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Perceived serosorting of injection paraphernalia sharing networks among injection drug users in Baltimore, MD

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Abstract

We examined perceived serosorting of injection paraphernalia sharing networks among a sample of 572 injection drug users (IDUs). There was evidence for serosorting of high-risk injection behaviors among HIV-negative IDUs, as 94% of HIV-negative IDUs shared injection paraphernalia exclusively with perceived HIV-negative networks. However, 82% of HIV-positive IDUs shared injection paraphernalia with perceived HIV-negative networks. The findings indicate a potential risk of rapid HIV transmission. Future prevention efforts targeting IDUs should address the limitation of serosorting, and focus on preventing injection paraphernalia regardless of potential sharing networks' perceived HIV status.

Keywords

Serosorting; Injection drug use; Injection paraphernalia sharing; HIV risk; Social network

INTRODUCTION

Serosorting has referred to the practice of limiting unprotected sexual encounters to those with the same HIV status [1], and it has been identified as a possible prevention strategy for reducing sexual transmission of HIV. The practice of serosorting has been well documented in the literature, primarily among men who have sex with men (MSMs) [2,3]. Few studies of serosorting have focused on injection drug users (IDUs), who are at risk for acquiring HIV infections through their injection and sexual practices. In a sample of HIV-positive IDUs from New York, Miami, Baltimore, and San Francisco, Mizuno and colleagues reported that 40% of HIV-positive heterosexual IDUs had sex exclusively with HIV-positive partners [4]. However, in the same sample of IDUs, Metsch and colleagues found a high proportion of HIV-positive IDUs (17.8%) who have lent their needles to HIV-negative or unknown serostatus injection partners [5]. It is not clear the extent to which HIV-positive and negative IDUs serosort their high risky injection behaviors by limiting their high-risk injection behaviors to network members with the same perceived HIV serostatus.

Dynamics of social networks may shape how HIV and other infections flow through communities. Among populations with high HIV prevalence, the effectiveness of serosorting in limiting HIV transmission depends on open HIV serostatus disclosure in injection and sexual networks and complete knowledge of individual serostatus. However, stigma, fear of rejection, threats to personal well-being may inhibit serostatus disclosure among HIV-positive IDUs [6]. In addition, due to high infectivity and unawareness of HIV infection among recently infected individuals, serosorting high risk behaviors among HIV-negative individuals can be problematic. In fact, serosorting has been reported to increase the risk of infection among individuals whose social networks have a high proportion of recently infected people, who usually disclose themselves as HIV negative [7]. Incomplete

knowledge of social networks' serostatus and high infectivity among recently infected individuals may limit the effectiveness of perceived serosorting in reducing HIV transmission. Non-serosorters who engage in high risk HIV-related behaviors with both HIV-positive and negative network members can create spikes in incidence rates as the disease spreads rapidly.

A more detailed examination of the characteristics of IDUs who serosort high risk injection behaviors may better inform prevention intervention programs targeting IDUs. In a sample of active IDUs in Baltimore, MD, the present study aimed to 1) describe serosorting injection risk behaviors based on injection partners' perceived HIV status, and 2) to examine the characteristics of serosorters and non-serosorters among both HIV-negative and positive IDUs.

METHODS

Study population

The current study used the baseline data of STEP into Action (STEP) study, an HIV prevention intervention among drug injectors and their risk network members conducted in Baltimore, Maryland.

Baseline interview data were collected from March 2004 to March 2006. Two types of participants were enrolled in the STEP study: index and network participants. Index participants were recruited using community outreach methods in neighborhoods with high concentrations of drug use and drug sales. The eligibility for index participants included: 18 years and older; resided in Baltimore; had not participated in HIV or network studies in the past year; injected drugs in the past 3 months; and willing to talk to network members about HIV prevention. Index participants were asked to recruit at least one network participant whom they had previously listed as drug or sexual risk network member on their social network inventory. Network participants were eligible if they were 18 years and older and nominated by the index. Data for this study includes both index and network participants.

All participants completed face-to-face interviews that included both interviewer-administered sections and Audio Computer-Assisted Self-Interview (ACASI) sections for items pertaining to sex and drug behaviors. All participants were compensated with \$35 for completion of the baseline assessment. All protocols were approved by the Johns Hopkins Institutional Review Board prior to study implementation.

Measures

Sociodemographic characteristics and injection behaviors—Sociodemographic characteristics examined in this study were race/ethnicity (African-American vs. others), age, gender, relationship status (married or in a committed relationship vs. others), highest education (at least high school diploma or GED), current unemployment, monthly income (median split for \$500 or more), homelessness, the frequency of drinking alcohol (daily drinker vs. others), and history of arrest in the past one year. Depressive symptoms were assessed by the Centers for Epidemiological Studies Depression (CES-D) Scale, a 20-item, 4-point response scale, using a cut-off score of 20 [8]. Participants were also asked about the frequency of injecting heroin, attendance of shooting gallery, and access to drug treatment in the past 6 months.

Participants' HIV status and disclosure—Although participants were tested for HIV antibodies, this study aimed to evaluate IDUs' injection paraphernalia sharing behaviors based on the perceived HIV seroconcordance of themselves and sharing network members.

Therefore, participants' HIV status in the current analyses was assessed through the self-reported HIV status using three questions, "What was the result of your last HIV test?" "Have you ever been tested positive for HIV?" and "Do you have HIV?" Participants were categorized as HIV positive if they answered "positive" or "yes" to any of these three questions.

HIV status disclosure was evaluated using three questions, "How many of your friends know that you have HIV?" "How many of your family members know that you have HIV?" and "How many of people that you do drugs with know that you have HIV?" using a 5-point response from "None" to "All." Full HIV status disclosure was created by dichotomizing the response as "all" vs. "none, a few, some or most."

High risk injection network—The social network data were collected using the Personal Network Inventory, a modified version of the Arizona Social Support Inventory [9]. This inventory has been shown to have good concurrent and predictive validity and internal consistency [10]. The first section of this inventory was designed to generate names (first and last initials) of people in the entire social support networks based on series of questions about people who provided emotional and material support, and with whom they share meals and socialized.

For each network member enlisted in the inventory, participants were asked "Who you do drugs with?" "If you were going through withdrawal, who can/could you usually count on get you drugs?" and "Who usually counts on you for a blast when they don't have money or drugs?" The number of networks who were reported having done any of these activities was summed up to obtain the size of drug support network.

Participants were also asked if they have shared cookers or/and needles with each network member in the past 6 months. Perceived HIV status of each network member was assessed by asking "who on this list has HIV?"

Serosorters—Serosorters were defined as participants who reported sharing injection paraphernalia exclusively with the network members perceived to have the same HIV status. Non-serosorters refer to participants who reported sharing injection paraphernalia with both perceived HIV-positive and negative network members

DATA ANALYSIS

The sample for the present study was restricted to individuals who self-reported having shared injection paraphernalia with network members within 6 months prior to the baseline assessment. Of 1,024 participants who completed the STEP baseline visit, 575 (56%) reported having shared injection paraphernalia with network members in the past 6 months. Three cases were excluded because of missing perceived HIV status of sharing network members. Therefore, a total sample size of 572 was used in the final analysis.

Frequency distribution of serosorters among HIV-positive and negative IDUs was examined using Chi-square tests. Bivariate logistic regressions were conducted to examine characteristics of HIV-negative and positive IDUs who were serosorters, looking at the sociodemographics, drug use behaviors and personal network characteristics, and HIV status disclosure among HIV-positive IDUs. Since network participants were recruited by index participants, the independent observation assumptions may be violated. Generalized Estimating Equations (GEE) modeling was used. Data were analyzed using Stata 10.0 (College Station, TX, USA).

RESULTS

At the baseline assessment, the self-reported HIV prevalence among this sample was 16%. The participants listed an average of 9 network members, with a range from 1 to 20, and 11% of the participants reported having at least one HIV-positive network member. The majority of the participants (83%) were serosorters. Compared to HIV-negative IDUs, a significantly higher proportion of HIV-positive IDUs were non-serosorters (82% vs 6%, $\chi^2 = 302.41$, $p < .001$).

Characteristics of serosorters and non-serosorters among HIV-negative IDUs

Table 1 presents the characteristics of HIV-negative IDUs at the baseline assessment, and compares the characteristics of serosorters and non-serosorters. The majority of HIV-negative IDUs were African American (76%), 24% were white, and 0.2% were Asian. The average of age was 42.4 with a range 28 to 57. The vast majority of the HIV-negative IDUs were serosorters (95%). A significantly higher proportion of HIV-negative non-serosorters reported more depressive symptoms (82% vs. 56%) as compared to HIV-negative serosorters.

Characteristics of serosorters and non-serosorters among HIV-positive IDUs

Table 1 presents the characteristics of HIV-positive IDUs at the baseline assessment, and compares the characteristics of serosorters and non-serosorters. The majority of HIV-positive IDUs were African American (88%), 9% were white and 2% were Asian. The average of age was 43.8 with a range 28 to 57. Among HIV-positive IDUs, 82% were non-serosorters.

Compared to HIV-positive serosorters, a significantly higher proportion of HIV-positive non-serosorters reported attending shooting gallery in the past 6 months (42% vs. 13%), marginally significant higher proportion of non-serosorters reported a larger drug support network (33% vs. 6%), and marginally significant lower proportion of non-serosorters were married or in a committed relationship (21% vs. 44%). Moreover, HIV-positive non-serosorters had a significantly lower HIV status disclosure rates to friends and drug network members as compared to HIV positive serosorters; 25% of serosorters and 6% of non-serosorters had full HIV status disclosure to friends; over half of HIV positive serosorters (56%) and only 27% of non-serosorters had full HIV status disclosure to the drug networks.

DISCUSSION

Our data offer evidence of serosorting injection paraphernalia sharing behaviors based on perceived HIV status of networks among HIV-negative IDUs. We found that 82% of HIV-negative IDUs reported sharing injection paraphernalia exclusively with perceived HIV-negative networks. However, compared to HIV-negative IDUs, a significant higher proportion of HIV-positive IDUs were non-serosorters. A large proportion of HIV-positive IDUs (82%) reported sharing injection paraphernalia with perceived HIV-negative networks. The findings are of utmost concern because of a potential risk of rapid HIV transmission from HIV-positive IDUs to HIV-negative IDUs.

The present study findings provide insights into the dynamic of social networks and risky behaviors among IDUs. In unadjusted analysis, HIV-negative IDUs with more depressive symptoms were more likely to be non-serosorters. Orr et al. [11] has hypothesized that depression may affect the adoption of health behaviors because depression reduces outcome expectancies, thereby impeding HIV preventive behaviors. Additionally, factors associated with non-serosorters among HIV-positive IDUs included shooting gallery attendance and larger size of drug support network. Previous research suggested all these factors have been

associated with greater risk [5,10,12]. For example, it is well-known that shooting galleries create a high-risk setting associated with sharing needles and other drug paraphernalia [12]. The same circumstances and factors that contributed to needle sharing may also facilitate social interaction between various high risk social networks and lead to the practice of sharing injection paraphernalia with both HIV-positive and negative networks.

As noted earlier, the effectiveness of serosorting in limiting HIV transmission depends on open HIV status disclosure among injection and sexual networks. In this sample of HIV-positive IDUs, the HIV full disclosure rates varied from 10% to friends, 56% to family members and 33% to drug networks. Moreover, we found HIV-positive non-serosorters had significantly lower rates of HIV status disclosure as compared to HIV positive serosorters. In contrast to the finding that a large proportion of HIV-negative IDUs were serosorters, these data suggest that many HIV-negative serosorters could actually have shared injection paraphernalia with perceived HIV-negative networks, who were actually HIV positive and did not disclose their HIV-positive status.

This study has several limitations. First, the data are cross-sectional, and therefore it is not possible to definitely establish causality between the HIV status and perceived serosorting of injection paraphernalia sharing networks. The present findings may imply that, compared to HIV-negative IDUs, HIV-positive IDUs are less likely to serosort the injection behaviors. The alternative explanation could be due to the non-serosorting behaviors, IDUs are more likely to be HIV positive. However, the average year of knowing HIV-positive status among this sample of IDUs was reported to be 7 years, and only 10% of HIV-positive IDUs reported that they had found out about their positive HIV status within 6 months prior the baseline assessment. Given the questions about sharing of injection paraphernalia with network members asked in reference to the last 6 months, the time order may provide information for a potential causal inference. In addition, generalizability of the findings is restricted due to the sampling strategy. The face-to-face assessment of high risk behaviors and self-report HIV status may have the potential for heightened social desirability response bias. Furthermore, the lack of statistical power due to the small sample size of HIV-positive participants and the subgroups could not allow us to detect statistical significance. Nevertheless, we believe the trends depicted in the descriptive analyses are informative for future studies. Finally, we did not assess the serosorting intention, and therefore it is not clear if observed serosorting in the current study was driven by the serosorting intention. Future study should include the measure of serosorting intervention to gain a better understanding as to whether or not the observed serosorting was due to the participants' intention to protect themselves from HIV infection or transmission.

In summary, the results of the current study indicate serosorting occurs among HIV-negative IDUs in Baltimore. However, the findings that a significant higher proportion of HIV-positive IDUs were non-serosorters suggest a potentially rapid disease transmission in the community. The high level of continued high-risk injection practice among HIV-positive IDUs shown in this study highlights the importance of more interventions that address high-risk injection behaviors with HIV-positive IDUs. Future harm reduction practice should address the relationship between depression and HIV-related high risk behavior, and promote norms of HIV status disclosure. The present study findings suggest that serosorting is not a viable method of prevention among IDUs, and the limitation of serosorting should be addressed in the prevention messages toward IDUs. Future harm reduction practice should emphasize not sharing injection paraphernalia regardless injection partners' perceived HIV status.

Acknowledgments

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Table 1

Perceived serosorting among HIV-negative and positive IDUs, STEP study

	HIV-negative IDUs				HIV-positive IDUs			
	Total (n=484) %	Non-serosorters (n=27) %	Serosorters (n=457) %	Unadjusted OR of serosorters (95%CI)	Total (n=88) %	Non-serosorters (n=72) %	Serosorters (n=16) %	Unadjusted OR of serosorters (95%CI)
Age: mean (SD)	42.4(8.6)	44.6(7.0)	42.3(8.7)	0.97 (0.93,1.01)	43.8(6.2)	43.8(6.5)	43.5(5.2)	0.99 (0.92,1.07)
Race: African American	75.6	85.2	75.1	0.52 (0.18,1.56)	87.5	87.5	87.5	1.00 (0.11,8.93)
Gender: Female	36.8	51.9	35.9	0.52 (0.23, 1.17)	34.1	31.9	43.8	1.66 (0.63,4.39)
Married/ in a committed relationship	31.0	29.6	31.1	1.07 (0.45,2.55)	25.0	20.8	43.8	2.96 ⁺ (0.87,9.99)
High school diploma or GED	43.8	48.2	43.5	0.83 (0.37,1.86)	40.9	41.7	37.5	0.84 (0.26,2.74)
Currently unemployed	81.0	88.9	80.5	0.52 (0.15,1.74)	95.5	95.8	93.8	0.65 (0.06,6.85)
Monthly income: >\$500	48.7	48.2	48.7	1.02 (0.49,2.15)	59.1	56.9	68.8	1.66 (0.45,6.14)
Homeless [#]	41.5	51.9	40.9	0.64 (0.29,1.45)	36.4	40.3	18.8	0.34 (0.09,1.24)
Daily alcohol drinker	26.0	37.0	25.4	0.58 (0.26,1.26)	32.9	34.7	25.0	0.63 (0.19,2.10)
Arrested in the past one year	52.9	51.9	53.0	1.05 (0.49,2.21)	53.4	54.2	50.0	0.85 (0.26,2.77)
CES-D: >20	57.4	81.5	56.0	0.29 [*] (0.11,0.79)	59.1	59.7	56.3	0.87 (0.33,2.25)
Daily heroin injector	51.1	56.0	50.8	0.81 (0.34,1.91)	34.2	36.9	21.4	0.47 (0.11,1.92)
Attended shooting gallery [#]	38.6	37.0	38.7	1.07 (0.47,2.45)	36.4	41.7	12.5	0.20 [*] (0.04,0.89)
Attended 12-step/na/aa [#]	46.6	55.6	46.1	0.68 (0.32,1.46)	45.5	47.2	37.5	0.67 (0.22,2.05)
Drug support network size: >4	42.9	51.9	42.5	0.68 (0.31,1.53)	28.4	33.3	6.3	0.13 ⁺ (0.02,1.11)
HIV status disclosure to all friends	---	---	---	---	10.0	6.3	25.0	5.00 [*] (1.03,24.16)
HIV status disclosure to all family members	---	---	---	---	56.3	53.1	68.8	1.94 (0.63,5.97)
HIV status disclosure to all drug networks	---	---	---	---	32.5	26.6	56.3	3.55 [*] (1.15,11.01)

[#] in the past 6 months

⁺ p<10

*
p<.05

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