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Lessons in HIV/STD prevention

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The Internet as a Newly Emerging Risk Environment for Sexually Transmitted Diseases

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Context: Transmission of sexually transmitted diseases (STDs) such as human immunodeficiency virus (HIV) infection is associated with unprotected sex among multiple anonymous sex partners. The role of the Internet in risk of STDs is not known.

Objective: To compare risk of STD transmission for persons who seek sex partners on the Internet with risk for persons not seeking sex partners on the Internet.

Design: Cross-sectional survey conducted September 1999 through April 2000.

Setting and Participants: A total of 856 clients of the Denver Public Health HIV Counseling and Testing Site in Colorado.

Main Outcome Measures: Self report of logging on to the Internet with the intention of finding sex partners; having sex with partners who were originally contacted via the Internet; number of such partners and use of condoms with them; and time since last sexual contact with Internet partners, linked to HIV risk assessment and test records.

Results: Of the 856 clients, most were white (77.8%), men (69.2%), heterosexual (65.3%), and aged 20 to 50 years (84.1%). Of those, 135 (15.8%) had sought sex partners on the Internet, and 88 (65.2%) of these reported having sex with a partner initially met via the Internet. Of those with Internet partners, 34 (38.7%) had 4 or more such partners, with 62 (71.2%) of contacts occurring within 6 months prior to the client's HIV test. Internet sex seekers were more likely to be men ($P < .001$) and homosexual ($P < .001$) than those not seeking sex via the Internet. Internet sex seekers reported more previous STDs ($P = .02$); more partners ($P < .001$); more anal sex ($P < .001$); and more sexual exposure to men ($P < .001$), men who have sex with men

($P < .001$), and partners known to be HIV positive ($P < .001$) than those not seeking sex via the Internet.

Conclusions: Seeking sex partners via the Internet was a relatively common practice in this sample of persons seeking HIV testing and counseling (representative of neither Denver nor the overall US population). Clients who seek sex using the Internet appear to be at greater risk for STDs than clients who do not seek sex on the Internet.

Several studies have shown that transmission of sexually transmitted diseases (STDs), such as human immunodeficiency virus (HIV) infection, often involves persons with multiple and sometimes anonymous sex partners.¹⁻¹⁰ Sex with anonymous partners typically has been initiated in bars, bathhouses, clubs, or parks.⁴ It has been suggested that the Internet may be another venue for the initiation of sexual contact.¹¹ Observations of chat rooms and other Internet sites reveal that the Internet facilitates communication of sexual desires, as well as in-person meetings resulting in sexual contact.¹² Identifying information such as full name, address, or place of work may be withheld from Internet-based sex partners. Due to the impossibility of observing this behavior from initiation of conversation to completion of a sexual encounter, it is difficult to gauge the rate at which persons engage in Internet-initiated sexual relationships. Also, it is difficult to assess, based on Internet observations, the risk of STD/HIV transmission resulting from these encounters. Our goal was to determine whether the use of the Internet to solicit sex partners should be considered a potential risk factor for STD/HIV. To ascertain whether high risk persons seek sex partners on the Internet, we surveyed clients of an HIV counseling and testing site regarding Internet behaviors and risk for STD/HIV.

Methods

This study was reviewed and approved by the institutional review board at the Centers for Disease Control and Prevention (CDC), as well as by the Colorado Multiple Institutional Review Board. Clients aged 18 years or older who sought HIV testing at the Denver Public Health HIV Counseling and Testing Site (DPH-HCTS) were eligible for the study. All eligible clients presenting for counseling and testing during the study period (September 1999-April 2000) were invited to participate. Clients completed a detailed consent form referencing the risk-assessment questionnaire administered by a counselor. The counselor, who had completed CDC-supported training for client-centered HIV counseling, reviewed the consent form with the patient before obtaining consent.

The HIV testing protocol included a risk-assessment questionnaire covering sexual orientation (heterosexual, homosexual, or bisexual), number of sex partners in the past 12 months, and history of sexual exposure to risky partners (ie, persons with history of STDs, HIV, or injection drug use; men who have sex with men; or hemophiliacs). Questions about drug and alcohol use, condom

use during the last sexual encounter, and types of sex performed (ie, oral, anal, or vaginal) were included. Clients were asked to provide a blood specimen. Test results were entered into the record.

We also asked clients to complete a 6-item questionnaire, administered via face-to-face interview, about their use of the Internet for solicitation of sex partners. Of the 911 patients eligible for the survey, 55 did not participate, yielding a 94% participation rate. All questions were administered by the counselor who obtained the general risk information; counselors administering these questions received survey-administration training. A client could refuse to answer any question. The first question was whether the client had ever logged on to the Internet with the intention of seeking a sex partner. Clients answering in the negative were not asked further questions. Those answering affirmatively were asked whether they had successfully solicited a sex partner via the Internet, the number of partners they had ever solicited in this manner, time since the last Internet-initiated contact, whether a condom was used during the last Internet-initiated contact, and from what location they most often logged on to the Internet (eg, home, work, library).

Responses to all Internet-related questions were recorded on a sheet separate from the HIV testing record and entered into a separate database. We linked Internet responses to the HIV test record via the test record number alone; this method offered no linkage to information that could be used to identify clients specifically. Each comparison among columns (in the tables presented herein) was considered a separate family, and we used a family-wise error rate (α) of .05 to adjust for multiple comparisons.

Results

Data were gathered from 856 clients of the DPH-HCTS. Because clients could skip any question, the number of respondents answering each question varied. The study sample was largely white (77.8%), men (69.2%), and heterosexual (65.3%) (Table 1). The analysis of risk factors, presented in Table 2, indicated that a substantial proportion of clients had a past history of STDs (21.8% [185/850]). Overall, the sample was sexually active; 176 (23.5%) of the 750 clients reporting had 7 or more partners in the last 12 months. The sexual practice indicated by the most respondents was oral sex (88.7% [749/844]), though vaginal sex (73.9% [621/840]) and anal sex (41.2% [345/838]) were also reported. Of the 832 who responded, 335 (40.3%) reported having used a condom during their last sexual encounter, while 13.1% (109/834) reported being under the influence of drugs or alcohol during their last sexual encounter, and 16.8% (142/847) reported being sexually exposed to a person known to have HIV infection; 53% of those reported using a condom during their last sexual encounter (M.M., unpublished data, 2000).

Responses to Internet usage questions appear in Table 3, with 135 (15.8%) clients reporting that they have logged on to the Internet to seek sex partners, and 88 (65.2%) of these having successfully initiated sexual contact;

Table 1. Demographic Characteristics of Study Subjects Seeking HIV Testing at the Denver Public Health HIV Counseling and Testing Site¹

Characteristics (No. Responding)	No. (%) of Subjects (N = 856)
Age, y (n = 813)	
<19	25 (3.1)
20-29	271 (33.3)
30-39	247 (30.4)
40-49	166 (20.4)
50-59	84 (10.3)
≥ 60	20 (2.5)
Sex (n = 851)	
Men	589 (69.2)
Women	262 (30.8)
Race (n = 852)	
White	663 (77.8)
Black	50 (5.9)
Hispanic	93 (10.9)
Native American	11 (1.3)
Other	35 (4.1)
Sexual orientation (n = 848)	
Heterosexual	554 (65.3)
Homosexual	228 (26.9)
Bisexual	66 (7.8)

¹ A total of 856 subjects were studied. Number of respondents answering each question varied. HIV indicates human immunodeficiency virus.

34 (38.7%) of those who had sex with Internet partners had met more than 3 partners using the Internet. Most contacts occurred in the 6 months prior to the client's visit to the DPH-HCTS, and condom use during the last encounter with an Internet partner was reported by only 37 (44.0%) of 84 clients. Of the 88 clients who reported initiating sexual contact via the Internet, of 86 reporting, 78 (90.7%) used home computers and 5 clients (5.8%) did so at work. To compare the risk for STD/HIV in Internet sex seekers with that of clients who did not seek sex on the Internet, we divided the sample by responses to the first 2 questions on our Internet usage survey. Clients who had never logged on to the Internet with the intention of seeking a sex partner were called the offline group (n=721), indicating that sex partners were not sought using the Internet.

Table 2. Risk Assessment of Study Subjects Seeking HIV Testing at the Denver Public Health HIV Counseling and Testing Site¹

Risk Factors (No. Responding)	No. (%) of Subjects (N = 856)
History of sexually transmitted diseases (n = 850)	185 (21.8)
Victim of abuse or assault (n = 844)	73 (8.6)
No. of partners in prior 12 mo (n = 750)	
0	3 (0.4)
1- 3	517 (68.9)
4- 6	54 (7.2)
7- 9	98 (13.1)
10-19	45 (6.0)
>20	33 (4.4)
Type of sexual practice	
Oral (n = 844)	749 (88.7)
Anal (n = 838)	345 (41.2)
Vaginal (n = 840)	621 (73.9)
Used condom at last sexual encounter (n = 832)	335 (40.3)
Used drugs or alcohol at last sexual encounter (n = 834)	109 (13.1)
Sexual exposure	
Women (n = 848)	509 (60.0)
HIV-positive partner (n = 847)	142 (16.8)
Injection drug user (n = 852)	94 (11.0)
Men (n = 841)	535 (63.6)
Men who have sex with men (n = 846)	285 (33.7)
Paid sex partner (n = 849)	70 (8.2)

¹ A total of 856 subjects were studied. Number of respondents answering each question varied. HIV indicates human immunodeficiency virus.

Table 3. Risk Behaviors and Internet Usage of Study Subjects Seeking HIV Testing at the Denver Public Health HIV Counseling and Testing Site¹

Characteristics (No. Responding)	No. (%) of Subjects
Seeking sex partners on Internet (n = 856)	135 (15.8)
Ever had sex with Internet partner (n = 135)	88 (65.2)
No. of Internet sex partners (n = 88)	
0	1 (1.1)
1	26 (29.5)
2	13 (14.8)
3	14 (15.9)
≥ 4	34 (38.7)
Time last Internet-initiated sex contact occurred, mo (n = 87)	
<3	47 (54.0)
3- 6	15 (17.2)
7-12	9 (10.3)
>12	16 (18.4)
Used condom at last Internet-initiated sex (n = 84)	37(44.0)
Site of logging on (n = 86)	
Home	78 (90.7)
Work	5 (5.8)
Other	3 (3.5)

¹ A total of 856 subjects were studied, Number of respondents answering each question varied. HIV indicates human immunodeficiency virus.

Table 4. Demographic Characteristics of the Offline, Online Seeker, Online-No-Partner, and Online Partner Groups¹

Characteristics	No. (%) of Subjects			
	Offline (n = 721)	Online Seeker (n = 135)	Online No Partner (n = 47)	Online Partner (n = 88)
Age, y, No. responding	(n = 686)	(n = 127)	(n = 44)	(n = 83)
<19	25 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)
20-29	234 (34.1)	37 (29.1)	11 (25.0)	26 (31.3)
30-39	200 (29.1)	47 (37.0)	20 (45.4)	27 (32.5)
40-49	139 (20.3)	27 (21.3)	8 (18.2)	19 (22.9)
50-59	69 (10.1)	15 (11.8)	5 (11.4)	10 (12.1)
≥60	19 (2.8)	1 (0.8)	0 (0.0)	1 (1.2)
Sex, No. responding ²	(n = 716)	(n = 135)	(n = 47)	(n = 88)
Men	467 (65.2)	122 (90.4)	42 (89.4)	80 (90.9)
Women	249 (34.8)	13 (9.6)	5 (10.6)	8 (9.1)
Race, No. responding	(n = 719)	(n = 133)	(n = 44)	(n = 86)
White	548 (76.2)	115 (86.5)	39 (83.0)	76 (88.4)
Black	45 (6.3)	5 (3.8)	1 (2.1)	4 (4.6)
Hispanic	85 (11.8)	8 (6.0)	5 (10.7)	3 (3.5)
Native American	10 (1.4)	1 (0.8)	1 (2.1)	0 (0.0)
Other	31 (4.3)	4 (2.9)	1 (2.1)	3 (3.5)
Sexual orientation, No. responding	(n = 715)	(n = 133)	(n = 47)	(n = 86)
Heterosexual ³	511 (71.4)	43 (32.3)	23 (48.9)	20 (23.3)
Homosexual ³	149 (20.9)	79 (59.4)	21 (44.7)	58 (67.4)
Bisexual	55 (7.7)	11 (8.3)	3 (6.4)	8 (9.3)

¹ A total of 856 subjects were studied. Number of respondents answering each question varied.

² Offline vs online seeking group comparison significant at $P < .001$

³ Offline vs online seeking group comparison significant at $P < .001$ and online-no-partner vs online partner group comparison significant at $P < .01$.

If clients responded that they had logged on to the Internet with the intention of seeking a sex partner, they were classified as online seekers ($n=135$). If online seekers reported having sex with partners whom they had originally met on the Internet, then they became online partners ($n=88$). Online seekers who had not initiated sex contacts via the Internet constituted the online no partner group ($n=47$). The online partner and the online-no-partner groups are combined to form the online seekers.

As shown in Table 4, there were some similarities in age and in race between groups. However, online seekers were more likely to be men than offline clients: 13 women reported seeking sex partners on the Internet. Online seekers were more likely to be homosexual than offline clients, and online partners were more likely to be homosexual than the online no partner group.

As shown in Table 5, some risk factors were more frequently reported by the online than the offline group. Online seekers were more likely to have had a previous STD than the offline clients, thus increasing their risk of acquiring future STDs such as HIV.¹³⁻¹⁵ Online seekers had greater numbers of partners than offline clients but were more likely to have used a condom during their last sex act. Oral and anal sex were more frequently reported by online seekers, with vaginal sex less frequently reported. Online seekers reported more sexual exposure to men and to men who have sex with men than offline clients, and online partners were still more likely to be exposed to men and to men who have sex with men than those in the online-no-partner group. Only 14.5% of the offline clients reported sexual exposure to a person known to be HIV positive, while 28.9% of online seekers reported this exposure. Of online partners, 35.2% had been sexually exposed to a person known to be HIV positive. Though the sample size of HIV positive persons was small ($n=7$), online seekers (2.22%) were about as likely as offline clients (0.55%) to be HIV positive.

Comment

The sample of DPH-HCTS clients is representative of neither Denver nor the U.S. population as a whole. However, among this sample, the Internet clearly has had a role in the solicitation of risky sex partners. Clients who reported seeking sex on the Internet were more likely to have concomitant risk factors for STD/HIV than clients who did not seek sex on the Internet. Thus, seeking sex on the Internet may be a potential risk factor for STD/HIV. These data underscore the need for development of strategies to promote STD/HIV prevention among online sex seekers.

Table 5. Comparison of Risk Factors Between Groups Who Used the Internet to Seek Sex Partners and Those Who Did Not¹

Risk Factors	Offline (n = 721)			Online Seeker (n = 135)			Online No Partner (n = 47)			Online Partner (n = 88)		
	No. Responding	Answered Yes No. (%)	P Value	No. Responding	Answered Yes No. (%)	P Value	No. Responding	Answered Yes No. (%)	P Value	No. Responding	Answered Yes No. (%)	P Value
No. with history of sexually transmitted diseases	717	146 (20.4)	.02	133	39 (29.3)		10	10 (21.3)		86	29 (33.7)	.13
Victim of abuse or assault	712	64 (9.0)	.42	132	9 (6.8)		47	1 (2.1)		85	8 (9.4)	.11
No. of partners in prior 12 mo	626			124			44			80		
0		3 (0.5)			0 (0.0)			0 (0.0)			0 (0.0)	
1-3		463 (74.0)			54 (43.6)			26 (59.1)			28 (35.0)	
4-6		44 (7.0)			10 (8.1)	<.001		5 (11.4)			5 (6.3)	
7-9		76 (12.1)			22 (17.7)			9 (20.5)			13 (16.3)	
10-19		28 (4.5)			17 (13.7)			2 (4.5)			15 (18.7)	
≥20		12 (1.9)			21 (16.9)			2 (4.5)			19 (23.7)	
Type of sexual practice												
Oral	712	621 (87.2)	<.001	132	128 (97.0)		47	100 (100.0)		85	81 (95.3)	.13
Anal	704	252 (35.8)	<.001	134	93 (69.4)		47	28 (59.6)		88	65 (74.7)	.07
Vaginal	705	558 (79.2)	<.001	135	63 (46.7)		47	26 (55.3)		88	37 (42.1)	.14
Used condom at last sexual encounter	702	270 (38.5)	.01	130	65 (50.0)		45	21 (46.7)		85	44 (51.8)	.58
Used drugs or alcohol at last sexual encounter	702	89 (12.7)	.44	132	20 (15.2)		46	8 (17.4)		86	12 (13.9)	.60
Sexual exposure												
Women	716	424 (59.2)	.27	132	85 (64.4)		47	32 (68.1)		88	53 (62.4)	.51
HIV-positive partner	712	103 (14.5)	<.001	135	39 (28.9)		47	8 (17.0)		88	31 (35.2)	.03
Injection drug user	719	85 (11.8)	.08	134	9 (6.7)		47	3 (6.4)		87	6 (6.9)	.91
Men	708	428 (60.5)	<.001	133	107 (80.5)		47	29 (61.7)		86	78 (90.7)	<.001
MSM	715	202 (28.3)	<.001	131	83 (63.4)		46	21 (45.7)		85	62 (72.9)	<.005
Paid sex partner	716	54 (7.5)	.08	133	16 (12.0)		47	5 (10.6)		86	11 (12.8)	.72
Positive HIV status of Study subjects		4 (0.55)	.05		3 (2.22)			3 (6.4)			0 (0.0)	.02

¹A total of 856 subjects were studied. HIV indicates human immunodeficiency virus; MSM, men who have sex with men.

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