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Safe Spaces 4 Sexual Health: A Status-Neutral, Mobile Van, HIV/STI Testing Intervention Using Online Outreach to Reach MSM at High Risk for HIV Acquisition or Transmission

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Abstract

Background: Black MSM carry the greatest burden of new HIV diagnoses in the US. Ending the HIV epidemic (EHE) requires strategic, culturally specific approaches to target factors contributing to persistent HIV disparities.

Setting: Safe Spaces 4 Sexual Health (SS4SH), a community-informed HIV/STI testing strategy combining mobile van testing with online outreach, was implemented over a 14-month period from 2018–2019 in Baltimore, Maryland.

Methods: We evaluated the reach of MSM at high risk with high acquisition or transmission risk by SS4SH mobile van combined with online outreach as compared to the Baltimore City Health Department's (BCHD) venue-based mobile van (with no online outreach) operating during the same period based on the following HIV/STI testing outcome measures 1) number of MSM HIV or STI tested, 2) new HIV diagnosis rate, 3) percent with new syphilis diagnosis, 4) percent at high risk for HIV acquisition, and 5) percent PLHIV at high risk for transmission.

Results: Over a 14-month period, SS4SH HIV/STI tested 151 MSM. Of these, 74% were Black, mean age was 34 (SD=10, range=19–68). Seven percent (10/148) were new HIV diagnoses and 10% (13/130) were diagnosed with syphilis. The BCHD venue-based mobile van strategy yielded 53% (231) more MSM (71% Black, mean age 38, SD=14, range=15–74), but the HIV/syphilis positivity rate was significantly lower: 0.5% new HIV diagnosis rate ($p<0.001$) and 0.5% with syphilis diagnosis ($p<0.001$).

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Conclusions: Our findings suggest SS4SH combining online outreach with mobile van testing may be more effective at reaching high risk Black MSM than venue-based mobile testing.

Keywords

Black/African American; MSM; online; mobile HIV testing; racial disparities

Introduction

The US federal initiative “Ending the HIV Epidemic: A Plan for America,” (EHE) depends on developing innovative and tailored approaches to HIV diagnosis, treatment and prevention.¹ While new diagnoses have declined, progress has stalled, particularly among Black men who have sex with men (MSM) who remain disproportionately affected.^{2,3} The etiology of this racial disparity is multifactorial but includes greater exposure to dense, racially homogenous sexual networks with high rates of undiagnosed/unsuppressed HIV, sexually transmitted infections (STI) and other factors that facilitate ongoing HIV transmission and acquisition among Black MSM.^{4–11}

Interrupting transmission requires public health strategies that prioritize: 1) identifying HIV transmission networks, 2) identifying network members at high risk for acquisition or transmission, and 3) linking individuals in these networks to PrEP or HIV care. Implementing mobile van HIV/STI testing at physical venues is a common and effective public health intervention for identifying and linking to care individuals at risk for HIV acquisition or transmission.^{12–15} However, transmission networks are increasingly associated with online spaces (e.g., geo-social networking (GSN) and social media applications), and mobile van testing strategies that depend on venue-based outreach may miss those who congregate primarily online and the opportunity to access, i.e., meet, online populations where they are.^{16,17}

To address this gap, we developed Safe Spaces 4 Sexual Health (SS4SH), a HIV/STI testing intervention designed to reach MSM at risk for acquisition or transmission in online spaces by combining mobile van testing with online outreach. SS4SH is an adaptation of the Baltimore City Health Department’s (BCHD) venue-based implementation of mobile van testing. This paper describes this adaptation and evaluates/compares the reach of SS4SH and BCHD mobile van HIV/STI testing implementation strategies.

Methods

Overview

Through an academic-public health collaboration between the Johns Hopkins School of Medicine (JHSOM) Center for Child and Community Health Research (CCHR) and the BCHD, we developed SS4SH, a community-informed, status-neutral mobile van testing strategy employing online outreach and prioritizing Black MSM in geographic and online spaces associated with HIV transmission (i.e., hotspots). SS4SH was implemented from February 2018 to April 2019 in Baltimore. The Institutional Review Board at JHSOM approved this study (IRB00122603).

Academic-Public Health Collaboration

The CCHR and BCHD have partnered for over 20 years to develop and implement evidence-based, data-informed public health practice strategies with a specific focus on strategies to improve the sexual health of sexual minority populations. As HIV rates have declined, improving efficiency of HIV/STI testing and outreach protocols to reach populations at greatest risk has been a critical emphasis of this partnership. For this study, our partnership enabled the timely development and evaluation of an innovative implementation strategy to improve the reach of mobile van HIV/STI testing for MSM at high risk by combining mobile van testing with online outreach. We intentionally mirrored SS4SH van HIV/STI testing protocols with protocols used on the BCHD van (e.g., common HIV/STI test kits, specimen collection and processing, confirmatory testing and care linkage procedures for reactive test results). The SS4SH mobile van schedule and locations were informed by HIV/STI surveillance data shared through an existing CCHR-BCHD data sharing agreement. The SS4SH mobile van was co-staffed by both CCHR research staff and off-duty BCHD testing and outreach staff. Demonstrative of their investment in identifying and incorporating effective online outreach strategies into their community-based testing protocols, BCHD covered the cost of HIV/STI test kits and the processing of HIV confirmatory and STI testing. To assist with the evaluation of this implementation strategy, BCHD shared testing data from SS4SH participants and BCHD mobile van clients tested during the study period.

Study population, recruitment and enrollment:

Eligibility criteria were as follows: cisgender male, male sex partner in past 12 months, Baltimore-area resident, English-speaking, and 18 years of age. We did not include race in eligibility criteria; instead, we optimized recruitment strategies to prioritize Black MSM, the population with the greatest HIV vulnerability in Baltimore.¹⁸ We did not include transgender women who have sex with men (TWSM). While TWSM also have significant HIV vulnerabilities, they are a distinct population and have called for their own tailored HIV control approaches.¹⁹

We used the Priority Locations for AIDS Control Efforts (PLACE) method, an approach used to prioritize physical locations associated with HIV transmission (i.e., hotspots),^{20,21} to guide recruitment and enrollment. For MSM, recent studies have shown increasing reports of GSN and social media applications as sex partner meeting venues.^{16,20} Building on prior research,^{12,14,22–26} we adapted the PLACE method in the context of GSN application-based sex partner meeting venues to identify location-day-time (LDT) units within Baltimore that 1) were located in geographic HIV hotspots (i.e., census tracts with high community viral load (VL)) and 2) had the highest congregation of MSM GSN application users. Our adapted PLACE method involved the following steps: 1) selected online sex partner meeting venues highly reported among MSM with newly diagnosed HIV and/or syphilis;^{14,17} 2) identified geographic HIV hotspots based on census tract community VL;¹² 3) determined LDT units with the highest GSN application utilization; and 4) selected physical testing LDT units for the mobile van in areas with overlapping high GSN application utilization and geographic HIV hotspots. A total of 23 LDT units across 15 locations (see Figure 1) were selected for recruitment and mobile testing.

We used the following strategies for online recruiting in LDT units: 1) direct messaging on GSN and social media applications, 2) in-application advertisements geo-targeted to application users in Baltimore, 3) study website directing potential participants to the mobile van location, and 4) referrals from enrolled participants. All advertisements directed participants to the study website which described testing services, schedule of van locations/times, a real-time map of the van's location during scheduled shifts, and contact number. The van was affixed with the study logo but was otherwise unmarked. Recruiting materials were community-informed and tailored to Black MSM using findings from our team's prior work^{27,28} and feedback from a community advisory board.

Potential participants who approached the study van completed eligibility-screening questions using an audio computer assisted self-interview (ACASI). Eligible participants provided informed consent prior to enrollment and HIV/STI testing.

Mobile Van HIV/STI Testing Strategy and Data Collection

The SS4SH van operated in 4-hour shifts, four times weekly rotating across the 23 LDT units in 15 locations (see Figure 1) from February 2018 to April 2019. The van included space for interviews, phlebotomy, and a restroom for self-collected biologic specimens. Participants completed an ACASI which included questions on referral source, demographics, sexual behaviors and other risk factors.²⁹ Participants had the option to receive rapid HIV, syphilis and gonorrhea/chlamydia testing and were remunerated \$50 for completing the survey, and \$10 each for HIV, syphilis and gonorrhea/chlamydia testing. Rapid HIV testing was conducted with a fingerstick sample using INSTI® HIV-1/HIV-2 Rapid Antibody Test, a third-generation test. Reactive tests were confirmed with a fourth-generation HIV-1/2 Antigen and Antibody serum blood test. Penile meatus and extragenital (i.e. pharyngeal and rectal) swabs were self-collected for gonorrhea/chlamydia nucleic acid amplification tests (NAAT). A phlebotomist collected blood samples for syphilis and confirmatory HIV testing. HIV rapid test results were disclosed by a trained HIV counselor and participants with a reactive test were referred to HIV care. For all HIV/STI testing, participants completed a BCHD intake form that was sent with their biological specimens. BCHD processed the HIV/STI tests, contacted participants requiring treatment, and provided care linkage at BCHD sexual health clinics. The study team received test results from BCHD with no identifying information except the unique study identifier.

BCHD Mobile Testing Van

The BCHD mobile van operated in 5-hour shifts, twice daily (daytime and evening shifts) for a total of 10–12 shifts weekly from February 2018 to April 2019. Van locations were throughout the city including physical venues (e.g. bars/clubs, food pantries, shelters), street intersections with available parking, and festivals and events where testing services were requested. Locations were identified and frequented based on prior volume of testing and historical knowledge of BCHD outreach workers.³⁰ BCHD van shifts (time and location) never overlapped with SS4SH van shifts. The BCHD mobile van was marked as a BCHD testing van, relied on street outreach to recruit individuals for testing, and did not conduct online outreach. The BCHD van offered HIV and syphilis testing. Testing was free but, with the exception of festival or event-based testing, there was typically no incentive offered.

Measures

We evaluated the reach of MSM at high risk (i.e., new HIV diagnoses, proportion of MSM with high acquisition or transmission risk) by SS4SH as compared to the BCHD mobile van operating during the same period based on the following HIV/STI testing outcome measures 1) number of MSM HIV or STI tested, 2) new HIV diagnosis rate, 3) percent with new syphilis diagnosis, 4) percent at high risk for HIV acquisition, and 5) percent PLHIV at high risk for transmission. HIV acquisition risk (i.e., individuals with a PrEP indication) was defined based on national PrEP guidelines³¹ and local HIV epidemiology and included the following risk factors: in past 3 months reported: chlamydia, gonorrhea or syphilis diagnosis; or >1 sex partner; or in the past 12 months reported: sex partner living with HIV; or exchange sex. HIV transmission risk was defined as PLHIV with VL>1500 copies/ml.³² BCHD mobile van testing data was extracted from public health surveillance data. HIV/STI testing record numbers associated with SS4SH visits were checked against surveillance data to ensure SS4SH participants were not included in the comparison group. New HIV diagnoses were confirmed by BCHD and Maryland Department of Health's Enhanced HIV/AIDS Reporting System database.

Data Analysis

We used summary statistics to characterize and compare SS4SH participants' and BCHD mobile van clients' HIV/STI testing outcome measures. Wilcoxon's rank sum test was used to compare non-normally distributed continuous variables, and Pearson's chi-squared test was used to compare categorical variables. We used Stata 15.1³³ for all analyses.

Results

Over a 14-month period, SS4SH enrolled 160 MSM; 151 received HIV or STI testing; 148 (93%) received HIV testing and 150 (94%) received STI testing including 130 (81%) tested for syphilis and 139 (86%) tested for gonorrhea/chlamydia. Of the 151 MSM tested, the mean age was 34 (SD=10, range=19–68) and 74% were non-Hispanic Black; 47% learned about the SS4SH van through GSN or social media applications, 26% from a referral code, 24% through a friend, and 3% from another source. In the prior 12 months, 85.4% reported >1 sex partner, 41.7% had a sex partner living with HIV, and 21.9% reported exchange sex. In the prior 3 months, 23.8% reported a bacterial STI diagnosis.

Among those tested by SS4SH, 39% (57/148) tested positive for HIV and 7% (10/148) were confirmed new HIV diagnoses. In addition, 10% (13/130) were diagnosed with syphilis; 3% (4/139) were diagnosed with gonorrhea; and 9% (12/139) were diagnosed with chlamydia. Based on co-factor STI and behavioral risk factors, 73% of HIV negative MSM (61/84) were at high risk for HIV acquisition; 44% of PLHIV with VL data (14/32) were at high risk for HIV transmission (VL>1500 copies/ml).

Compared to SS4SH, the BCHD mobile van implementation strategy reached 53% (231) more MSM (71% Black, mean age=38, SD=14, range=15–74), but yielded significantly lower HIV/syphilis positivity rates: 5.5% (12/201) tested positive for HIV, 0.5% (1/201) had a new HIV diagnosis ($p<0.001$) and 0.5% (1/219) were diagnosed with syphilis ($p<0.001$).

The BCHD strategy also reached a significantly lower proportion of HIV negative MSM at high risk for acquisition but a similar proportion of PLHIV at high risk for transmission; 16% (29/177) of HIV negative MSM had STI or behavioral risk factors for acquisition ($p < 0.001$) and 33% (2/6) of PLHIV with VL data had VL > 1500 copies/ml ($p = 0.635$) (Table 1).

Discussion

Mobile van testing remains a prevalent public health strategy for HIV testing and linkage³⁴ and has been an effective strategy for reaching Black MSM for community-based HIV testing in several urban settings.^{35–37} In New York, mobile vans identified the largest number of undiagnosed PLHIV compared to other community-based testing strategies.³⁵ In Washington, DC, mobile van and social network strategies were more effective than standard testing practices at reaching Black MSM who had never been tested.³⁷ In Baltimore, in a prior 2013 study, 9% of Black MSM tested via mobile van were newly diagnosed with HIV.³⁶ However, these studies were done in the early 2010s prior to increased use of online sex partner meeting spaces, and effective strategies to link Black MSM in online spaces to mobile van testing have not been previously demonstrated. SS4SH applied a novel implementation strategy to reach MSM at risk for acquisition or transmission in online spaces by combining mobile van testing with online outreach. Our findings suggest the SS4SH implementation strategy may be more effective at reaching MSM at high risk than the venue-based implementation of mobile van testing (without online outreach) currently used in public health practice.

Our evaluation of these implementation strategies was limited by incomplete surveillance data. Viral load data and sex partner data in particular had higher levels of missingness among BCHD clients which may have biased our measures of high risk for acquisition or transmission.

Despite these limitations, it is clear from these findings that combining online outreach with mobile van testing has the potential to expand this critical public health tool and adapt it to an online context. Online sex partner meeting venues will continue to be important access points for reaching MSM at risk. Mobile van and other community-based testing strategies, which have been particularly important interventions for reaching Black MSM, will need to expand to include this online space. The SS4SH implementation strategy for mobile van testing in the online context may be a good model to follow.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Conflicts of Interest and Source of Funding:

The authors declare no conflicts of interest. This work was supported, in part, by the Centers for Disease Control and Prevention of the U.S. Department of Health and Human Services (HHS) Minority HIV/AIDS Initiative U01 PS 005115 and Category C Demonstration Project PS12-1201.

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Implementation of Mobile Van HIV/STI Testing Using Online Outreach

Evidence-based innovation:

Community-Based Mobile Van HIV/STI testing

Innovation recipients:

MSM in online space who are at risk for HIV acquisition or transmission

Setting:

Public health departments and community-based outreach and HIV/STI testing programs

Implementation gap:

Mobile van HIV/STI testing at physical venues and events have effectively tested and linked high risk individuals to care. However, MSM are increasingly meeting sex partners in online spaces; spaces that may be connected to high risk sexual networks. Mobile van testing implementation strategies that depend on physical spaces only may (1) miss the opportunity to access, i.e., meet online populations where they are, and (2) miss those MSM who congregate primarily in online spaces

Primary research goal:

Evaluate/compare implementation strategies

Implementation strategies:

Intervene with consumers to enhance uptake (community advisory board to develop online outreach and advertisements); Develop and implement tools for quality monitoring (measures of reach to compare across implementation strategies); Tailor strategies (identification of SS4SH mobile van locations that overlap with geographic hotspots and online congregation of MSM)

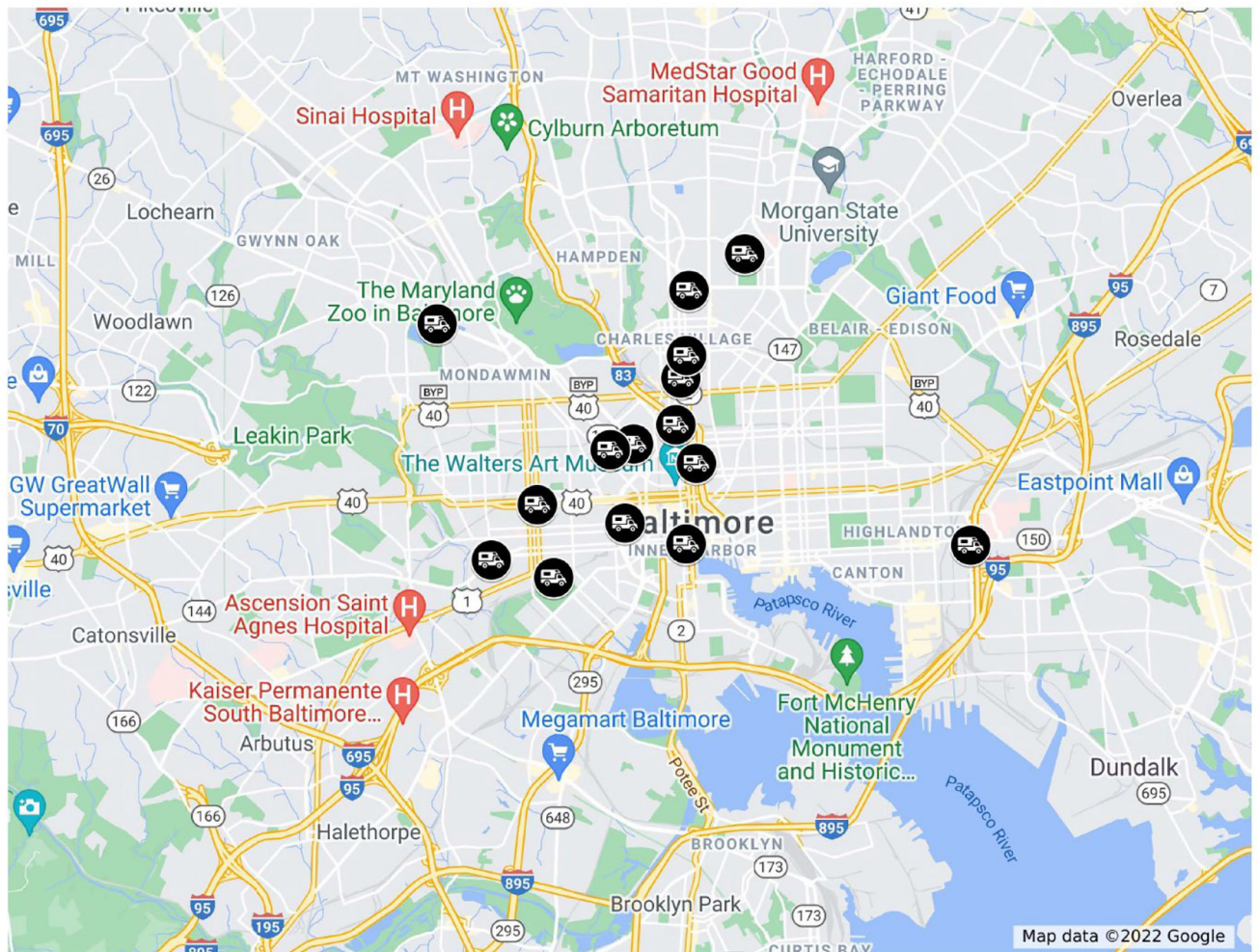


Figure 1: SS4SH Online Recruiting Strategy and Van Locations

The SS4SH van operated in 4-hour shifts, four times weekly rotating across the 23 LDT units in 15 locations from February 2018 to April 2019. The 15 locations and their geographic distribution across the Baltimore area are illustrated with the black/white van icons pictured above.

Table 1.

Demographic characteristics, HIV risk factors, and HIV/STI testing outcomes of SS4SH participants vs. Baltimore City Health Department (BCHD) mobile van MSM clients, Baltimore, Maryland, February 2018 to April 2019

	SS4SH Van (N=151)		BCHD Van (N=231)		p-value
	N	%	N	%	
DEMOGRAPHIC CHARACTERISTICS					
Age	Mean=34.1, SD=10.1		Mean=37.8, SD=13.9		p=0.026
Race/Ethnicity					p=0.271
- NH Black/African American	112	74%	163	71%	
- NH White	28	19%	55	24%	
- Hispanic	9	6%	7	3%	
- NH Other	2	1%	6	3%	
HIV RISK FACTORS					
Living with HIV at risk for HIV transmission (VL>1500 copies/ml) ⁱ	14	44%	2	33%	p=0.635
HIV negative at risk for HIV acquisition (STI/behavioral risk) ^{ii, iii}	61	73%	29	16%	p<0.001
- Gonorrhea, chlamydia, or syphilis in past 3 months	19	22%	19	11%	p=0.018
- HIV seropositive sex partner in past 12 months	24	27%	2	1%	p<0.001
- Exchange sex (buying or selling) past 12 months	13	15%	9	5%	p=0.007
- >1 sex partner past 3 months ⁱⁱⁱ	50	57%	4	2%	n/a
HIV/STI TESTING OUTCOMES					
Total Number HIV/STI tested	151		231		
- Number HIV tested	148	98%	201	87%	p<0.001
- Number STI tested	150	99%	219	95%	p=0.017
Total HIV Positivity	57	39%	12	5.5%	p<0.001
- Confirmed new HIV diagnosis	10	7%	1	0.5%	p<0.001
- Previous Positive	47	32%	11	5%	p<0.001
New STI diagnosis	26	17%	1	0.5%	p<0.001
- Individuals with syphilis infection	13	10%	1	0.5%	p<0.001
◦ Primary infection	1	8%	0	0%	
◦ Secondary infection	2	15%	0	0%	
◦ Unspecified, non-primary/ secondary, unknown or latent	10	77%	1	100%	
- Individuals with gonorrhea infection	4	3%	0	0%	p=0.506
◦ Pharyngeal infection	3	75%	n/a	n/a	
◦ Rectal infection	0	0%	n/a	n/a	
◦ Urethral infection	1	25%	n/a	n/a	
- Individuals with chlamydia infection	12	9%	0	0%	p=0.236
◦ Pharyngeal infection	1	8%	n/a	n/a	
◦ Rectal infection	10	84%	n/a	n/a	

	SS4SH Van (N=151)		BCHD Van (N=231)		p-value
	N	%	N	%	
◦ Pharyngeal and rectal infection	1	8%	n/a	n/a	
◦ Urethral infection	0	0%	n/a	n/a	

i. VL data available on 68% (32/47) of SS4SH participants and 55% (6/11) of HD mobile van clients living with HIV (previous positive).

ii. Standard health department mobile van client data limited by low response rate related to number of sex partners (5%).

iii. HIV acquisition risk data presented for 84 SS4SH participants and 177 HD mobile van clients with a documented negative HIV test result