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Screening for sexually transmitted infections in substance abuse treatment programs

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Abstract

Objectives—We evaluated the prevalence of the sexually transmitted infections (STIs) chlamydia and gonorrhea in clients at a methadone maintenance program and a residential detoxification program.

Methods—We collected urine specimens for chlamydia and gonorrhea ligase chain reaction testing and assessed sexual, substance abuse and STI histories.

Results—Of 700 subject assessments, 490 occurred among detoxification clients and 210 in methadone maintenance. *Chlamydia trachomatis* was detected in 5/700 (0.9, 95% CI = 0.1–1.8%) and *Neisseria gonorrhoeae* in none. All chlamydia infected subjects were recruited from the detoxification program. Subjects reported high risk sexual behavior: 17% reported commercial sex exchange, and 22% reported inconsistent condom use with multiple sexual partners during the prior 2 months.

Conclusion—Based on prevalence in Boston, MA, universal screening for STI in substance abuse treatments programs is not warranted. However, routine screening for younger substance abusers and in communities with high prevalence should be considered.

Keywords

Sexually transmitted infection; Drug treatment; Detoxification; Chlamydia; Gonorrhea; Methadone

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1. Introduction

Every year in the US there are an estimated 3.7 million new cases of the sexually transmitted infections (STIs) *Chlamydia trachomatis* and *Neisseria gonorrhoeae* (Centers for Disease Control and Prevention, 2000). The prevalence of *C. trachomatis* among the general US population has been steadily increasing in the past decade and in 2000 was 0.25% overall, with 0.4% in women and 0.1% in men in (Centers for Disease Control and Prevention, 2001a,b). *N. gonorrhoeae* prevalence, while in decline throughout the period 1975–1997, showed a slight increase to 0.13% in 1998 and remained at that level through 2000 (Centers for Disease Control and Prevention, 2001b) Individuals with *N. gonorrhoeae* and *C. trachomatis* infections appear to be at greater risk for HIV transmission (Centers for Disease Control and Prevention, 2001b). Similarly, untreated cases of *C. trachomatis* or *N. gonorrhoeae* resulting in pelvic inflammatory disease (PID) account for much of the infertility, ectopic pregnancy and chronic pelvic pain in US women. Scholes et al. (1996) found that the incidence of PID was 56% lower among a group of women screened for cervical *C. trachomatis* than among a usual-care group in a managed care setting.

Multiple studies have demonstrated the strong correlation between substance abuse and sexual behaviors that put individuals at risk for STIs (DeHovitz et al., 1994; Poulin et al., 1999, 2001; Ross et al., 1999; Shafer et al., 1993). In a recent study in a substance abuse treatment facility in Birmingham, Alabama, 40% of women and 15% of men reported having ever exchanged sex for drugs, while 53% of women and 36% of men reported a history of STIs (Bachmann et al., 2000). Despite the documented high STI risk for substance abusers, few studies have examined the prevalence of STIs among individuals seeking substance abuse treatment. Such studies may not have been conducted in the past due to a general lack of emphasis on medical issues in substance abuse treatment and because traditional methods of STI testing have been unwieldy, requiring penile urethral swabs or pelvic examinations. In addition, STI screening may be challenging to accomplish in inpatient substance abuse detoxification programs as typical length of stay is brief, 4–6 days.

A substance abuse treatment program may be an opportune time at which to provide STI screening and counseling. This hypothesis is supported by a recent study of 8241 crack or injection drug users which found that individuals who entered drug treatment programs were more likely than untreated users to reduce their number of sexual partners, to reduce the frequency of exchanges of sex for drugs and/or money, and to increase the number of sexual acts involving protection (Hoffman et al., 1998). The recent development of new simpler approaches to STI testing involving high-sensitivity nucleic acid amplification technology, such as the ligase chain reaction (LCR) test for diagnostic use in urine specimens, has opened up the possibility of STI screening in non-medical settings (Black, 1997).

In order to evaluate the efficacy of screening for STIs in substance abuse treatment programs, we assessed the prevalence of *C. trachomatis* and *N. gonorrhoeae* in 2 common types of substance abuse treatment programs, a residential detoxification unit and in a methadone maintenance treatment program, and evaluated risk factors for STIs that would identify target groups for screening in these settings.

2. Method

2.1. Subjects and study site

Subjects were recruited from two sites in the metropolitan Boston area, the CAB River Street Detoxification Center (Detox) and the Boston Public Health Commission's Methadone Maintenance Program (MM), between April and December 2001. The Detox is a 35-bed inpatient facility serving primarily uninsured and Medicaid-eligible individuals from Eastern Massachusetts. Individuals are admitted for opioid, cocaine, and/or alcohol dependence. The MM offers counseling services and daily methadone dosing to approximately 250 persons living in the Boston area. Clients in both programs may be self-referred or referred from local hospitals or treatment programs; priority for admission to the MM is given to pregnant women and HIV-infected individuals. Trained research associates recruited and interviewed subjects at both programs. The Institutional Review Board at Boston University Medical Center approved the study, and all interviewed subjects provided written informed consent.

Study eligibility criteria included the following: (1) receiving substance abuse treatment at either the Detox or the MM; (2) willingness to provide a urine specimen; and (3) availability of contact information, specifically a telephone number or address by which the subject could be reached in case of a positive test result. Subjects could only enroll once. Full participation included providing an unsupervised urine specimen and completing a 15–30 min standardized interview administered in a private room. The interview covered demographics, substance use history, prior STIs, current genitourinary symptoms (discharge, sores in genital area, vaginal odor, burning on urination), and sexual risk behaviors. For the purposes of the study, subject income was assessed as 'total income from all sources (including jobs, benefits, unreported income, and illegal means).' A General Equivalency Degree (GED) was considered equivalent to 12 years of formal education.

The interview was also administered in Spanish when a Spanish speaking interviewer was available. The instrument was translated into Spanish by a certified medical interpreter, back-translated into English to check for accuracy, and then corrected. When the Spanish-speaking interviewer was unavailable, ability to speak English was an additional requirement for eligibility.

2.2. Screening and survey

Each subject was instructed to collect the first 10–20 ml of the urine stream in a sterile container. Subjects who participated in voluntary testing were told that the urines would be only tested for the *Chlamydia* and *N. Gonorrhea*, not drugs. Subjects who participated in the blinded testing had observed urines because they were tested during random toxic screening. All specimens were transported in refrigerated carriers to a 3 °C refrigerator at the main research office and conveyed to the testing laboratory within 3 days of collection. On arrival at the testing laboratory, all specimens were frozen at −20 °C. A single laboratory tested all specimens for *C. trachomatis* and *N. gonorrhoeae* using the LCR assay (LCx, Abbott Laboratories, Abbott Park, IL). Recent reviews of the published literature on *C. trachomatis* and *N. gonorrhoeae* screening using the LCx test in urine specimens have documented a

relative sensitivity of 93–98% and specificity of 99% for *C. trachomatis* (Black, 1997), and a sensitivity of 96–98% and specificity of 98–100% for *N. gonorrhoeae* (Koumans et al., 1998). Subjects with positive test results were contacted by a research associate and referred to the Boston Medical Center Public Health Clinic for treatment and partner notification counseling. If subjects did not present for treatment within 7 days, they were contacted again. If they failed to present after an additional 7 days, all available contact information was reported to the Massachusetts Department of Public Health as per STI reporting requirements. All subjects were given a phone number to receive test results, but subjects with negative tests were not contacted with those results.

Because extensive recruitment efforts only yielded 69 subjects among MM program clients, we decided to conduct 'blinded' urine testing for *N. gonorrhoeae* and *C. trachomatis* among MM clients who had not enrolled in the study in order to give an accurate estimate of prevalence among MM program clients. The Institutional Review Board at Boston University approved this modification of the study. In December 2001 MM staff provided a list of current MM clients who had not previously participated in the study to the collecting laboratory ($n = 156$). Between December 2001 and February 2002, testing for *C. trachomatis* and *N. gonorrhoeae* occurred on urine specimens routinely collected as part of supervised testing for drug screening for those clients. Blinded testing was continued until no further missing client specimens were retrieved during a 2-week period. All specimens were transported in refrigerated carriers to the testing laboratory and frozen and tested as described above. Gender was the only information provided to the research team for urines tested in this blinded fashion.

Statistical analysis was conducted using Fisher's exact tests for categorical variables, and *t*-tests for continuous variables. Two-sided values of $P < 0.05$ were considered statistically significant.

3. Results

A total of 700 subjects were screened for STIs, including 210 subjects from the MM and 490 from Detox. Of the 210 subjects screened for STIs at the MM, 69 subjects participated in voluntary testing and 141 in blinded testing. Of the 700 total subjects, 440 were male and 260 female. During the study period in which this was performed, 339 clients were treated at the MM, of which 62% were screened as part of the study. Of 156 clients eligible for blinded testing, 141 (90%) specimens were tested. There were 2680 admissions to the Detox during this period, of which we estimate 53% were repeat admissions. We enrolled 39% of the estimated 1260 different clients available during this period. Detox subjects enrolled were comparable demographically to those treated but not enrolled in a comparable period.

Surveys were conducted with 551 of 559 subjects providing informed consent, 67 from the MM and 484 from Detox. Sociodemographic and substance use characteristics of surveyed study subjects are listed in Table 1. The mean age was 37.4 years; MM subjects were older (mean age 41.7 years, SD = 7.6) than Detox subjects (36.8 years, SD = 8.9) ($P < 0.0001$). Surveyed subjects were 36% White, 33% Black, and 26% Hispanic. The primary drug of choice was heroin for 65%, with fewer subjects preferring alcohol (19%), cocaine (11%), or

other drugs (6%). Median annual income was between $10 000–19 999 for Detox subjects and $5000–9999 for MM subjects. Twelve years or more of formal education was reported by 67% of subjects.

Fifty-four percent of subjects reported a prior history of STIs (defined as a reported incidence of *C. trachomatis*, *N. gonorrhoeae*, HIV, syphilis, genital warts, genital herpes, trichomonas, genital lice, or, for women, PID or an abnormal Pap smear) (Table 2). Twice as many females reported such a history (130/179, 73%) compared to males (165/372, 44%) ($P < 0.0001$). While there was no significant difference in prior incidence of *N. gonorrhoeae* infection by gender (25 and 26%, respectively), a prior diagnosis of *C. trachomatis* was reported by 29% of females and 8% of males. MM subjects were significantly more likely to be HIV positive (25/67, 37%) than Detox subjects (30/484, 6%) ($P < 0.0001$), reflecting HIV infection as a criteria providing preferred entry into the methadone program. Current genitourinary symptoms were reported by 14% of all subjects surveyed.

A total of 434 individuals (79%) reported having engaged in sexual activity (including vaginal, anal, or oral sex) in the 2 months prior to the survey. Of the subjects reporting sexual activity, 58% had a single sexual partner, 26% reported 2–3 partners and 16% reported 4 or more partners. Of the 184 subjects reporting more than 1 partner, 66% reported no (33%) or inconsistent (34%) condom use. Seventeen percent of all subjects surveyed reported selling or purchasing sexual acts for drugs or money in the previous 2 months. Additional information on reported STI history and sexual behaviors is summarized in Table 2.

Of the 700 subjects screened for STIs, 5 subjects (0.7%; 95% CI 0.09–1.34%) were found to be positive for *C. trachomatis* ; no subject was positive for *N. gonorrhoeae* (0%, 95% CI 0.0–0.005). All of the *C. trachomatis*-positive subjects were clients of the Detox; we found no STIs in MM subjects. Table 3 presents selected characteristics of each *C. trachomatis*-positive subject. Four of the 5 subjects were younger than 25 years of age, while 2 of 5 reported genitourinary symptoms, 3 of 5 had multiple sex partners, and 4 of 5 reported inconsistent condom use. The sensitivity of screening in response to reported symptoms was 40%, and the specificity was 86%. Among the 60 subjects aged under 25 years, prevalence of *C. trachomatis* rose to 6.7%.

4. Discussion

The prevalence of *C. trachomatis* and *N. gonorrhoeae* infections at two substance abuse treatment programs in metropolitan Boston was very low. No *N. gonorrhoeae* infections were detected among any subjects, and *C. trachomatis* was detected among less than 1% overall.

This prevalence of STIs is less than half the prevalence noted among clients in 1999 at an inpatient substance abuse treatment facility in Birmingham, Alabama, where 3.9% were found to have *C. trachomatis* and 1.6% *N. gonorrhoeae* (Bachmann et al., 2000). The lower prevalence in Boston may reflect the lower state-wide prevalence in Massachusetts (177.6 per 100 000) compared to Alabama (350.7 per 100 000) (Centers for Disease Control and

Prevention, 2000). The Birmingham study used the same urine test as did this study and the age of the population was similar in the two studies. In contrast, a 1997–98 probability sample of community adults in Baltimore ages 18–35 showed 5.3% infected with *N. gonorrhoeae* and 3.0% with *C. trachomatis*, significantly higher than either the Boston or Birmingham studies of substance abuse treatment clients (Turner et al., 2002). The higher prevalence in the Baltimore community sample may in part reflect the younger age of the population studied. These studies suggest the importance of considering background state and local prevalence when deciding whether to screen for STIs in substance abuse treatment settings. The CDC has readily available data on statewide STI prevalence (available online at http://www.cdc.gov/std/stats).

4.1. Substance abuse and high-risk sexual behavior

Despite the low STI prevalence in these substance abuse treatment programs, subjects frequently reported engaging in high-risk sexual behavior. Twenty-one percent of sexually active individuals reported participating in the trade of sex for money or drugs, and 22% of all subjects reported inconsistent condom use and more than one sexual partner in the previous 2 months. Detox clients were 3.7 times more likely than MM clients to engage in high-risk sexual behavior (95% CI 1.6–8.1, $P = 0.002$), an effect that remained constant even when controlling for the younger mean age of Detox clients. This may reflect the role of the Detox as a substance abuse treatment entry point, in which clients are actively using drugs or alcohol and therefore are more likely to be engaging in risky sexual behavior (Ross et al., 1999; Aktan et al., 2001; Bagnall et al., 1990; Ericksen and Trocki, 1992; Fitterling et al., 1993; Flom et al., 2001; Morrill et al., 2001; Purcell et al., 2001; Scheidt and Windle, 1995; Somlai et al., 2000; Zenilman et al., 1994). It also may reflect the lower motivation to enter meaningful treatment, and thus reflect repeated and long-standing patterns of risky behavior associated with chronic drug use. In addition, MM clients are much less likely to be using drugs or alcohol and the methadone itself may decrease libido (Kreek, 1973).

Involvement in substance abuse treatment like the MM may reduce risky sexual behaviors. A 1998 study by Hoffman et al. found that cocaine and heroin users who completed a substance abuse treatment program reported both decreased drug use and decreased frequency of high-risk sexual behaviors, including multiple sex partners and inconsistent condom use (Hoffman et al., 1998). Studies have shown treatment for cocaine abuse can lower risky sexual behavior (Shoptaw et al., 1997). Among MM clients in our study, the lack of STI incidence reflects their lower frequency of involvement in risky sexual behavior.

The overall very low prevalence of STIs in our study was unexpected and may be explained by several factors. The accessibility of health care in the city of Boston is very good; there have been generous Medicaid benefits and supported health care for uninsured persons. The 220 subjects from the particular methadone maintenance program (MM) examined are required to see a primary care physician yearly, and some detoxification clients are referred to treatment from medical facilities. In addition, the MM gives priority admission to pregnant women, a group more likely to have been screened for STIs in the recent past. In fiscal year 2001, 47 of the 78 new admissions were pregnant women. These women can remain in the MM program indefinitely, even after delivery.

4.2. Study limitations

This study is limited by convenience sampling in the detoxification program, where clients spend only a short time. We have no information on the clients that were not approached or who refused participation, although we have no reason to suspect lower STI prevalence in those examined. We captured a high percentage of MM clients by the combination of consented and blinded urine testing, thus accurately reflecting prevalence in this setting. Another limitation is the relatively small numbers of younger substance abusers because they are of the highest risk. The older age reflects the general age of clients in substance abuse treatment programs and therefore may underestimate the prevalence in other programs where the clients may be younger. We chose to use non-invasive testing mechanisms, urine samples, which only tested for *N. gonorrhea* and *C. trachomatis*, thus missing the potentially important infections of trichomonas, syphilis and herpes simplex. Should equally sensitive and non-invasive assays be developed for those infections, we suggest further studies should also look into the value of screening for those infections as well. Subjects may have been reluctant to disclose sexual risk behaviors due to the short duration of the interview, which might bias the results toward underreporting. Despite this, risk behaviors were still quite notable.

4.3. STI screening implementation

When choosing to implement screening programs for STIs, substance abuse programs need to consider underlying prevalence and then consider which of the standard screening guidelines best speak to the needs of their client population. Miller, 1998 described a model program of *C. trachomatis* screening that considers both underlying prevalence and risk assessment. Based upon the 0.7% *C. trachomatis* prevalence found in the two treatment programs we studied, universal screening is not indicated. *C. trachomatis* prevalence was much higher among subjects aged 24 years and younger: 6.7% among subjects 18–24 years old, all of whom reported sexual activity in the prior 2 months. Targeted screening among individuals in this age group may be indicated, a recommendation which is consistent with the Massachusetts Department of Public Health (MDPH) (Division of STD Prevention), Centers for Disease Control and Prevention (CDC) (Centers for Disease Control and Prevention, 1993), and the United States Preventive Services Task Force (USPSTF) guidelines (US Preventive Services Task Force, 2000–2002). A comparison of *C. trachomatis* screening guidelines from the MDPH, CDC, and USPSTF showed that these guidelines recommend screening for STIs among sexually active young women 24 years old and younger, although only the MDPH also recommends this screening in men. Among a drug-abusing population, however, young men are likely to be at greater risk for STIs, which may increase the utility of screening among this select group.

5. Conclusion

Despite the appeal of using non-invasive methods to screen all clients for STIs in substance abuse treatment programs, the unexpectedly low prevalence of *C. trachomatis* and *N. gonorrhoeae* in this study suggests that widespread screening is not indicated. STI screening for those substance abuse treatment clients meeting current general CDC and MDPH guidelines is supported by our findings. In other locales, higher STI prevalence in the

general population may persuade public health officials to consider screens for STIs in substance abuse treatment programs, particularly in detoxification programs.

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Table 1

Characteristics of subjects assessed at substance abuse treatment sites for STIs between April and December 2001

Characteristic	Total	By program	
		Detox[a]	MM[b]
N	551	484	67
	%	%	%
Gender			
Female	32	30	51
Male	68	70	49
Age (mean years)	37.4	36.8	41.7
Race/ethnicity[c]			
White	35	34	43
Black or African–American	34	33	37
Hispanic	27	28	17
American Indian or Alaskan native	3	3	3
Native Hawaiian or Asian/Pacific Islander	2	2	0
Primary drug of choice[c]			
Alcohol	19	21	3
Heroin	65	61	94
Cocaine	11	12	3
Marijuana	2	2	0
Sedatives	0.7	1	0
Other	3	4	0
Total income, all sources[d]			
<$10 000	42	39	60
$10 000–19 999	13	12	13
$20 000+	46	48	27
Formal education[d]			
<12 years	33	33	31
12 years	41	40	48
13 years or more	26	27	21

[a] Detoxification center.

[b] Methadone Maintenance Program.

[c] Eighteen missing values.

[d] Ten missing values.

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Table 2

Selected characteristics of sexual behaviors and STI history among subjects assessed at substance abuse treatment sites for STIs between April and December 2001, $n = 551$

Characteristics	**%**	**% By gender**		**% By program**	
N	**Total 551**	**Male 372**	**Female 179**	**Detox[a] 484**	**MM[b] 67**
Prior STIs					
Any STI	54	44	73	51	75
C. trachomatis	15	8	29	14	19
N. gonorrhoeae	26	26	25	26	24
HIV	10	9	12	6	37
Current genitourinary symptoms					
Any symptom	14	9	26	14	12
Vaginal odor	19	–	11	11	9
Discharge	8	2	20	8	6
Burning upon urination	5	5	7	6	3
Sores in genital area	3	3	2	3	1
Sexually active, prior 2 months[c]	79	78	81	81	63
Number of partners, prior 2 months[d]					
0	21	22	18	19	36
1	46	46	45	45	51
>1	33	32	37	36	13
2–3	21	20	23	23	9
4 or more	13	12	14	14	4
Involved in exchanges of sex for money and/or drugs, prior 2 months[e]	21	17	30	22	7
Exchanged sex for money and/or drugs	15	8	29	16	3
Exchanged money and/or drugs for sex	10	12	5	10	2
Reported condom use frequency among subjects reporting > 1 partner, previous 2 months[f]					
Always	34	36	29	33	56
Most of the time	14	11	18	14	0
Some of the time	20	16	26	20	11

Characteristics	%	% By gender		% By program	
	Total	Male	Female	Detox[a]	MM[b]
N	**551**	**372**	**179**	**484**	**67**
Never	33	36	27	32	33

All percentages are column percents.

[a]Detoxification center.

[b]Methadone Maintenance Program.

[c]Missing 1 data point.

[d]Number of sexual partners (including anal, oral, and vaginal sex) of either sex in the previous 2 months, missing 1 data point.

[e]Percent of those who were sexually active during prior 2 months ($n = 434$).

[f]Percent of those who had more than one partner during the previous 2 months ($n = 184$).

Table 3

Selected characteristics of *C. trachomatis* infected subjects tested at a substance abuse detoxification unit, April–December 2001

Case #	Sex	Age	# Sex partners[a]	Condom use	HIV status	Sex for money	Drug of choice	Prior STI	Symptoms[b]
1	F	45	1	All of the time	Positive	N	Heroin	Gonorrhea, PID[c]	None
2	M	22	1	None of the time	Never tested	N	Oxycontin	None	None
3	F	22	4 or more	Some of the time	Negative	Y	Heroin	PID[c]	Burning on urination
4	M	24	2–3	None of the time	Negative	N	Heroin	None	Burning on urination
5	F	21	2–3	Most of the time	Negative	N	Cocaine	Chlamydia	None

[a] Number of reported sex partners in past 2 months.

[b] Reported genitourinary symptoms, including discharge, burning, ulcerative sores.

[c] Pelvic inflammatory disease.