup>13-16</sup> Patients were offered a choice between a \$25 Target or Walmart gift card. Funding for a 30-day pilot was provided by Partnership Healthplan of California, the primary Medicaid insurer for Yolo County. We described the intervention to each patient before asking if they would like to participate. Patient confidentiality was maintained according to standard healthcare privacy rules. For analysis, data was disaggregated from identifying information. We communicated with the patient that their decision to receive a gift card for screening would not affect their care in any manner.

Additional parameters around the gift cards were developed over fine-tuning PDSA cycles. Patients were eligible for the gift card if they had no prior syphilis infection and if their last screening test was over 90 days prior. The screening test used cannot detect new infections for patients with a history of treated syphilis. Patients with a history of syphilis were advised to get a blood test for antigen titers to assess for new infections. However, these patients could still receive the gift card incentive if they opted-in for HIV or HCV screening (if they were eligible, i.e. had no known infection and had not been tested in the prior 90 days).

Syphilis naive patients could receive testing more frequently than every three months but would not receive a gift card for those additional tests. Patients who opted in to the syphilis screening were encouraged to also get testing for HIV, HCV, gonorrhea and chlamydia. However, this additional testing was not required to receive a gift card. These parameters were developed to optimize limited resources, to limit complexity around the incentive and support equity for patients with a history of syphilis.

**Table 1. Participant Characteristics.**

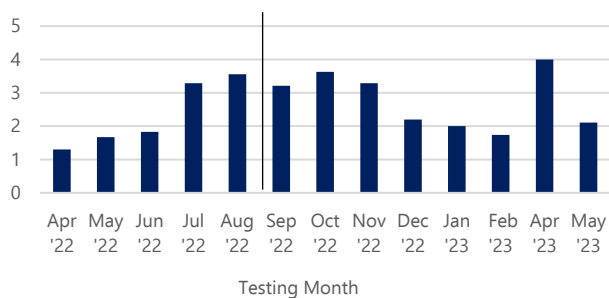
Race/ethnicity of participants	Number of participants (n)	Percentage of participants (%)
Hispanic/ Latino	86	34.1%
White / Caucasian	88	34.9%
Black/ African American	13	5.2%
American Indian / Alaska Native	9	3.6%
Multiracial	8	3.2%
Not reported	49	19.4%

**Legend:** This table describes the self-reported race/ethnicity of the study participants. The number of participants (n) of each race/ethnicity is reported in the second column and the percentage of total participants of that race/ethnicity is reported in the third column

## Results

Slightly less than half (42.9%) of the patients tested identified as male. The racial/ethnic breakdown of the patients was: 34.1% Hispanic/Latino, 34.9% White, 5.2% Black/African American and 3.6% American Indian, with 19.4% declining to report [Table 1](#). This racial breakdown reflects known inequities in California housing.<sup>17</sup> In particular, Black Californians are four times more likely to be unhoused as compared to white Californians.<sup>18</sup>

**Figure 1. Average Participants Tested per Clinic Day by Month**



**Legend:** The figure demonstrates the average number of participants tested per clinic day per month. The month of March 2023 was removed due to patient registration changes which resulted in the loss of data. Initiation of the gift card intervention is indicated by the black vertical line after June 2022. The vertical axis represents average number of patients tested per clinic day per month and the horizontal axis shows each month of the study.

Throughout the study, the average number of patients screened each month was determined by the sum of the patients screened each day divided by the total clinic days a health coach was present and offering screening. Prior to gift card incentives, the mean number of patients screened per clinic day was 1.6 (SD = 0.27) for a total of 30 patients screened from April to June of 2022. After the gift card incentive was implemented, the mean patients screened per clinic day was 3.0 (SD = 0.74) for a total of 223 patients seen from July 2022 to May 2023. The data revealed an 87.5% increase in screening rates after the gift card incentive program was implemented, the t-test revealing a significant increase, with  $P = 0.0094$  ([Figure 1](#)). In an effort to prevent losing patients to follow up, the team initiated same day syphilis treatment. The initiative is ongoing.

## Discussion

Challenges faced by the team included difficulties in the field-based venipuncture for confirmatory testing, gift card inclusion criteria, developing a workflow for people with a known syphilis diagnosis, and wording choice (infectious disease screening vs STI test). The biggest logistical challenge was weather. The test parameters require test storage at an ambient temperature of less than 86F. However, the team's workflow required seeing patients outdoors to reduce the risk of COVID-19 transmission. In July, as temperatures reached above 100F, the tests yielded false positives. The team donned additional personal protective equipment and moved services into air-conditioned spaces when

possible. Staff turnover and scheduling barriers also affected results. High staff turnover resulted in inconsistencies when describing the intervention to the patients. Furthermore, fewer tests were performed in December through February because of holiday schedules. We also had to exclude data from March 2023 due to a change in the clinic's patient registration methods which resulted in missing and unaccounted-for data.

Overall, in this small study, the gift card intervention provided to be a highly effective method for increasing rates of syphilis testing among unhoused patients. The intervention period ended in July of 2023. We are now tracking testing uptake after withdrawal of gift card incentives. Furthermore, including pre-intervention data from December, January and February could reveal whether the low testing rates in those months were random or due to external factors as those mentioned previously. These findings show that gift card incentives can be a health equity tool. For patients who have unreliable sources of food, clothing, shelter, or hygiene supplies, a gift card incentive can provide the additional benefit needed to encourage engagement in services. The incentives may also provide a positive association with health care services, perhaps ameliorating some of the mistrust that has built up. Patient interactions should be conducted with respect, humility and reliability to reinforce the positive impact of the gift card incentive. This study contributes to evidence supporting the use of patient incentives for public health prevention measures, particularly for vulnerable populations. More research is needed on the effect of gift card incentives on treatment rates for syphilis and prevention of congenital syphilis.

## Bias And Limitations.

The study's generalizability is limited by influences such as seasonal variations, holidays, small sample size and individual bias. For example, during the summer, seasonal agriculture workers make up half of the patients seen. This may produce fluctuations in testing rates. The patient population was also affected by seasonal variations as people experiencing homelessness may change their location based on weather. This may partially explain the drop in testing seen in the coldest winter months. Holidays in the winter months also resulted in more clinics missed and reduced patient population size, likely also contributing to the drop in testing seen during these months. The relatively small sample size weakens the generalizability of the study and should be addressed by future studies which implement the intervention to more patients, across different geographic regions. Despite standardized training in how to offer and conduct the STI testing, individuals involved in the intervention were also subject to bias. Language barriers and use of translators with Spanish-speaking patients may have created additional limitations in standardizing the interventions protocols. Because unhoused people often are in unstable financial situations, the gift card incentive may be more effective in this group compared to other groups. Further studies should examine if this incentive program is effective when applied to other groups.

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## Conflict of Interest Statement & Funding

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## Author Contributions

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