Increases in HIV status disclosure and sexual communication between South African men who have sex with men and their partners following use of HIV self-testing kits

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Abstract

Availability of HIV self-testing may increase HIV testing frequency among men who have sex with men (MSM). It is unclear, however, if self-testing may impact HIV-related sexual behaviors among MSM, including HIV status disclosure and condom use. We conducted a mixed methods analysis of changes in HIV-related behaviors after HIV self-testing introduction, using data from 110 MSM participating in a feasibility and acceptability study of HIV self-testing in Mpumalanga Province, South Africa. We found increased HIV status disclosure from study participants to sexual partners after HIV self-testing introduction, from 61.8% at baseline to 75.5% at 6-month follow-up ($p = 0.04$), but decreased condom use with female partners ($p = 0.03$). Qualitative interviews reveal that some participants used test results to inform condom use. Distribution of self-testing kits can improve mutual disclosure, but should be accompanied by information stressing that the tests may not detect early HIV infections or other sexually transmitted infections.

Keywords

HIV self-testing; condom use; HIV status disclosure; men who have sex with men (MSM); South Africa

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INTRODUCTION

HIV self-testing has emerged as a safe alternative to clinic-based testing for HIV-1/2 screening, particularly appropriate for populations who have difficulty accessing clinic-based testing in low-resource settings (World Health Organization, 2016, 2017) and among populations who face considerable stigma, such as men who have sex with men (MSM) (Lippman, Lane et al., 2018). A growing body of research has demonstrated acceptability and feasibility of HIV self-testing among MSM (Carballo-Dieguez et al., 2012; Estem et al., 2016; Figueroa et al., 2015; Harichund & Moshabela, 2018; HIV Self-testing clearinghouse, 2018; Jamil et al., 2017; Katz et al., 2018; Lippman et al., 2014; Lippman, Gilmore et al., 2018; Lippman, Lane et al., 2018; Pal et al., 2016; Volk et al., 2016; Witzel et al., 2016). However, gaps in understanding remain. In particular, there is some concern regarding the potential impact of HIV self-testing on HIV-related behaviors (Johnson et al., 2017; Lippman, 2015). While some studies suggest that use of self-testing does not alter sexual risk behaviors, other studies have modeled or found evidence that test results may guide partner selection or sexual behaviors within partnerships (Balan et al., 2014; Hurt & Powers, 2014; Katz et al., 2014; Wood et al., 2014). We use mixed methods to assess HIV-related behaviors---including disclosure and condom use behaviors---following introduction of HIV self-testing in a cohort of South African MSM participating in a feasibility and acceptability study of personal use and network distribution of blood and oral-fluid HIV self-tests (Lippman, Lane et al., 2018).

METHODS

Study procedures

The HIV self-testing feasibility and acceptability study was conducted in two districts, Gert Sibande and Ehlanzeni, building on a parent integrated bio-behavioral survey (IBBS), the Mpumalanga Men's Study (Lane et al., 2014), run by a local non-governmental organization (NGO) with expertise in MSM health. Men were enrolled in the project between May and June 2015 in Gert Sibande (n=55) and between August and October 2016 in Ehlanzeni (n=72). In Gert Sibande, 67% of study participants were between the ages of 18 and 24 and 16% identified as gay or homosexual. In Ehlanzeni, 69% of study participants were between the ages of 18 and 24 and 41% identified as gay or homosexual. Further details on study sites and recruitment procedures for both studies are described elsewhere (Lane et al., 2014; Lippman, Lane et al., 2018). We obtained written informed consent from all study participants. Participants underwent counselor-conducted HIV rapid testing to confirm negative status prior to study enrollment, then responded to a brief behavioral questionnaire and watched a demonstration of how to use two HIV self-testing kits, the oral fluid OraSure OraQuick HIV 1/2 Rapid Antibody Test (OraSure, Bethlehem, PA) and the blood fingerstick AtomoRapid HIV 1/2 Antibody Test (Atomo Diagnostics, Sydney, Australia). Participants in Ehlanzeni also had access to an Internet link with instructional videos provided by the manufacturers. The videos were also downloaded to study site computers and participants could watch them at the 3-month follow-up visit or any time they visited the study office, which was also a community gathering space for gay and bisexual men. Participants were then dispensed five test kits of their choice (oral or blood), logs to record test results,

informational material about the test kit and the study, a resource and referral list, and condoms and lubricant. Participants were asked to use at least one test kit before returning for follow-up and to share the other kits with partners and friends with whom they felt safe and comfortable testing (Lippman, Lane et al., 2018). Any participant with a positive HIV test result received counseling at the time of the result, and a care call weekly until it was confirmed the participant had linked to care or the study ended. If the participant wished, study staff would accompany the participant to the clinic for confirmatory testing and ART initiation.

Participants attended follow-up visits at three months and six months. At 3-month follow-up, participants were dispensed four additional tests (possibly of a different type than initially selected, depending on participant preference) and additional supportive materials. Participants also responded to a questionnaire about their experiences using the test kits. At 6-month follow-up, the participants responded to a final questionnaire and performed a final, supervised self-test. All questionnaires were interviewer-administered and captured on study laptops using QDS™ (Questionnaire Development System) software. The behavioral questionnaire included questions on demographics, HIV testing, sexual behavior with male and female partners, HIV disclosure and discussion, and anticipated HIV stigma.

Following the six-month visit, selected participants were approached about participation in a one-hour in-depth interview (IDI) to elicit further information on contextual factors for test use. The IDI recruitment strategy was purposive and designed to include all those testing HIV-positive by self-test at each site and a sample of those testing HIV-negative whom the staff believed would be forthcoming about their experiences. In-depth interviews were conducted by the site supervisors, who had training in qualitative methods, and who were not the field staff administering the study questionnaire, thereby creating an external-observer environment in which participants could feel comfortable being candid. The interviews were conducted using a guide composed of open-ended questions on the major domains of interest, with multiple prompts available for the interviewer to encourage participant elaboration of themes of interest. Interviewers did not pursue lines of questioning not within the domains of the guide. Interviews were conducted in the local languages isi-Zulu or siSwati, audio-recorded, transcribed verbatim, and then translated into English. A local staff person listened to the audio recordings while reading the written transcripts and corrected any errors or refined translations as needed.

All procedures were approved by the UCSF Committee on Human Research, the University of the Witwatersrand's Human Research Ethics Committee, the Mpumalanga Department of Health and Social Development Research Committee, and the CDC's Center for Global Health, Human Research Protection.

Measures and Analysis

Our outcomes of interest are: condomless intercourse, disclosure of HIV status with sexual partners, testing with sexual partners, discussion of HIV, and perceived HIV stigma. We distinguish two types of HIV disclosure: disclosure of the respondent's HIV status to a sexual partner and disclosure of sexual partner's HIV status to the respondent. We measured condomless intercourse, disclosure, and testing with sexual partners using a partnership-

specific component of the questionnaire, which elicited detailed responses on up to three recent sexual partners. We then collapsed responses across partnerships, such that the outcomes are defined by any occurrence across partners. For example, nondisclosure is defined as any instance of not disclosing HIV status with at least one sexual partner. For some measures, we specifically restricted to certain types of partners, defined by gender or relationship type. For example, condomless intercourse with casual partners is defined as condomless intercourse with any casual partner. Additional outcomes of interest, not measured via the partnership-specific component of the questionnaire, are: frequency of discussion of safer sex with sexual partners, frequency of discussion with friends about HIV and HIV behaviors, and anticipated HIV stigma. We measured anticipated stigma using a 9-item scale that has been reported to have internal reliability and that has previously been used in South Africa (Weiser et al., 2006; Treves-Kagan et al., 2017). Each item has possible responses of very likely (coded numerically as 1), somewhat likely (2), or unlikely to experience stigma (3). Summing across the nine responses, we classified very high anticipated stigma (total of 9 to 21), high anticipated stigma (22 to 24), and low anticipated stigma (25 or greater).

Quantitative analysis

We restricted analysis to individuals who responded to the 6-month follow-up behavioral questionnaire and therefore provided data on disclosure and condom use following HIV self-testing use. We generated frequency tables to describe the population demographics and behaviors for the overall sample and for each of the two study sites (Gert Sibande and Ehlanzeni). We conducted Fisher's exact tests to compare these characteristics across sites.

To assess behavioral changes over time, we used McNemar's test. We conducted this analysis with stratification by site as well as using pooled data, but chose to report the pooled analysis in our tables, with supplementary text regarding results from the site stratification. Additionally, for the analysis of changes in frequency of condom use, we added sensitivity analysis with restriction to individuals who reported the partnership type of interest at baseline or at both time points, with partnership type defined by gender or relationship type. We used a critical level of $\alpha = 0.05$ for all hypothesis testing.

Qualitative analysis

We analyzed transcripts of the in-depth interviews using a framework analysis (Boyatzis, 1998), focusing on the elements of the HIV self-testing experience associated with sexual decision-making, resultant sexual behavior and communication with others around self-testing, in the moment and afterwards. A single analyst (HG) conducted an initial coding of the transcripts guided by the a priori domains of the interview guide and adding inductive codes as needed to flag emergent themes in the data. The analyst then submitted reports back to the principal investigators (2) about findings, presenting illustrative quotes. The two principal investigators reviewed selected excerpts and the coder's work at scheduled qualitative analysis meetings to validate findings and any disagreements in contextualization resulted in a return to the transcripts for re-analysis. When a new theme was identified from this code and excerpt review, the full transcripts were returned to for re-application of the emergent codes. After coding each transcript, the analyst wrote a memo to provide

a summary of the key elements of the participant's experience and to describe any analytic ideas as they developed from review and coding of the data. Once the full codebook of a priori and inductive codes was established frequency tables of responses were generated for each code, and each participant's responses to each question were categorically mapped to identify patterns across responses. Analysis for this paper focused on excerpts for the following key codes: participant used test with sexual partner, participant tested in order to not use condoms, reported change in condom use as a result of the HIV self-testing study, reported change in safer sex discussions with partners or peers, and HIV-related stigma.

Once quantitative analysis and qualitative analysis were completed separately, findings from the two analyses were triangulated to assess inconsistencies and patterns between and among findings. This mixed methods approach was implemented to formulate a more complete picture of the results and assess the reliability of findings. The quantitative data allowed us to examine possible associations between variables in the population, while the qualitative data collection allowed for the capture of a more nuanced understanding of self-testing behavior and decision-making, important due to limited previous data on this topic and within this population and region in particular. Key quantitative and qualitative findings are presented together and organized under the sub-themes identified in both the qualitative and quantitative data review.

RESULTS

Baseline characteristics

Of 127 participants, 110 (86.6%) presented for 6-month follow-up, forty-five of whom (40.9%) were in Gert Sibande and 65 individuals (59.1%) were in Ehlanzeni. All but four individuals (96.4%) reported use of at least one HIV self-testing kit during the study period to perform self-testing and 74 individuals (68.2%) reported distributing test kits to others and testing with at least one kit recipient. Aggregating across site, roughly two-thirds (67.3%) of participants were between the ages of 18 and 24 at baseline, 68.2% reported no paid work within the last 6 months, and 66.4% self-identified as bisexual (Table I). More than eighty percent of participants (81.8%) reported currently having a regular male partner while 51.8% reported a regular female partner. Further descriptive analyses of our study population have been described elsewhere. The Fisher's tests suggest differences between the two sites (Gert Sibande and Ehlanzeni) with regards to education ($p = 0.03$), sexual identity ($p < 0.01$), testing frequency ($p < 0.01$), and having a regular female partner ($p = 0.03$).

Qualitative IDIs were completed with 15 participants: seven in Gert Sibande and eight in Ehlanzeni. Five IDI individuals identified as gay/homosexual, and nine identified as bisexual. Three IDI participants seroconverted during the study. All individuals participating in the IDIs used at least one HIV self-testing test prior to the six-month interview; nine individuals reported using two kits and four individuals reported using three kits.

Condom use, disclosure, and testing together

Table II summarizes quantitative analysis of changes in behaviors between baseline and 6-month follow-up. Tests for changes over time suggest a statistically significant increase in the percent of participants engaging in condomless intercourse with female partners, from 24.5% at baseline to 37.3% ($p = 0.03$), but no statistically significant difference in the percent engaging in condomless intercourse with casual partners ($p = 0.73$) or male partners ($p = 0.27$). Additionally, the analysis suggests a statistically significant increase in disclosure of HIV status to all sexual partners, from 61.8% to 75.5% ($p = 0.04$). Concurrent testing with at least one sexual partner increased among participants, from 31.8% to 44.5%, but the difference was not statistically significant ($p = 0.06$).

In site-stratified analysis, we failed to find statistically significant evidence of changes in the frequency of condom use with female partners in either site, and found evidence of increased disclosure to all partners in Ehlanzeni only ($p = 0.01$). We found no other qualitatively different findings in the site-stratified analysis. When restricting analysis to individuals reporting the partnership type (defined by gender or relationship type) at baseline, or at baseline as well as 6-month follow-up, we failed to find statistically significant evidence of changes in condom use with casual partners, female partners, male partners, or any partners. For example, in the analysis of changes in condom use with casual partners, we restricted analysis to individuals reporting casual partners at baseline. Separately, we also restricted analysis to individuals reporting casual partners at both time points.

Behavioral change emerged as a theme in the qualitative analysis, which revealed that some individuals used HIV self-testing with sexual partners and allowed test results to guide sexual decision-making and behavior---both the decision to use a condom and the decision not to do so. Ten of the 15 participants reported using one of their self-tests with a sexual partner; of those, half acknowledged doing so to have condomless intercourse with that partner. For example, one respondent indicated:

> There were things I wanted to do and we couldn't because we didn't know each other's statuses... Now we can do things we couldn't do.
>
> – Ehlanzeni interview #2

Similarly, when one participant was asked why they choose to test with their partner, they responded:

> We discuss[ed]...if we take our relationship to [the] next level we should test and know our status because [then] we don't use protection 'cause we know that no one is sick between us.
>
> – Gert Sibande interview #6

We also found evidence of HIV self-testing leading to partnership-level harm reduction: one individual reported using condoms with a partner specifically because concurrent testing led to the discovery that the partner was HIV-positive.

Test-guided sexual decision-making was not, however, consistently reported in all interviews. About one third of the fifteen IDI participants reported an increased interest

in condom use during the study period, regardless of test results. For example, when asked "Okay, after now you have done HIV [self] test, did your sexual behavior change?" one participant responded:

> I have changed a lot my brother, I don't walk without shoes anymore: if I found you at night I use protection, without protection there is nothing we can talk. If you don't want me to use protection, I tell you straight that you want to kill me, please leave my place.
>
> – Gert Sibande interview #7

Other individuals claimed no test-related changes in condom use. For example:

> Interviewer: If you find that your results are negative, what did you do?
>
> Participant: I continued using condoms and still take good care of myself…… I feel happy because it didn't change anything.
>
> – Gert Sibande interview #3

Overall three of fifteen participants definitely noted that they would continue to use condoms regardless of test use and results. Several others stated this but later in the dialogue made statements that conflicted with this assertion.

HIV-related conversations

There was no evidence in the quantitative analysis of changes in the percent engaging in HIV-related discussions with friends within the last 30 days ($p = 0.81$ for discussion about HIV/AIDS, $p = 1.00$ for discussion about HIV testing, and $p = 0.27$ for discussion about condoms). In the qualitative analysis, we found that HIV self-testing use and testing results had varied effects on discussion of HIV with peers. Among the three men who tested positive via self-testing, two said that they were less likely to talk about HIV after self-testing, while the third said he was more likely to talk about HIV after learning his HIV status. Similarly, some men who tested HIV-negative via self-testing said the experience led them to talk about HIV more often:

> It has freed me because now I know my status as opposed to before when I didn't know my status… I tell my friends and girlfriends that it is important to know your status…I never used to participate in those conversations because I didn't know my status.
>
> - Ehlanzeni interview #1

Others, however, said the results led them to talk about HIV less often with peers.

HIV-related stigma

The quantitative analysis suggests no statistically significant change in perceptions of HIV-related anticipated stigma following HIV self-testing distribution in the community ($p = 0.86$), with consistently high anticipated HIV stigma over time. High awareness of pervasive HIV stigma emerged as a consistent theme in the qualitative interviews. Perceptions of HIV as a pejorative condition, connoting moral inferiority, were common. Knowing one's status

was empowering, but only if it was HIV-negative; testing with a partner increased trust, but again, only if the partner tested HIV-negative. Words like "sick" were used to describe people with HIV, "clean" for those without; promiscuous behavior or being a "crook" was thought to be associated with HIV, as well as HIV being "a disease of the taverns" e.g. associated with "immoral" activities such as alcohol consumption.

DISCUSSION

In our cohort of South African MSM, we found an increase in disclosure from respondents to partners following access to HIV self-testing. This finding is consistent with an internet-based survey of MSM in China that found correlations between HIV self-testing use and HIV status disclosure conversations with sex partners (Tang et al., 2018). Broadly, increased potential for disclosure of HIV results prior to sex has been noted as an advantage of self-testing among MSM and trans women (Katz et al., 2018; Wirtz et al., 2017). Though our finding could be attributable to something other than self-testing, and though increased disclosure was not observed in both sites, we believe that having test kits in the home likely facilitated disclosure for at least some of our study participants, particularly given that concurrent testing with sexual partners was reported by 50% of study participants at follow-up.

We found decreased condom use with female partners, but not male partners, after introduction to HIV self-testing kits, but this finding did not hold after restriction to site or after restriction to individuals with female partners at baseline or restriction to participants with female partners at both time points. The qualitative data illuminated similar heterogeneity, which suggests that HIV self-testing may have played a role in behavioral changes for some, but not all, individuals.

This work is subject to limitations. The pilot study and accompanying qualitative inquiry included a small sample size and primarily consisted of young MSM; it is therefore unlikely to be representative of all MSM in the country or in the region. We did detect some demographic differences even across our two sites; it is possible that such differences contribute to the heterogeneity of some of our findings. Additionally, recruitment for the qualitative interviews was purposive, designed to include all participants testing HIV-positive by self-test, and a sample of those testing HIV-negative whom the staff believed would be forthcoming about their experiences.

We conclude that HIV self-testing has promise for increasing disclosure of HIV status. We acknowledge, however, that for some but not all individuals, a possible side effect of easy access to testing through self-testing is the use of test results to negotiate non-condom use between partners (Kippax et al., 1993; Mitchell, 2014), which is of concern because of potential overconfidence in test results. We suggest that pamphlets accompanying HIV self-testing kits emphasize that the tests may not detect recent HIV infection and do not screen for other STI.

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TABLE 1.

Demographic and behavioral characteristics, men who have sex with men, South Africa, 2015–2016.

	Gert Sibande		Ehlanzeni			Overall	
	Count	Percent	Count	Percent	*p*	Count	Percent
Age							
18–24	30	66.7	44	67.7	1.00	74	67.3
25+	15	33.3	21	32.3		36	32.7
Highest level of education							
Primary or secondary	16	35.6	40	61.5	0.03	56	50.9
Matric	23	51.1	19	29.2		42	38.2
Tertiary or beyond	6	13.3	6	9.2		12	10.9
Paid work, last 6 months							
Paid work	13	28.9	22	33.8	0.68	35	31.8
No	32	71.1	43	66.2		75	68.2
Sexual identity							
Gay/homosexual	7	15.6	26	40.0	0.00	33	30.0
Bisexual	34	75.6	39	60.0		73	66.4
Straight	3	6.7	0	0.0		3	2.7
Transgender	1	2.2	0	0.0		1	0.9
Testing frequency prior to study							
0–6 months	9	20.0	36	55.4	0.00	45	40.9
6–12 months	24	53.3	5	7.7		29	26.4
More than 12 months	5	11.1	15	23.1		20	18.2
Never tested	7	15.6	9	13.8		16	14.5
Regular male partner							
Male partner	35	77.8	55	84.6	0.45	90	81.8
No	10	22.2	10	15.4		20	18.2
Regular female partner							
Female partner	32	71.1	25	38.5	0.00	57	51.8
No	13	28.9	40	61.5		53	48.2
Number of sexual partners, last 6 months							
0	2	4.4	1	1.5	0.26	3	2.7
1	30	66.7	37	56.9		67	60.9
2+	13	28.9	27	41.5		40	36.4

TABLE 2.

Behaviors at baseline and follow-up, men who have sex with men, South Africa, 2015–2016.

	Baseline		Follow-up		
	Count	Percent	Count	Percent	*p*
Condomless intercourse, last 6 months					
With casual partner					
Yes	25	22.7	22	20.0	0.73
No	85	77.3	88	80.0	
With female partner					
Yes	27	24.5	41	37.3	0.03
No	83	75.5	69	62.7	
With male partner					
Yes	27	24.5	20	18.2	0.27
No	83	75.5	90	81.8	
With any partner					
Yes	48	43.6	56	50.9	0.29
No	62	56.4	54	49.1	
HIV disclosure and discussion					
Disclosure of HIV status from respondent to partner					
Nondisclosure in at least one partnership	42	38.2	27	24.5	0.04
Disclosure in all partnerships	68	61.8	83	75.5	
Disclosure of HIV status from partner to respondent					
Nondisclosure in at least one partnership	50	45.5	41	37.3	0.27
Disclosure in all partnerships	60	54.5	69	62.7	
Testing with sexual partners					
No	75	68.2	61	55.5	0.06
Tested together in at least one partnership	35	31.8	49	44.5	
Likelihood of discussing safer sex with sexual partners					
Unlikely	6	5.5	12	11.1	0.24
Likely	52	47.3	25	23.1	
Very likely	52	47.3	71	65.7	
Most recent discussion with friends about HIV/AIDS					
Longer than 30 days ago	10	9.1	8	7.3	0.81
Within the past 8–30 days	13	11.8	32	29.4	
Within the past 7 days	87	79.1	69	63.3	
Most recent discussion with friends about HIV testing					
Longer than 30 days ago	9	8.2	9	8.3	1.00
Within the past 8–30 days	17	15.5	32	29.4	
Within the past 7 days	84	76.4	68	62.4	
Most recent discussion with friends about condoms					
Longer than 30 days ago	5	4.5	10	9.2	0.27
Within the past 8–30 days	16	14.5	25	22.9	

	Baseline		Follow-up		
	Count	Percent	Count	Percent	*p*
Condomless intercourse, last 6 months					
Within the past 7 days	89	80.9	74	67.9	
Perceived HIV stigma					
Perceived HIV stigma					
Very high stigma	82	74.5	80	73.4	0.86
High stigma	23	20.9	24	22.0	
Low stigma	5	4.5	5	4.6	