CHANGES IN INJECTION RISK BEHAVIOR ASSOCIATED WITH PARTICIPATION IN THE SEATTLE NEEDLE-EXCHANGE PROGRAM

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ABSTRACT  We studied the influence of the Seattle, Washington, needle-exchange program on sharing of drug injection equipment (syringes, drug cookers, filtration cotton) to identify potential gaps in risk reduction and to understand in greater detail the lack of an association between exchange use and risk of hepatitis B or C virus transmission. In a cohort of 2,208 injection drug users who completed a 1-year follow-up visit, we measured the association between needle-exchange use at study enrollment (ever vs. never) and injection risk behavior at the follow-up. Control for confounding was carried out using both logistic regression and propensity score analytic methods to estimate the adjusted odds ratio (AOR). In both univariate and multivariate analyses, needle-exchange use was associated with a lower likelihood of injection with a used syringe (AOR = 0.7, 95% confidence limit 0.5, 0.9). There was no association between exchange use and cooker or cotton sharing (AOR = 0.8, 95% confidence limit 0.6, 1.1) or between exchange use and use of a common syringe to divide drugs (AOR = 0.9). This analysis suggests that risk reduction measures adopted by users of the Seattle exchange may not be sufficient to prevent transmission of all blood-borne viruses, including hepatitis C virus. Greater awareness of the infection risk associated with these practices may help curb this type of equipment sharing and ultimately prevent disease transmission.

KEY WORDS  Behavior Change, HBV; HCV; HIV, Injection Drug Use, Needle-Exchange Program, Prevention, Substance Abuse, Syringe-Exchange Program.

BACKGROUND

Needle-exchange programs for injection drug users (IDUs) have sought to reduce transmission of blood-borne viral infections by exchanging sterile syringes for previously used, contaminated ones and by distributing other new equipment—such as drug cookers—used to prepare drugs for injection. Risk reduction coun-
Selling and referral to or direct provision of other social and health services are also typically provided at needle exchanges in the US and elsewhere. Several studies have reported that IDUs who participate in needle-exchange programs are less likely than others to use syringes and other equipment previously used by another injector. Others have reported lower rates of infection with HIV and hepatitis B virus (HBV) and hepatitis C virus (HCV). However, three recent studies have also reported increased risk or no effect of needle-exchange participation on HIV transmission or infection with hepatitis B or C. This raises questions whether risk reduction among needle-exchange users is sufficient to prevent transmission of blood-borne viruses or whether “residual” risk behavior may lead to infection. Alternatively, extreme background risk differences between exchange users and nonexchangers may also affect comparison of outcomes between the two groups. Thus, control of confounding must be addressed thoroughly in study design and analyses to measure any existing needle exchange effect accurately, and gaps in risk behavior change must be identified.

In observational studies of voluntary risk reduction programs, investigators have no control over which individuals elect to participate. As a result, comparisons of treated and untreated subjects may be biased by the presence of substantial background differences between the groups. Stratification and adjustment are the analytic methods for reducing bias due to imbalance between groups. As an extension of the method of stratification, the propensity score is the probability of assignment to a treatment group, conditional on a set of covariates; stated another way, it is the estimated likelihood that an individual would participate voluntarily in a disease prevention program given their characteristics. The propensity score may be used to balance background characteristics between treated and untreated individuals. Subjects with the same propensity score will tend to have the same distribution of their background risk factors, so that adjustment for the propensity score can be expected to adjust for those risk factors included in the propensity score estimation. Calculation of the treatment effect within a subclass of the propensity score will remove the biasing influence of the covariate to the extent that balance in the distribution of the covariates is achieved within the subclass, and error in measurement does not exist. Studies have shown that approximately 90% of this bias may be removed when individuals are subclassified into propensity score quintiles. However, unlike random assignment, the propensity score will not balance unobserved covariates, except perhaps when they are correlated with the observed characteristics. In this paper, the association between participation in the Seattle needle exchange and subsequent injection risk behavior was estimated using both logistic regression and