ORIGINAL ARTICLE

Sexual abstinence and other behaviours immediately following a new STI diagnosis among STI clinic patients: Findings from the *Safe in the City* trial

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ABSTRACT

Background Few studies have assessed patients' sexual behaviours during the period immediately following a new diagnosis of a curable sexually transmitted infection (STI).

Methods Data were analysed from a behavioural study nested within the *Safe in the City* trial, which evaluated a video-based STI/HIV prevention intervention in three urban STI clinics. We studied 450 patients who reported having received a new STI diagnosis, or STI treatment, 3 months earlier. Participants reported on whether they seriously considered, attempted and succeeded in adopting seven sex-related behaviours in the interval following the diagnostic visit. We used multivariable logistic regression to identify, among men, correlates of two behaviours related to immediately reducing reinfection risk and preventing further STI transmission: sexual abstinence until participants were adequately treated and abstinence until their partners were tested for STIs.

Results Most participants reported successfully abstaining from sex until they were adequately treated for their baseline infection (89%–90%) and from sex with potentially exposed partners until their partners were tested for HIV and other STIs (66%–70%). Among men who intended to be abstinent until they were adequately treated, those who did not discuss the risks with a partner who was possibly exposed were more likely not to be abstinent (OR, 3.7; 95% CI 1.5 to 9.0) than those who had this discussion. Similarly, among men who intended to abstain from sex with any potentially exposed partner until the partner was tested for HIV and other STIs, those who reported not discussing the risks of infecting each other with HIV/STIs were more likely to be sexually active during this period (OR, 3.5; 95% CI 1.6 to 8.1) than were those who reported this communication.

Conclusions Improved partner communication could facilitate an important role in the adoption of protective behaviours in the interval immediately after receiving a new STI diagnosis.

Trial registration number NCT00137670.

INTRODUCTION

Sexually transmitted infections (STIs) remain a critical public health issue with an estimated 499 million new cases of chlamydial infection, gonorrhoea, syphilis and trichomoniasis occurring annually worldwide.[1] Repeat infections also occur frequently with reinfection rates for chlamydia and gonorrhoea reaching as high as 32% and 40% in women,[2] and 18% and 31% in men, respectively.[3] Patients newly diagnosed with a curable STI represent an important target population for preventing reinfection, as well as for avoiding further transmission to sexual partners. Risk factors for reinfection with gonorrhoea or chlamydia include young age, minority race or ethnicity, having multiple or new partners, failing to attend a clinical treatment appointment, previous history of an STI, continuing to have sex with a partner not known to have been treated and being a man who has sex with men.[3–9]

Despite research on STI risk factors and reinfection rates, few studies have examined the sexual behaviours of patients immediately following receipt of a new STI diagnosis.[10–14] We describe reports by STI clinic patients of their seriously considering, attempting and successful adopting multiple behaviours related to sex and relationships during the immediate interval after their being diagnosed with or treated for a new curable STI. Given longstanding recommendations by the US Centers for Disease Control and Prevention (CDC) and European health agencies to abstain from sex while undergoing treatment for STI,[15 16] we also evaluated behavioural characteristics of male participants reporting failure to be abstinent until they were adequately treated and until their partners were tested for HIV and other STIs.

MATERIALS AND METHODS

We analysed data from a behavioural study nested within the *Safe in the* City trial, which was conducted in public STI clinics in three US cities (Denver, Colorado, USA; Long Beach and San Francisco, California, USA) during 2003–2005. The trial systematically allocated 4-week intervals alternating with and without the *Safe in the City* intervention, a theory-based video on safer sex, playing in the clinic waiting-room.[17] The main trial involved review of medical records for 38 635 STI clinic patients and demonstrated that patients initially attending the clinics during an interval where the waiting-room video was being shown ('intervention interval') had a 9% decrease in new laboratory-confirmed STIs (ie, gonorrhoea, chlamydia, trichomoniasis, syphilis and HIV infection) during study follow-up compared with patients initially attending during an interval where the video was not playing ('control interval'). The per-patient

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cost of producing the video and implementing the intervention was estimated at $0.46.[18] Additional details regarding the design and results of the *Safe in the City* trial have been reported elsewhere.[17]

In the nested study, a systematically drawn sample of male and female STI clinic patients from both intervention and control study conditions in the original trial completed audio computer-assisted self-interview (ACASI) surveys. These surveys were conducted immediately following the baseline clinic visit (ie, before the patient departed the clinic) and at a 3-month visit. English-speaking patients in the three study clinics were eligible for the nested study if they were ≥18 years of age, reported engaging in vaginal or anal intercourse in the last 3 months, reported having been in the clinic waiting-room for at least 20 min during the baseline visit and were not known by the clinician or counsellor to be HIV positive, pregnant or seriously ill. Patients who had a condition requiring frequent clinic visits for treatment (eg, human papillomavirus or herpes) or who had previously attended a participating clinic during an intervention interval when the video was played were ineligible. The protocol (#3500) was approved by the Institutional Review Board at the CDC and at the study sites (University of California, San Francisco and at Long Beach; the University of Colorado Hospital and Education Development Center).

The study population for the present analysis consisted of all participants in the nested study who completed the 3-month follow-up assessment and who reported having been diagnosed or treated during their baseline visit for ≥1 curable STI (ie, gonorrhoea, chlamydia, trichomoniasis, primary or secondary syphilis, mucopurulent cervicitis or non-gonococcal urethritis). Although participants could have inaccurately recalled their STI history, we wanted to focus on those who thought (even erroneously) that they had recently had an infection. Participants were assessed on whether they 'seriously considered', 'attempted to adopt' and 'succeeded in adopting' (distinct questions) in accomplishing seven behaviours related to sex or relationships in the 3-month period following the baseline visit. These behaviours consisted of the following: (1) abstaining from sex until the participant was adequately treated, (2) abstaining from sex with any potentially exposed partner until the partner was tested for HIV and other STIs, (3) discussing the risks with a partner who was possibly exposed, (4) telling a potentially exposed partner to seek an STI examination, (5) breaking up with a partner who exposed participant to STI, (6) discussing with a partner the risks of infecting each other with HIV/STIs and (7) abstaining from sex when drinking or using drugs.

We identified correlates of the two self-reported behaviours that relate directly to the immediate risk of reinfection or further transmission of infection: (1) failing to abstain from sex until the participant was adequately treated and (2) failing to abstain from sex with any potentially exposed partner until the partner was tested for HIV and other STIs. The analyses to identify correlates were restricted to those reporting that they 'seriously considered' engaging in the given type of abstinence. The analyses to identify correlates were restricted a priori to male participants because the sample of women was insufficient in size. We assessed as potential correlates participant reports of succeeding in accomplishing the other behaviours related to sex or relationships listed above and the number of partners in the past 3 months (0 or 1, 2 vs ≥3). We fit two full multivariable logistic models (one for each abstinence outcome) with potential correlates and then used stepwise backward elimination to reduce the model by removing factors that were not associated (based on a p value ≤0.05) with the outcome.

RESULTS

Among the 1609 participants enrolled in the nested behavioural study, 1392 (87%) completed the 3-month follow-up assessment. Among this subset, 450 (32%) reported having received a new STI diagnosis or treatment for an STI at their baseline visit, and therefore comprise the analysis population for this report. Most of these participants were men (76%), ≥25 years of age (61%), heterosexual (77%) and single (74%) (table 1). The most common reason for the baseline visit was having new symptoms (48%).

In general, for each of the seven behaviours assessed following the baseline visit, few male or female participants reported that they 'seriously considered' the given behaviour without also having 'attempted' or 'succeeded' in adopting the behaviour (tables 2 and 3). Likewise, few reported having attempted to—without having succeeded in—adopting the behaviour. For example, 89% of men and 90% of women succeeded in adopting the recommended risk-reduction behaviour of abstaining from sex until they were adequately treated. However, few men and women reported only having seriously considered it (2% and 0%, respectively) with no further action, and few men and women attempted without also succeeding in adopting it (7% and 9%, respectively). The sole exception was that large differences existed between the proportions of men and women who only 'seriously considered' breaking up with a partner with no

Table 1 Characteristics of patients with STI reporting baseline receipt of STI diagnosis or treatment, by sex

	Men (n=340) No. (%)	Women (n=110) No. (%)	Total (n=450) No. (%)
Age			
<25 years	115 (33.8)	61 (55.5)	176 (39.1)
≥25 years	225 (66.2)	49 (44.6)	274 (60.9)
Race or ethnicity			
White, non-Hispanic	111 (32.7)	26 (23.6)	137 (30.4)
Black, non-Hispanic	135 (39.7)	42 (30.1)	178 (39.6)
Hispanic	73 (21.5)	29 (26.4)	102 (22.7)
Other/missing	21 (6.2)	12 (10.9)	33 (7.3)
Highest level of education completed			
≤ High school or equivalent	129 (37.9)	57 (51.8)	186 (41.3)
>High school	211 (62.1)	53 (48.2)	264 (58.7)
Marital status*			
Single	254 (74.9)	76 (69.1)	330 (73.5)
Married, cohabiting or domestic partner	64 (18.9)	21 (19.1)	85 (18.9)
Divorced or widowed	21 (6.2)	13 (11.8)	34 (7.6)
Site			
Denver	95 (27.9)	23 (20.9)	118 (26.2)
San Francisco	140 (41.2)	55 (50.0)	195 (43.3)
Long Beach	105 (30.9)	32 (29.1)	137 (30.4)
Sexual identity			
Heterosexual	248 (72.9)	97 (88.2)	345 (76.7)
Gay/lesbian, bisexual	92 (27.1)	13 (11.8)	105 (23.3)
Reason for baseline visit*			
New symptoms	174 (51.2)	43 (39.1)	217 (48.3)
Contact to an STI	90 (26.5)	33 (30.0)	123 (27.4)
Other†	75 (22.1)	34 (30.9)	109 (24.3)

*N=339 men.
†Could include visit for routine STI screening or examination, follow-up on positive test, HIV testing, emergency contraception or other contraception.
STI, sexually transmitted infection.

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Table 2 Reports of having seriously considered, attempted and succeeded in adopting behaviours during the interval immediately following a new STI diagnosis or treatment, men (n=340)

	Did not consider, attempt or successfully adopt No. (%)	Seriously considered the behaviour* No. (%)	Attempted to adopt the behaviour† No. (%)	Succeeded in adopting the behaviour No. (%)
Abstaining from sex until adequately treated	6 (1.8)	6 (1.8)	24 (7.1)	304 (89.4)
Abstaining from sex with potentially exposed partner until the person was tested for HIV and other STIs	53 (15.6)	13 (3.8)	37 (10.9)	237 (69.7)
Discussing the risks with a partner who was possibly exposed	14 (4.1)	30 (8.8)	15 (4.4)	281 (82.7)
Telling a potentially exposed partner to seek an STI examination	14 (4.1)	36 (10.6)	6 (1.8)	284 (83.5)
Breaking up with a partner who exposed participant to STI	103 (30.8)	61 (18.2)	40 (11.9)	131 (39.1)
Discussing with a partner the risks of infecting each other with HIV/STIs	26 (7.7)	25 (7.4)	10 (3.0)	277 (82.0)
Abstaining from sex when drinking or using drugs	115 (34.5)	16 (4.8)	32 (9.6)	170 (51.1)

*Among those not reporting having attempted or succeeded in adopting the behaviour.
†Among those not reporting having succeeded in adopting the behaviour.
STI, sexually transmitted infection.

further action (18% and 12%, respectively) or having attempted to break up without then succeeding in doing so (12% and 17%, respectively).

Among 321 male participants who reported an intention ('seriously considered') to abstain from sex until they received adequate STI treatment, 8% (n=24) reported failure to succeed in adopting this behaviour. In the bivariable analyses, three correlates of failure to abstain until having received adequate treatment were identified: not discussing the risks with a partner who was possibly exposed (OR, 3.7; 95% CI 1.5 to 9.0), not telling a partner who might have been exposed to seek an STI examination (OR, 3.3; 95% CI 1.3 to 8.1) and not discussing with a partner the risks of infecting each other with HIV/STIs (OR, 3.5; 95% CI 1.4 to 8.5) (table 4). In the multivariable analysis, only not discussing risks with a partner who was possibly exposed remained statistically significant.

Among the 259 men who stated that they intended to abstain from sex with any potentially exposed partner until the partner was tested for HIV and other STIs, 15% (n=39) admitted that they were not abstinent. Only one factor was associated in the bivariable analyses with abstaining from sex until their potentially exposed partner was tested: male participants who failed to discuss with a partner the risks of infecting each other with HIV/STIs were more likely to report failure to remain abstinent until treatment (OR, 3.5; 95% CI 1.6 to 8.1) than were men who had this discussion (table 4). No other factor emerged as significant in the multivariable analysis.

DISCUSSION

Most participants reported contemplating and implementing sexual-risk-reduction behaviours following receipt of a new STI diagnosis. Most notably, high proportions of male and female participants reported successfully abstaining from sex until they were adequately treated for their baseline infection (89%–90%) or until their partners who were potentially exposed were tested for HIV and other STIs (66%–70%). These results are consistent with other studies demonstrating the adoption of protective behaviours after receiving an STI diagnosis. For example, a study conducted among Mexican-American and African-American women diagnosed with a non-viral STI found that 83%–90% of participants reported abstaining from sex with an untreated partner in the interval following diagnosis.[10]

Table 3 Reports of having seriously considered, attempted, and succeeded in adopting behaviours during the interval immediately following a new STI diagnosis or treatment, women (n=110)

	Did not consider, attempt or successfully adopt No. (%)	Seriously considered the behaviour* No. (%)	Attempted to adopt the behaviour† No. (%)	Succeeded in adopting the behaviour No. (%)
Abstaining from sex until adequately treated	1 (0.9)	0 (0.0)	10 (9.1)	99 (90.0)
Abstaining from sex with potentially exposed partner until the person was tested for HIV and other STIs	11 (10.0)	7 (6.4)	19 (17.3)	73 (66.4)
Discussing the risks with a partner who was possibly exposed	1 (0.9)	5 (4.6)	4 (3.6)	100 (90.9)
Telling a potentially exposed partner to seek an STI examination	1 (0.9)	6 (5.5)	6 (5.5)	97 (88.2)
Breaking up with a partner who exposed participant to STI	34 (30.9)	13 (11.8)	19 (17.3)	44 (40.0)
Discussing with a partner the risks of infecting each other with HIV/STIs	5 (4.6)	2 (1.8)	4 (3.6)	99 (90.0)
Abstaining from sex when drinking or using drugs	32 (29.1)	4 (3.6)	6 (5.5)	68 (61.8)

*Among those not reporting having attempted or succeeded in adopting the behaviour.
†Among those not reporting having succeeded in adopting the behaviour.
STI, sexually transmitted infection.

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Also, three multicity studies of adolescents found lower rates of reports of unprotected sex following the receipt of a positive STI diagnosis.[11–13]

Patients often fail to disclose a positive STI diagnosis with partners for reasons that include guilt, fear of stigma, embarrassment, denial or concern about effects on their relationship.[14] Partner communication in the present study, though, appeared important for successfully achieving abstinence. Among men who intended to be abstinent until they were adequately treated, discussing the risks with a partner who was possibly exposed was associated with succeeding in being abstinent until receiving adequate treatment. Similarly, among men who reported seriously considering abstaining from sex with any potentially exposed partner until the partner was tested for HIV and other STIs, those who discussed the risks of infecting each other with HIV/STIs were more likely to report achieving this abstinence than those who failed to have this partner communication.

For many of the sexual-risk-reduction behaviours evaluated, few participants reporting seriously considering a given behaviour without also attempting or succeeding in adopting it during the interval following a new STI diagnosis. Likewise, few reported attempting a given behaviour without also successfully adopting it. Given this pattern, asking patients who test positive for a new infection about their intentions could be a useful proxy for predicting the likelihood of success; additional counselling could be directed toward trying to influence intentions among the patients who admit that they do not intend to carry out a behaviour. In contrast, most patients who report intending to conduct the behaviour may not need additional intervening to support this intention.

Table 4 Unadjusted OR for association with reporting failure to abstain from sex until adequately treated or until partner was tested for HIV and other STIs, among men reporting having 'seriously considered' the behaviour

	Reporting failure to abstain from sex until adequately treated (n=321)		Reporting failure to abstain from sex with potentially exposed partner until partner was tested for HIV/STIs (n=259)	
	No. (%)	OR (95% CI)	No. (%)	OR (95% CI)
Number of partners in the past 3 months				
0.1	12 (6.9)	1.0	19 (12.8)	1.0
2	3 (5.1)	0.7 (0.2 to 2.7)	8 (15.7)	1.3 (0.5 to 3.1)
≥3	9 (10.2)	1.5 (0.6 to 3.8)	12 (20.3)	1.7 (0.8 to 3.9)
Discussed the risks with a partner who was possibly exposed				
Yes	15* (5.6)	1.0	31 (13.5)	1.0
No	9* (18.0)	3.7 (1.5 to 9.0)	8 (26.7)	2.3 (1.0 to 5.7)
Told a partner who might have been exposed to seek an STI examination				
Yes	16* (5.9)	1.0	33 (14.2)	1.0
No	8* (17.0)	3.3 (1.3 to 8.1)	6 (23.1)	1.8 (0.7 to 4.9)
Broke up with a partner who put participant at risk of an STI				
Yes	9† (7.1)	1.0	13‡ (11.4)	1.0
No	13† (7.2)	1.0 (0.4 to 2.5)	25‡ (17.7)	1.7 (0.8 to 3.4)
Discussed with a partner risks of infecting each other with HIV/STIs				
Yes	15§ (5.7)	1.0	28 (12.4)	1.0
No	9§ (17.3)	3.5 (1.4 to 8.5)	11 (33.3)	3.5 (1.6 to 8.1)
Abstained from sex when drinking or using drugs (n=311 and 252)				
Yes	8¶ (4.9)	1.0	18** (12.5)	1.0
No	15¶ (10.1)	2.2 (0.9 to 5.3)	20** (18.5)	1.6 (0.8 to 3.2)

*n=318 due to missing values.
†n=308 due to missing values.
‡n=255 due to missing values.
§n=317 due to missing values.
¶n=311 due to missing values.
**n=252 due to missing values.
STI, sexually transmitted infection.

The similarities in the proportions of participants reporting seriously considering, attempting and succeeding in adopting specific sexual-risk-reduction behaviour could be the result of reporting bias. Reliance on participants' self-reports, which could have been affected by social desirability or recall bias, is a primary limitation of the study. For example, to please investigators in an STI clinic setting, some participants may have over-reported success in adopting preventive behaviours, including abstinence. The use of ACASI, which obviates the need for an interviewer, could have reduced the potential for reporting bias; however, the evidence of the effectiveness of ACASI on reducing bias is inconsistent.[19 20] Self-reported STI diagnoses also are subject to error.[21] However, the target population for this research consists of individuals who perceived that they recently received an STI diagnosis, making the preventive behaviours practiced in response to this belief relevant. An additional limitation is that the sample size of women did not permit the multivariable analysis of correlates of abstaining behaviours. Also, patterns of behaviours in the target population could have changed since the study was conducted roughly a decade ago. Finally, the study focused only on individual-level behaviours; the influence of other factors, such as sexual or social networks or other interventions, on the risk for reinfection was not explored.

The strengths of this analysis include the assessment of a range of potential correlates of recommended abstinence-related behaviour following STI diagnoses. Furthermore, the analysis benefited from its prospective cohort design in which patients were assessed for STIs and then later were administered the retrospective questionnaire on their behaviour during the interval following receipt of their STI diagnosis. Finally, the follow-up rate (87% of those enrolled in the nested behavioural study) was high.

Interventions (eg, abstinence, mutual monogamy, condoms and the use of expedited partner treatment) have demonstrated effectiveness for preventing STIs, but replication and scale-up of these prevention strategies have been slow.[22 23] Controlling STIs in 'core' groups—subpopulations at elevated risk of STI acquisition and transmission—is thought to be a necessary (but not sufficient) step for adequately addressing infection in the overall population.[24] Focusing on patients at STI clinics with high risk for subsequent infections could provide a practical and efficient way of identifying and intervening with core group transmitters (ie, those who are often infected or often transmit the infection).[25 26] One proposed strategy is to counsel patients to abstain from sex[15 16] or to use condoms consistently and correctly until treatment is completed; however, few studies on the effectiveness of these counselling interventions have been conducted.[27] Interventions demonstrated to be effective in reducing subsequent STIs among index patients include displaying an educational video in the STI clinic waiting-room and notifying patients' partners about the infection and the need to receive treatment.[17 28] While the optimal strategy for partner notification (ie, patient referral, expedited partner therapy, contract referral and provider referral) of specific STIs may differ by patient, partner and situation,[28] the present findings support the role of patient communication of the risks of infection with their partners. Future research could evaluate the feasibility and effectiveness of brief interventions to improve partner communication as a means to strengthen behaviours for avoiding transmission or reinfection among patients newly diagnosed with an STI.

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Key messages

- Most participants reported successfully abstaining from sex until receiving treatment for their baseline infection and until their potentially exposed partners were tested for HIV/STIs.
- In general, for each of the seven behaviours assessed, few male or female participants reported that they 'seriously considered' the given behaviour without also having 'attempted' or 'succeeded' in adopting the behaviour in the period following their STI diagnosis.
- Partner communication was an important correlate for successfully achieving abstinence until adequate treatment or until partners were tested for HIV/STIs.

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Contributors CKM, CAR, JDK, LO and LW contributed to the study design and concept. AM, CKM, CAR and JDK participated in acquisition of data. MG, ADM and LW contributed to the statistical analysis. All authors participated in the drafting of the manuscript and have reviewed and approved the final version.

Disclaimer The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC. The authors have no conflicts of interests.

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