Knowledge of HIV serostatus and risk behaviour among injecting drug users in Estonia

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We used the findings from two, cross-sectional studies of HIV serostatus and risk behaviours to assess the effects of knowledge of HIV serostatus and risk behaviours (relating to sex and injection drug use) among injecting drug users (IDUs). Respondent-driven sampling was used simultaneously at two sites in Estonia (the capital Tallinn, and the second-largest city of Ida-Virumaa County, Kohtla-Järve). The research tool was an interviewer-administered survey. Biological samples were collected for HIV testing. Participants were categorised into three groups based on HIV testing results and self-report on HIV serostatus: HIV-negative (n = 133); HIV-positive unaware of their serostatus (n = 75); and HIV-positive aware of their serostatus (n = 168). In total, 65% of the participants tested positive for HIV. Of those 69% were aware of their positive serostatus. HIV-positive IDUs aware of their serostatus exhibited more risk behaviours than their HIV-positive counterparts unaware of their serostatus or HIV-negative IDUs. Effective prevention of HIV among IDUs should therefore, include programmes to reduce high-risk sexual and drug use behaviours at the public health scale and enhanced prevention efforts focusing on HIV-infected individuals.

Keywords: injecting drug use; HIV; knowledge of HIV serostatus; risk behaviour; voluntary counselling and testing

Introduction

In the last decade, Estonia has faced the highest increase in the incidence of HIV infection in Europe (rising from 7.2 per million in 1998 to 504 per million in 2005). The HIV epidemic in Estonia, as in other Eastern European countries, is mainly driven by injection drug use (EuroHIV, 2007). The estimated prevalence of injecting drug use in Estonia is 2.4% among 15–44-year olds (Uusküla et al., 2007). Local studies performed in the last two years have shown prevalences of up to 90% (Platt et al., 2006; Uusküla, Heimer, Dehovitz, Fischer, & McNutt, 2006; Uusküla, McNutt, Dehovitz, Fischer, & Heimer, 2007; Wilson, Sharma, Zilmer, Kalikova, & Uusküla, 2007) and a high incidence of HIV among injecting drug users (IDUs) (>20/100 person years at risk) (Uusküla et al., 2008).

Research over the last decade shows that knowledge of HIV serostatus can affect risk behaviours and that protective behaviours tend to increase following notification of positive HIV status (Casdonte, Des Jarlais, Friedman, & Rotrosen, 1990; Deren, Beardsley, Tortu, & Goldstein, 1998; Desenclos, Papaevangelou, & Ancelle-Park, 1993; Rhodes, Donoghoe, Hunter, & Stimson, 1993; Wolitski, McGowan, Higgins, & Jorgensen, 1997). At the same time, however, a significant number of HIV-infected individuals continue to engage in risky behaviour (Avants, Warburton, Hawkins, & Margolin, 2000; McCusker et al., 1994; Singh et al., 1993; van Deb Hoek, van Haastrecht, & Coutinho, 1989).

Previous studies have examined the prevalence of HIV and its association with risk behaviour within the samples as a whole (Platt et al., 2006). In this report, we explore the relationships between knowledge of HIV serostatus and risk behaviour for HIV (both injecting and sexual) among IDUs in two Estonian cities with a high prevalence of HIV.
Methods

Study design

In 2005, two cross-sectional studies designed to assess the HIV prevalence and risk behaviours among current IDUs were conducted using respondent-driven sampling (RDS) (Heckathorn, Semaan, Broadhead, & Hughes, 2002) simultaneously in two sites in Estonia (the capital city Tallinn, and the second-largest city of Ida-Virumaa County, Kohtla-Järve). In both studies current IDUs were recruited for a paper-based, interviewer-administered risk-behaviour survey covering demographics, sexual behaviour and drug use history, together with biological sample collection for HIV testing.

Eligibility criteria included reporting injecting drugs within the past 90 days, age of 18 years or older and consent to provide a biological sample (dry blood spot) for HIV testing. To ensure the IDU status, the skin (arms and legs) of the study subjects was checked for injection marks and/or they were asked to describe the process of preparing drugs for injection.

Behavioural data were collected using a structured questionnaire developed from a previous questionnaire, which had been used extensively in a variety of multicentre studies in resource constrained and developed countries including the Russian Federation (Rhodes et al., 2002). The questionnaire included questions about previous HIV testing and reported HIV antibody status. Knowledge of HIV serostatus was recorded by comparing the self-report of the study subjects of earlier HIV testing with the result obtained from the blood test.

HIV antibody testing

Dried blood spot specimens were collected using single-use disposable lancets and neonatal Guthrie cards to detect antibodies to HIV (anti-HIV). Specimens were screened using anti-HIV GACELISA, and reactive specimens were confirmed using anti-HIV GACPAT immunoassay (Conell, Parry, Mortimer, & Duncan, 1993; Parry et al., 1995). Subsequent confirmatory testing was conducted on discordant results using the HIV Blot 2.2 Western Blot assay (Abbott-Murex). Testing was undertaken at the UK Health Protection Agency. At the end of study, participants were offered referrals for voluntary HIV counselling and testing.

Statistical analysis

For the purposes of the current study, IDUs were categorised into three groups based on self-report and HIV testing results: HIV-negative, HIV-positive unaware of their seropositive status and HIV-positive aware of their serostatus.

The following indicators for injecting drug use and sexual risk behaviours were used: (i) receptive sharing of syringes, needles; (ii) sharing water; (iii) having unprotected vaginal/anal intercourse within the last four weeks or last 12 months; (iv) receptive sharing of needles with a sexual partner; (v) having an IDU as a sexual partner; (vi) having two or more sexual partners within the last 12 months. The threshold for the number of sexual partners was set after consideration of the long-time period of the study (12 months) and the research target group.

Sexual and drug use risk behaviours were assessed for their relationship with HIV serostatus/knowledge of HIV status through logistic regression models and bivariate measures of association. HIV-infected IDUs aware and unaware of their serostatus were compared to the uninfected IDUs, using the latter as a reference group. In addition, a comparison within the HIV-positive group was made using the HIV-positive individuals aware of their serostatus as a reference group. Adjusted odds ratios (AOR) and 95% confidence intervals (CIs) are presented. We adjusted for the following variables: site; gender; age; ethnicity; frequency of injections (1–3 times a day); reported prison experience; age when participant started injecting drugs.

STATA software was used to calculate the statistical significance: Analysis of Variance (ANOVA) for continuous variables and χ² test or Fisher’s exact test for the categorical variables. Logistic regression was used to calculate AORs. RDS analysis Tool v. 5.0.1 was used to weight the sample to control for differences in network size and homophily to provide population-based estimates of study population characteristics (Volz, Wejnert, Degani, & Heckathorn, 2007).

The study was approved by the Ethics Committee on Human Research at the University of Tartu, Estonia, and Riverside Research Ethics Committee, London, UK.

Results

We recruited 450 IDUs to the study: 350 in Tallinn and 100 in Kohtla-Järve. Of these, 376 provided data for analysis (Table 1). Respondents who did not report HIV testing before the study (n = 52) or did not report any test result (n = 16) were excluded from the analysis. An HIV antibody test result was missing for one participant. Five IDUs who reported that they were HIV-positive, but who were tested HIV-negative at the time of the study were also excluded from the analysis. The study participants excluded
from the analysis ($N = 74$) did not differ from those included in terms of age, gender, ethnicity, site, HIV serostatus, daily injecting, frequency of injecting, age at initiation, receptive sharing of needles/syringes with IDUs, HIV-positive sexual partner and unprotected sexual intercourse. The majority of participants were men (84%), non-Estonians (89%) and used fentanyl (or “china white”, synthetic opiate) (61%) as their main drug.

Of the 376 respondents analysed, 35.4% ($N = 133$) were tested negative for HIV antibodies, while 64.6% ($N = 243$) were HIV-positive. Of those testing positive for HIV antibodies, 69.1% (168/243) reported having a positive HIV test in the past (and were therefore, aware of their seropositive status) and 30.9% (75/243) reported being HIV-negative when last tested (i.e. were unaware of their seropositive status).

Those who tested HIV-negative were less likely to inject daily (36.8% versus 58.3% for HIV-positive aware and 52.0% for HIV-positive unaware, $p \leq 0.01$), were older when they started to inject drugs (18.4 years versus 16.7 for HIV-positive aware and 16.1 for HIV-positive unaware, $p = 0.01$). The average age at interview was 25.3 years for HIV-negative, 24.3 years for HIV-positive aware and 23.0 years for HIV-positive unaware. The HIV-positive IDUs aware of their serostatus were more likely to be in contact with harm reduction services (90.5% versus HIV-negative 76.7% and HIV-positive unaware 73.3%, $p < 0.001$). There were no differences in measures of risky sexual behaviour (having unprotected intercourse or having multiple partners) within these three groups of IDUs (Table 2).

We assessed both sexual and drug-use risk behaviours for HIV as a function of HIV serostatus and awareness. The first comparison was done among those infected with HIV (Table 3). Those who were HIV-positive and aware of their serostatus had higher odds of receptive sharing of used syringes/needles and of sharing water with peers in the last four weeks (needles/syringes: AOR 2.19 (95% CI = 1.09–4.39), water: AOR 2.96 (1.40–6.24), with a sexual partner in the last year (AOR 5.09 (2.21–11.71)), or with HIV-positive individuals at any time (AOR 30.6 (9.65–97.26)). They were also four times more likely to have an IDU as a sexual partner (AOR 4.07 (2.02–8.20)).

We also compared HIV-negative and HIV-positive respondents (Table 4). HIV-positive individuals aware of their serostatus were more likely to share injection equipment, or to have an IDU as a sexual partner (AOR 2.42 (1.31–4.47)). HIV-positive IDUs unaware of their serostatus did not differ from HIV-negative IDUs in their risk behaviours except for having twice the odds for unprotected intercourse in the last year (AOR 2.44 (1.24–4.80)).

Potential recruitment biases were explored using RDSAT to adjust for differences in network size and for homophily (RDS). We specifically looked at the proportions of individuals who were HIV-negative, HIV-positive unaware of their seropositive status and HIV-positive aware of their serostatus in the sample population. The population estimates were generally similar to the values observed in the total population. All observed sample proportions fell within the 95% CIs of the RDS adjusted population estimates:

HIV-positive unaware 0.19 versus 0.22 (95% CI = 0.14–0.31); HIV-positive aware 0.42 versus 0.33 (0.26–0.43), and HIV-negative aware 0.34 versus 0.42 (CI = 0.32–0.51) for sample and estimated total population, respectively.

**Discussion**

HIV prevention efforts to date have focused primarily on reducing the risk of infection among HIV-negative individuals, concentrating on those individuals who engage in “high risk” sexual and drug using activities. Considerably less attention has been given to prevention efforts targeting individuals already infected with HIV.

Our findings suggest that HIV-positive individuals who are aware of their serostatus may have a tendency to continue high-risk activities. Based on the results of the current study, risk-taking seems to be more common among that group.
We found that HIV-positive IDUs aware of their serostatus exhibited the highest risk behaviours. HIV-positive IDUs aware of their serostatus reported higher injection risk behaviours (such as receptive sharing, sharing with a known HIV-positive person, sharing with a sexual partner) than their HIV-positive counterparts unaware of their HIV serostatus or than the HIV-negative IDUs.

As with any study, the limitations should be considered. The cross-sectional design does not allow us to establish a causal relationship or a direction of causality. In addition, there is the potential for information bias inherent to research on illicit drug use and sexual behaviour. There can be a tendency for individuals to avoid negative evaluations and to project a positive view of themselves by providing reports on their behaviour that are socially desirable. This response bias may interfere in the case of especially sensitive topics, such as drug use and sexual behaviour (Latkin & Vlahov, 1998). Moreover, the selective, constructive process of remembering makes self-reporting subject to memory biases (Hammersley, 1994). To diminish the potential biases of self-reporting, respondents obviously under the immediate influence of drugs were asked to return when sober. In addition, the respondents were anonymous, and unlinked interviews were held with trained interviewers in a familiar environment.

Our findings suggest that awareness of serostatus alone does not result in altered risk-behaviour profiles. A randomised controlled trial has shown that HIV testing without proper counselling has little effect on HIV risk behaviour and that knowledge of serostatus is only instrumental in changing risk behaviours when combined with intensive counselling (Kamb et al., 1998). There is also a concern that HIV testing without counselling could actually promote risky behaviour (Mertens, Smith, & Van Praag, 1994; Van der Perre, 2000). Voluntary testing and counselling (VCT) is available in Estonia and most VCT services in Estonia are trained to give pre- and post-test counselling. However, the quality of VCT service is unknown and no national guidelines exist to regulate or assess current VCT services.

### Table 2. Main characteristics of respondents according to knowledge of their HIV serostatus, injecting drug user survey 2005, Estonia.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HIV-negative aware of serostatus (n = 133)%</th>
<th>Aware of serostatus (n = 68)%</th>
<th>Unaware of serostatus (n = 75)%</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (proportion of men)</td>
<td>86.5</td>
<td>79.2</td>
<td>88.0</td>
<td>0.12</td>
</tr>
<tr>
<td>Ethnicity (non-Estonians)</td>
<td>83.5</td>
<td>92.9</td>
<td>91.9</td>
<td>0.02</td>
</tr>
<tr>
<td>Injecting drug use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily injectors</td>
<td>36.8</td>
<td>58.3</td>
<td>52.0</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Frequency of injection (1–3 times a day)</td>
<td>82.0</td>
<td>72.6</td>
<td>82.4</td>
<td>0.09</td>
</tr>
<tr>
<td>Fentanyl as main drug used</td>
<td>63.1</td>
<td>64.2</td>
<td>50.7</td>
<td>0.13</td>
</tr>
<tr>
<td>Environmental factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever in jail</td>
<td>64.7</td>
<td>69.1</td>
<td>64.0</td>
<td>0.64</td>
</tr>
<tr>
<td>Contact with harm-reduction services</td>
<td>76.7</td>
<td>90.5</td>
<td>73.3</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Sexual risk behaviour factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unprotected intercourse (anal or vaginal), last four weeks</td>
<td>51.9</td>
<td>51.3</td>
<td>43.6</td>
<td>0.56</td>
</tr>
<tr>
<td>Having two or more sexual partners, last 12 months</td>
<td>61.7</td>
<td>60.7</td>
<td>48.0</td>
<td>0.12</td>
</tr>
<tr>
<td>Unprotected intercourse (anal or vaginal), last 12 months</td>
<td>61.6</td>
<td>56.8</td>
<td>46.4</td>
<td>0.09</td>
</tr>
<tr>
<td>Injecting risk behaviour factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharing used syringes/needles, last four weeks</td>
<td>24.9</td>
<td>36.1</td>
<td>21.6</td>
<td>0.02</td>
</tr>
<tr>
<td>Sharing water, last four weeks</td>
<td>44.2</td>
<td>47.6</td>
<td>28.0</td>
<td>0.02</td>
</tr>
<tr>
<td>Sharing injection equipment with sex partner, last 12 months</td>
<td>19.2</td>
<td>41.5</td>
<td>13.0</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Sharing with HIV-positive person, lifetime</td>
<td>18.6</td>
<td>66.9</td>
<td>7.41</td>
<td>&lt;0.00</td>
</tr>
</tbody>
</table>
Given the high levels of risk behaviour among HIV-positive IDUs aware of their serostatus, HIV testing should be followed by counselling in combination with other interventions directed at fostering long-term behavioural change (Crepaz et al., 2006; Marks, Burris, & Peterman, 1999; Rhodes, Singer, Bourgois, Friedman, & Strathdee, 2005). This is especially important in situations where a variety of social and environmental factors interplay to produce or sustain risk (Rhodes & Simic, 2005).

The findings of this study have significant policy implications, suggesting an urgent need for enhanced interventions targeting HIV-positive IDUs attending for clinical care or contacting harm reduction services via other routes. Interventions need to target both injection and sexual risk reduction and access to HIV treatment and treatment for substance abuse/addiction. Given the high sexual risk behaviour and HIV prevalence among our study subjects the population groups at the most imminent risk are the sexual partners of current IDUs. Implementation of prevention efforts targeting IDU sex partners is therefore of vital importance in changing the course of epidemic. For example, drug-treatment programmes could intensify efforts to reach partners of their IDU clients by making use of extensive staff training in HIV issues, innovative outreach methods and creative counselling strategies (CDC, 1991; Iguchi, Donald, Kushner, & Lidz, 2001; Klevens, Fleming, Neal, & Li, 2001).

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References


