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## Factors Associated With Sexually Transmitted Infections in Men and Women

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### Abstract

**Background**—Sexually transmitted infections (STIs) remains a serious healthcare problem costing approximately 13 billion dollars annually to treat. Men and women who contract STIs have a higher risk for reinfection and for developing human immunodeficiency virus (HIV). Determining the risk factors associated with STIs in a community would be helpful in designing culturally appropriate tailored interventions to reduce spread of STIs.

**Purpose**—The purpose of this retrospective chart review was to determine the frequency and type of STIs, as well as to determine the predictor variables associated with STIs among those seeking treatment at a local inner city health unit.

**Method**—A total of 237 medical records were reviewed from a STI clinic. The sample comprised 119 men and 118 women, of whom 70.9% were African American. The mean age was 27, and 38% had a prior STI. Men used significantly more condoms ( $\chi^2 = 24.28, p = 0.000$ ), had more sexual partners ( $\chi^2 = 18.36, p = 0.003$ ), and had more prior infections of gonorrhea ( $\chi^2 = 10.04, p = 0.002$ ) than women. Women had significantly more prior infections of Chlamydia ( $\chi^2 = 11.74, p = 0.001$ ). Using no type of birth control measures (pills, diaphragm, implants) was a significant predictor of number of sexual partners ( $t = 2.441, p < 0.015$ ), but negatively associated with condom use ( $t = -12.290, p < 0.000$ ).

**Conclusions**—Over one-third had a prior STI, indicating that individuals do not perceive themselves to be at risk for another STI, and choose not to use condoms. Reasons why individuals continue to put themselves at risk need to be explored in gender specific focus groups so that tailored sexual risk reduction programs can be designed to meet the needs of different communities.

Approximately 19 million new sexually transmitted infections (STIs) are reported each year in the United States, and the vast majority of these occur in individuals 15 to 24 years of age (Centers for Disease Control & Prevention [CDC], 2007a). After acquiring one STI, men and women are at increased risk for acquiring a noncurable STI like the human immunodeficiency virus (HIV) or the herpes simplex type II virus (CDC, 2007b). There are now over 1.1 million people living with HIV in the United States (CDC, 2008a). According to the CDC (2008b) approximately 21% of the people with HIV are unaware that they are infected, making it more likely that they will transmit the virus to sexual partners. African Americans continue to be disproportionately affected, accounting for half of all the new HIV cases (CDC, 2008b). In fact, the rate of new infections among African Americans is 83.8 per 100,000, compared to 11.5 per 100,000 among Caucasians (CDC, 2008a).

Individuals at greatest risk for acquiring and transmitting HIV are those with ulcerative types of STIs such as syphilis, genital ulcer disease, and herpes (Donders, 2000; Hanson, Posner, Hassig, Rice, & Farley, 2005; Lee, Tobin, & Harindra, 2004; Risbud, 2005). However, nonulcerative STIs (gonorrhea, Chlamydia, nongonococcal urethritis) can also promote the transmission of HIV by altering the cells of the genital tract and enhancing the shedding of the HIV virus (Risbud, 2005).

The most effective way to prevent the transmission or acquisition of STIs, other than abstinence, is using a condom during sexual intercourse. Condoms are clearly effective in decreasing the transmission of HIV (Bell, Mosier, & Atkinson, 2003; Davis & Weller, 1999; Risbud, 2005; Weinhardt et al., 2004; Weller & Davis, 2002), and are equally effective against gonorrhea, Chlamydia, trichomonas, and hepatitis B (Sayegh, Fortenberry, Anderson, & Orr, 2005; Thornburn, Harvey, & Ryan, 2005; Weisbord, Koumans, Toomey, Grayson, & Markowitz, 2001). However, they are less effective against the transmission of genital herpes, human papilloma virus, syphilis, and chancroid (CDC, 2007a; Manhart & Kourtsky, 2002). To be more effective, preventive messages may need to inform individuals about the differences between ulcerative and nonulcerative STIs and the risk of acquiring HIV with each type.

In 2007, there were 1,108,374 new cases of Chlamydia reported, the highest number that had ever been reported in the United States, and the CDC (2007a) estimates that approximately 2.8 million new cases occur each year, suggesting that over half of these infections were not diagnosed. Women between the ages of 15 and 29 are three times more likely to acquire a Chlamydia infection than men. However, with the use of nucleic acid amplification test more men are being screened for Chlamydia, and from 2003 through 2007 there has been a 42% increase in the number of cases reported among men (CDC, 2007a). The rate of Chlamydia infections among African Americans is eight times that of Caucasians. Also, approximately 50% of women who have Chlamydia are asymptomatic and pose a risk of transmitting the infection to their sexual partners.

The second most common nonulcerative STI reported in the United States is gonorrhea. Approximately 350,000 new cases are diagnosed each year, and many more cases are never diagnosed, treated, or reported (CDC, 2007a). As with Chlamydia, gonorrhea rates were increased in women 15 to 24 years of age and were highest among men 20 to 29 years of age. However, in 2007 the gonorrhea rates among women were slightly higher (123.5 vs. 113.5, respectively) than those among men (CDC, 2007a). In 2007, gonorrhea rates among African Americans are 19 times that of Caucasians.

Syphilis, an ulcerative STI, is most infectious during the primary and secondary stages of the disease. In 2007, the rate of primary and secondary syphilis among men increased 17.9% and there was a 10% increase in the number of cases reported among women (CDC, 2007a). In addition, the rate of primary and secondary syphilis among men was six times higher than that among women. For the same year, there was a 5.3% increase in the number of cases of syphilis among Whites, compared to a 25% increase in the number of cases among African Americans (CDC, 2007a). Individuals infected with syphilis and/or gonorrhea are five times more likely than other individuals to acquire HIV (CDC, 2007a).

## PURPOSE OF STUDY

As STIs and HIV rates continue to rise each year in the United States, clearly the abstinence message is not working for those between the ages of 15 to 30. Therefore, because many individuals seek treatment for STIs at public health units (PHU), the PHU provides one of the best indicators of sexual health in a community (Einwalter, Ritchie, Ault, & Smith, 2005). It is important to evaluate the prevalence of STIs in an urban population to determine

the type of sexual risk reduction interventions needed in the community. Therefore, the purpose of this retrospective chart review was to determine the frequency and types of STIs, as well as the predictor variables associated with STIs among those seeking treatment at a local inner city STI clinic.

## RESEARCH QUESTIONS

The research questions for the study included: (a) What are the frequency and types of ulcerated and nonulcerated STIs reported for the individuals seeking treatment at the STI clinic? (b) Do men and women who have a STI have a new sex partner or more sexual partners than those without a prior STI? (c) Do men who are older have more STIs, a new sex partner, and more sexual partners and report not using condoms than do those without a STI?; (d) Do women who are older have more STIs, more sexual partners, and report not using condoms than do those without a STI? (e) What predictor variables are associated with STIs for men and women seeking treatment at the STI clinic? The predictor variables included race, age, type of STI, condom use, use of birth control measures (pills, diaphragm, implant, condom), not using birth control measures, number of sexual partners, prior STI, days since last sexual contact, and new sexual partner in last month.

## METHOD

The University of Arkansas for Medical Sciences Institutional Review Board (IRB) approved the study. The inner city STI clinic was chosen as the site to collect data because of the high patient census (approximately 500 per month). Patients receiving care at the clinic were screened for STIs and were tested for HIV and counseled. A thorough sexual risk behavior history was obtained from each patient and recorded in the patient's chart. The information obtained included: (a) age, (b) gender, (c) number of STIs, (d) history of prior STIs, (e) types of STIs, (f) days since last sexual contact, (g) number of sexual partners in last 3 months, (h) numbers of new sexual partners in last month, (i) type of birth control measures used (pills, diaphragm, implants), and (j) condom use. In addition to this information, the patient's race was recorded.

The patient's medical records were kept in securely locked cabinets at the STI clinic. Inclusion criteria for selecting the medical records were (a) men and women over the age of 18, (b) with a completed sexual history form in the medical record, (c) who had acquired a STI during the previous year. A ward clerk randomly selected every tenth medical record until 250 charts were obtained. Of the 250 charts reviewed, 13 had incomplete or missing information and were excluded, leaving a sample of 237.

## DATA ANALYSIS

All analyses were two-tailed and performed at an alpha level of 0.05. In the cases where the dependent variable was continuous, for example, days since last sexual contact, multiple linear regression was applied. In the cases where the outcome was dichotomous, for example, using birth control measures or not; the technique used was logistic regression. In either case, simultaneous entry of the independent or predictor variables was used to facilitate the interpretation of the relative predictive strength of each of the independent variables.

## FINDINGS

Of the 237 patients whose charts were reviewed, 118 were women and 119 were men. The majority were African Americans (73.2%), and 24.1% were Caucasians. The mean age was 27 years (see Table 1). Approximately 70.1 ( $n = 164$ ) of the patients had a nonulcerative

type of STI (Chlamydia, gonorrhea, and/or trichomonas) and 29.8% ( $n = 68$ ) had an ulcerative type of STI (syphilis or herpes; see Table 2). In addition, over one-third (38.5%,  $n = 90$ ) of the patients had a prior history of an STI, and another 15% ( $n = 35$ ) were seeking treatment because his or her sexual partner had acquired an STI.

### Gender Differences and Sexual Partners

A chi-square was used to answer the question, “Do men and women who have an STI have a new sex partner or more sexual partners that those without a prior STI?” The men in the study had significantly more sexual partners ( $\chi^2 = 18.36$ ,  $p = 0.003$ ) than women. Over 60% of them indicated that they had had the same sexual partner for the last 3 months.

Approximately 40% of this sample reported having two or more sexual partners in the last month and were infected with either Chlamydia or gonorrhea. Women in the study had significantly more prior infections of Chlamydia ( $\chi^2 = 11.74$ ,  $p = 0.001$ ) and trichomonas ( $\chi^2 = 5.47$ ,  $p = 0.019$ ) than men; and men had significantly more prior infections of gonorrhea ( $\chi^2 = 4.14$ ,  $p = 0.042$ ) than women. However, there was no significant difference between men and women in the number of prior STIs. Both men and women who had a new sexual partner in the last month were more likely to report more sexual partners than those who did not have a new sexual partner ( $F = 29.71$ ,  $df = 1$ ,  $p = .0001$ ).

### Days Since Last Sexual Contact and Predictor Variables

A regression model was used to examine the relationship between days since last sexual contact (dependent variable) and three predictor variables of numbers of sexual partners, age, and condom use. There were significant correlations with age ( $r = 0.14$ ,  $p = 0.016$ ) and number of sexual partners ( $r = -0.23$ ,  $p = 0.000$ ). The analysis accounted for 5.5% of the variance in the dependent variable. Only number of sexual partners ( $t = -3.069$ ,  $p = 0.002$ ) is a significant contributor to the model. According to the ANOVA table, the model was useful for predicting the number of days since last sexual contact ( $F = 5.322$ ,  $df = 3$ ,  $p = 0.001$ ).

### Using No Type of Birth Control Measures and Predictor Variables

A logistic regression model was used to examine the relationship between using no type of birth control measures (dependent variable) and three predictor variables of number of sexual partners, age, and condom use. The three variable predictor model accounted for 40% of the variance in the dependent variable of using no type of birth control measures (pills, diaphragm, implant). Condom use ( $t = -12.290$ ,  $p = 0.000$ ) and number of sexual partners ( $t = 2.441$ ,  $p = 0.015$ ) were significant contributors to the model. Condom use was negatively associated with number of sexual partners. There was a significant negative correlation with condom use ( $r = -0.62$ ,  $p = 0.000$ ) but not with age.

### Men, Condom Use and Predictor Variables

In answering the question, “Do men who are older, have more STIs, a new sex partner, and more sexual partners use less condoms (dependent variable) than do those without a STI?” a bivariate logistic regression was used. Significantly, more men (39%) reported using condoms than women (11%;  $\chi^2 = 24.28$ ,  $p = 0.0001$ ). For men, a bivariate logistic regression was used to examine the relationship between no condom use (dependent variable) and five predictor variables of age, Chlamydia, gonorrhea, new sexual partner in the last month, and number of sexual partners. None of the variables was statistically significant, although gonorrhea approached significance ( $p = 0.054$ ). The odds ratio (OR = 2.522, CI = .985, 5.458,  $p = 0.054$ ) for gonorrhea indicated that a person who had gonorrhea was 2.5 times more likely to use a condom than not to have used one. Likewise, a person with a new sexual partner (OR = 2.227, CI = .878, 5.649,  $p = 0.092$ ) was 2.2 times more likely to use a condom than not have used one.

## Women, Condom Use and Predictor Variables

In answering the question, “Do women who are older have more STIs, more sexual partners, and not use condoms than do those without a STI?”. A multinomial logistic regression was used to examine the relationship between condom use (dependent variable) and the seven predictor variables of age, Chlamydia, bacterial vaginitis, mucopurulent cervicitis (MPC); gonorrhea, new sexual partner in last month, and trichomonas (see Table 3). The analysis revealed that bacterial vaginitis was significant ( $p = 0.004$ ) as a predictor of condom use. The odds ratio for bacterial vaginitis (OR = 0.091, CI = 0.18, 0.461,  $p = 0.004$ ) indicates that a woman is less likely to use a condom with sexual partners than women without this infection. On the other hand, women who had a prior infection of MPC or Chlamydia were 3.3 and 2.4 times more likely, respectively, to use a condom than to not use one. A woman who had gonorrhea was less likely to have used a condom with her partner (Table 3).

In answering the question, “What predictor variables are associated with STIs for men and women seeking treatment at the STI clinic?” for both men and women, a logistic regression was used to examine condom use (dependent variable) and five predictor variables of new sexual partner in the last month, Chlamydia, gonorrhea, trichomonas, and MPC. The analysis revealed that having a new sexual partner in the last month was not significant ( $p = 0.06$ ). The odds ratio (OR = 2.788, CI = 0.9540, 8.1516,  $p = 0.06$ ) indicated that a person who had a new sexual partner in the last month was 2.8 times more likely to have used a condom than not to have used one. A person who had Chlamydia, gonorrhea, or trichomonas was 1.0, 1.5 and 1.2 times more likely to have used a condom than not to have used one.

A logistic regression was used to determine the predictor variables associate with gonorrhea (dependent variable) and seven independent variables of gender, race, age, number of STIs, number of sex partners, and using no type of birth control measures (pills, diaphragm, implants, or condoms). Only the number of STIs is strongly related (OR = 1.719, CI = 1.129, 2.620,  $p = 0.012$ ), and the more STIs one has, the individual is almost two times more likely to have gonorrhea. Although not statistically significant (OR = 3.572, CI = 0.748, 17.058,  $p = 0.111$ ), African Americans are 3.5 times as likely as Caucasians to have gonorrhea.

## DISCUSSION

Public health prevention messages have focused on encouraging individuals to modify or adopt safer sexual practices to reduce the incidence of STIs and HIV. However, findings suggest that these men and women had not adopted safer sexual practices, such as consistently using condoms, or had erroneously assumed that their partners were not infected. Studies have shown that early in relationships, couples use condoms during sexual intercourse, but frequently abandon using them once trust is established (Bell et al., 2003; Weinhart et al., 2004). Einwalter, et al. (2005) reported that Caucasians and younger African American women who have new sexual partners or multiple sexual partners are at increased risk of contracting Chlamydia and gonorrhea. In fact, women in this sample who had two or more sexual partners had more infections of gonorrhea and Chlamydia and were less likely to use condoms. One reason for more of these types of infections may be that many of them were asymptomatic.

When Chlamydia and gonorrhea are left untreated, they can cause serious sexual reproductive health problems and increase the risk of contracting HIV (Hanson, et al., 2005). Hanson et al. (2005) reported that men with a prior history of a nonulcerative STI, like gonorrhea, were 2.8 times more likely to become HIV positive. Men in this sample had significantly more prior infections of gonorrhea than the women.

One way to prevent the spread of nonulcerative STIs like gonorrhea and Chlamydia is by using a condom during sexual intercourse (Bell et al., 2003; Bell, Montoya, Atkinson, & Yang, 2002; Manhart, & Koutsky, 2002; Ward, Rowe, Pattison, Taylor, & Radcliffe; 2005). In this study, 39% of the men used more condoms, compared to 11% of the women. Men also had more sexual partners. These findings are similar to those reported in numerous studies (Bell et al., 2003; Gullette & Lyons, 2005; Sterk, Klein, & Elfison, 2004; Weinhardt et al., 2004). Men use more condoms, in part, because they are less embarrassed to purchase them, they are accessible in men's public bathrooms, and most women expect men to have them (Thornburn et al., 2005). Only the men and women in this study who had prior infections of Chlamydia, gonorrhea, or trichomonas reported using condoms more frequently for protection. However, the great majority (75%) of the men and women seeking treatment at the STI clinic did not use them. Possible explanations for not using condoms include: (a) being inconvenient, (b) making sex feel unnatural, (c) implying an infection or infidelity, (d) decreasing sexual pleasure, (e) feeling powerless, or (f) fearing rejection and violence (Crosby et al., 2001; Crosby et al., 2005; Sterk et al., 2004). Reasons why individuals are not taking the necessary precautions to prevent the acquisition of another STI need to be explored in gender specific focus groups. Once some of these reasons are determined, then researchers can design more effective sexual risk reduction programs to use in the different communities, particularly in areas where there are exceedingly high STI rates.

In this sample, condom usage decreased when women used other forms of birth control (pills, diaphragm, implants, IUD, spermicidal), but the number of sexual partners increased. This suggests that some of the women may have erroneously believed that taking birth control pills protected them against STIs, and condoms were not needed with their sexual partners. Also, women have control over using pills, diaphragm, implants, and spermicidal ointments, whereas condom use requires a man's cooperation.

### Limitations

There are several limitations to the study. The information was collected by retrospective chart review from individuals attending an inner-city STI clinic. Most of the individuals were African Americans and identified themselves as not having health insurance or a primary care provider. This may have skewed the findings by suggesting that more African Americans have STIs when, in fact, Caucasians may seek treatment from private physicians for STIs. Also, questions about IV drug use, having sex with an IV drug user, or having sex with a bisexual were often left blank on the sexual history form. IV drug use, sharing of needles, or having sex with someone who is an IV drug user increase the risk of contracting HIV. Further, treating STIs is relatively inexpensive and easy to treat (except for HIV) which may be one reason why some of these individuals choose not to take protective measures to prevent acquiring another STI.

### Implications for Practice and Education

Practitioners who provide care to individuals attending STI clinics can be instrumental in helping sexually active individuals protect themselves from repeated infections by educating them about the differences between ulcerative and nonulcerative STIs and the risk of contracting HIV. Practitioners should educate individuals about how to negotiate safer sexual practices, such as using a condom with each sexual partner and should stress the importance of reducing the number of sexual partners. Practitioners can also play a key role in primary prevention by encouraging sexually active women to be regularly screened for Chlamydia infections, asking about sexual risk taking behaviors, and counseling about lifestyle changes such as reducing the number of sexual partners. Practitioners should

encourage women and men to have their sexual partners treated and to abstain from sexual contact until they are treated.

## Conclusion

The numbers of reinfections indicate that individuals do not perceive themselves to be at risk for another STI, and choose not to use condoms during sexual intercourse. Suggesting that sexually active individuals be tested for HIV and inquire about the sexual partner's HIV status may be a stronger HIV and STI prevention message than promoting condom use alone. Also, one-on-one interviews with men and women who have had multiple STIs may provide more information about perceived barriers to practicing safer sex and help to identify a culturally appropriate community-based prevention program for STIs and HIV.

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**TABLE 1**Demographic Characteristics of the Sample ( $N=237$ )

Variables	N	%	Mean
Age			26.5
Women	118		
Men	119		
African American	178	73.2	
Caucasian	59	24.2	
Hispanic	6	2.6	

*Note.* Marital status and educational level was not available on the sexual history form.

**TABLE 2**

Gender, Types of Sexually Transmitted Infections (STIs), Numbers of Sexual Partners, and Condom Use ( $N=234$ )

Variable	Men (n)	Women (n)	Total (n)	%
Prior STI	47	43	90	38.5
Nonulcerative STI			164	70.1
Chlamydia	25	47	72	30.7
Gonorrhea	43	22	65	27.8
Trichomonas	5	19	26	11.1
Ulcerative STI			68	29.8
Syphilis	18	10	28	11.9
Herpes	15	22	37	15.8
Chancroid	2	1	3	0.4
Number of sexual partners				
One	58	84	142	60.7
More than 2	57	35	92	39.3
Type of sexual preference				
Heterosexual	112	116	228	97.4
Bisexual	2	1	3	1.3
Homosexual	3	0	3	1.3
Tested for HIV	116	115	234	100.0
HIV positive	3	3	6	2.5
Condom use	45	13	58	24.8

*Note.* Items not responded to resulted in missing data for some items. Some had more than one STI.

**TABLE 3**  
 Logistic Regression for Condom Use<sup>a</sup> and Seven Predictor Variables for Women ( $n = 117$ )

Variables	B	SE	Wald	OR	95% CI <sup>b</sup>		P
					Lower	Upper	
Age	.111	.070	2.484	1.117	.973	1.283	0.115
Chlamydia	.862	.769	1.257	2.368	.525	10.685	0.262
BVC	-2.392	.826	8.390	.091	.018	.461	0.004*
MPC <sup>d</sup>	1.186	1.284	.854	3.275	.264	40.561	0.356
Gonorrhea	-2.159	1.307	2.732	.115	.009	1.494	0.098
New Partner <sup>e</sup>	.570	.888	.412	1.768	.310	10.074	0.521
Trichomonas	.485	1.006	.233	1.625	.226	11.669	0.629

Note.

<sup>a</sup>Dependent variable = condom use coded as 1.

<sup>b</sup>CI = 95% confidence interval;  $p < 0.05$ .

<sup>c</sup>Bacterial Vaginitis.

<sup>d</sup>Mucopurulent cervicitis.

<sup>e</sup>New sexual partner in last month.