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Engagement in HIV care and its correlates among people who inject drugs in St. Petersburg, Russian Federation and Kohtla-Järve, Estonia

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Abstract

Background and Aims—HIV infection and mortality in Eastern Europe are driven by unsafe injection drug use. We sought to compare engagement in care from HIV testing through receipt of antiretroviral treatment among HIV-positive people who inject drugs (PWID) in St. Petersburg, Russian Federation (RF) and Kohtla-Järve, Estonia and identify factors significantly associated with failure to progress at each stage of the HIV treatment cascade.

Design—Cross-sectional biobehavioral surveys of PWID with an analysis stratified by location – two Russian speaking regions with similar HIV epidemic histories and current prevalence.

Setting—Field-based surveys conducted in St. Petersburg, RF and Kohtla-Järve, Estonia.

Participants—We recruited 452 HIV-positive PWID in St. Petersburg (November 2012 to June 2013) and 370 HIV-positive PWID in Kohtla-Järve (June–August 2012) using respondent driven sampling.

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Competing Interests

There are no competing interests or conflicts of interest to report.

Contributions of Authors

R. Heimer designed the study, coordinated data collection in the two sites, and led the drafting of the manuscript. N. Marudova conducted the statistical analysis and prepared an initial draft of the Methods and Results sections. L. M. Niccolai assisted with study design, implementation, and data safety monitoring and assisted with manuscript preparation and editing. A. Uusküla assisted with study design led the research team in Estonia, and assisted with manuscript preparation and editing. O. S. Levina assisted with study design led the research team in Russia, conducted much of the data analysis, prepared an initial draft of the Methods and Results sections, and assisted with the editing of the other sections.

Ethical Approval

The research design and consent documents were approved by Institutional Review Boards of Yale University, the University of Tartu (Estonia) and NGO “Stellit” (Russia). Because of the illicit nature of injection drug use, approval was granted for oral informed consent.

Measurements—Participants were tested for antibodies to HIV, and administered a questionnaire focusing on participants' medical care histories. Engagement in care was categorized as a cascade of five transitional steps through six stages ranging from HIV testing to current receipt of antiretroviral medications.

Findings—Progress along the cascade was greater in Kohtla-Järve (32.7% were receiving antiretroviral medications) than in St. Petersburg (9.7%). In both locations, we found the steps with high failure rates were the transitions from being aware of one's HIV diagnosis to being in regular care and initiation of highly active antiretroviral therapy (HAART). Factors significantly associated with transition failure in both locations and across steps included high alcohol consumption, variables associated with drug choice and injection frequency, and lack of basic medical insurance.

Conclusion—The two steps in treatment cascade for HIV-positive PWID in St. Petersburg, RF and Kohtla-Järve, Estonia requiring greatest improvement are retention in regular care and initiation of HAART. Both individual behavioral and structural factors are associated with failure to transition along the cascade.

Keywords

HIV; people who inject drugs; HIV testing; antiretroviral therapy; treatment cascade; Eastern Europe

INTRODUCTION

Recent efforts to control HIV epidemics have emphasized the need to improve linkage to care and adherence to highly active antiretroviral therapy (HAART) among people living with HIV infection.(1) The treatment cascade has been used to identify gaps in the steps needed to improve the health of people living with HIV (PLWH) and prevent further transmission.(2, 3) Barriers to engagement within the cascade of HIV care have been identified for different populations.(4–8) In the United States the cascade has been analyzed to consider age, race, sex, and risk factors (9). Social-ecological factors of engagement in care have been explored and their importance in creating targeted prevention approaches demonstrated.(10, 11) Most of the studies described have been based on the secondary data analysis (12, 13) or retrospective cohort studies,(14) focusing on different stages of the cascade. Such data are less available to estimate HIV-care engagement in hard-to-reach and understudied populations. Despite the challenges in building HIV treatment cascades that include variations in metrics, contextual influences,(15) and missing outcomes,(5) it is important to expand the use of the treatment cascade to inform and improve HIV epidemic control and increase engagement in care.

Our study sought to assess engagement in HIV care among people who inject drugs (PWID) in Kohtla-Järve in northeastern Estonia and the Russian city of St. Petersburg, two neighboring regions in countries with high HIV prevalence.(16, 17) The two regions share a common history as part of the USSR when HIV surveillance was initiated in the late 1980's and both experienced serious social-economical challenges and major transitions in health-

care after the collapse of the USSR in 1991. Twin epidemics of injection drug use and HIV emerged at a similar moment later in the decade.(18, 19)

The study context: HIV in Russia and Estonia

In 2014 Russia and Estonia reported the first and third highest HIV number of newly diagnosed HIV cases in Europe: 82.4/100,000 and 29.6/100,000, respectively (20, 21). Countrywide HIV prevalence in PWID is estimated 53% in Estonia and 16% in Russia (UNAIDS, 2012), although in some regions of Russia, including St. Petersburg, prevalence exceeds 50%.(22) There are, however, substantial differences between the responses in the two countries.

HIV in Russia is now estimated to infect 0.8–1.4% of total population with more than 1,000,000 officially registered cases and greater than 10% increases in the number of new diagnoses every year since 2012.(17, 23) Although epidemic control efforts include free HIV testing, health-care, treatments and social welfare services that are guaranteed to all citizens of Russia, effective control measures targeting the most at risk population of PWID have not been implemented. Standard international harm reduction approaches are limited. Opioid substitution therapy remains illegal while needle and syringe program coverage is sparse and operates almost exclusively through non-governmental organizations with minimal political and financial support.(24, 25) Only 120,000 PLWH were provided treatment in 2013 reaching less than 20% of those in need.(17) The mandate that people with a history of injection drug use be six months drug-free prior to the initiation of HAART has prevented initiation of treatment among PWID and it has been estimated that only 1% of HIV-positive PWID receive HAART.(25–27)

In Estonia, on the other hand, the system of care has gone through the set of significant changes and has successfully reformed its health system.(18, 28) Capacity building for the governmental and nongovernmental sectors to interact constructively with each other has been instrumental in this process.(29) Estonia has increased its capacity to manage its response to HIV/AIDS over the past decade by scaling-up syringe exchange programs and establishing opioid substitution based drug treatment. Nevertheless, in 2012 HIV population prevalence in Estonia was 1.3%, the highest in EU.(28) Among PWID, estimated incidence in Tallinn, the capital, was still 7.5/100 person-years in 2011 even though 40% of all HIV-positive were receiving care in 2011.(30)

The analysis presented in this manuscript seeks to update estimates of PWID engagement in care in contiguous regions of the two countries – St. Petersburg and Kohtla-Järve. We have created treatment cascades for the two sites, relying on an integrated bio-behavioral survey conducted at both sites in 2012–2013 using similar methods, and identified associated social-behavioral barriers at each step in the treatment cascade, stratified by site, to identify factors amenable to remediation specific to each location. Thus, this study had two aims:

1. To compare progress along the cascade in the two regions; and
2. To produce a model of the factors significantly associated with progression at each step in the cascade.

METHODS

Study sites specifics

St. Petersburg is the largest northern city in Europe, with the population over 5,000,000 people, and the second most important political, social, cultural and industrial center in Russia. It consists of 18 districts containing the historical and business center, industrial, and outlying residential districts spread along the coast of the Gulf of Finland. Some districts are as much as a two-hour ride on public transportation from the city center. In St. Petersburg at the time of the study, AIDS treatment for St. Petersburg residents was offered free of charge at two centrally located facilities, the City AIDS Center and Botkin Infectious Disease Hospital. Decisions about the initiation of HAART were made by a committee of physicians and support staff once a patient's CD4+ cell count was ≥ 350 cells per μL .

Kohtla-Järve is an administrative center in Ida-Viru County in northeastern Estonia that borders on the Northwestern administrative region of Russia, which is centered in St. Petersburg. It consists of six districts that historically contained farmlands and chemical industrial areas adjacent to shale oil mines. Post-Soviet collapse of these industries has resulted in a declining population that is now 37,000, down from 90,000 in 1990. The vast majority of the population migrated from other parts of the Soviet Union to Kohtla-Järve to work in these industries, and the population remains ethnically Russian with Russian spoken most commonly. At the time of the study, AIDS treatment was provided by the government healthcare system free of charge in the Infectious Diseases department at one hospital and additional out-patient clinic. Following treatment guidelines of the European AIDS Clinical Society, HAART was initiated a patient's CD4+ cell count fell below 350 cells per μL .

Recruitment strategy

Participants were recruited in St. Petersburg from November 2012 to June 2013 and in Kohtla-Järve from June to August 2012 using respondent-driving sampling (RDS), a recruitment method previously been employed in these locations.(31, 32) The standard dual incentive used employed, providing reimbursement to study participants who completed the social-behavioral questionnaire and provided a sample for HIV-testing and who successfully referred up to three other study participants. In St. Petersburg, recruitment took place in seven districts, including those centrally or peripherally located. Multiple sites were visited by vans operated by the NGO "Diakonia", which provides services for vulnerable populations including needle-syringe exchange, counseling for PWID, and referrals to HIV and drug treatment. In Kohtla-Järve recruitment took place at the local needle-syringe exchange "Me aitame sind" ("We Will Help You" in English) located in Ahtme, the most affected of the city's six districts by injection drug use and HIV.

Inclusion criteria were: age over 18 in Estonia and over 21 in St. Petersburg, active injection drug use defined as occurring within the past four weeks, Russian or Estonian language literacy, and ability to provide informed consent. The study was anonymous and confidential. Individual identification numbers were issued to all study participants to comply with standard RDS methodology, to insure provision of HIV testing results and counseling if desired, and to link social-behavioral components of the study with HIV test

results. The study was approved by Institutional Review Boards of Yale University, the University of Tartu (Estonia) and NGO “Stellit” (Russia).

Target samples sizes of 800 PWID in St. Petersburg and 600 in Kohtla-Järve were set based on preliminary calculations to detect differences in stigma associated with drug use or with awareness of being HIV-positive. Recruitment yielded 811 PWID in St. Petersburg and 588 PWID in Kohtla-Järve. For the analysis presented herein, only those individuals who tested HIV-1 positive upon recruitment: 452 (55.7%) in St. Petersburg and 370 (62.9%) in Kohtla-Järve are included in the analysis.

Socio-behavioral data collection

Surveys were conducted to collect sociodemographic, behavioral, health services, knowledge, attitude, and perceptions data through face-to-face interviews conducted at or near recruitment sites in St. Petersburg and at the exchange site in Kohtla-Järve. The survey instrument was based on WHO Drug Injecting Study Phase II questionnaire (version 2b (rev. 2)(33) and modified by agreement among members of the international research team. The survey was later adjusted for the use in St. Petersburg by adding additional questions. At both sites the questionnaire included the following sections: RDS-related questions, socio-demographics, tobacco, alcohol, and injectable psychoactive drug use, injection-related HIV risks, sexual behaviors, HIV/AIDS, hepatitis, and overdose knowledge, overdose history, physical and mental well-being, drug and HIV treatment experiences, incarceration history, the use of somatic and mental health, harm-reduction and social care services, HIV-disclosure, and status stigma related to either injection drug use or HIV infection. Alcohol misuse used the Russian-validated CAGE questionnaire (34, 35) and three questions about quantity and frequency of drinking.(36) Problematic alcohol consumption was defined as >14 drinks per week for men or >7 drinks per week for women with a CAGE score 1 or a CAGE score of 2. Internalized and anticipated stigma measures were adopted from Kalichman et al. and Pinel, respectively, and as adapted as described in Burke et al.(37–39)

HIV Testing

Testing in St. Petersburg used OraSure rapid oral antibody tests (OraSure Technologies, Inc., Bethlehem, PA, USA). Study participants who tested positive were referred for confirmatory testing to the St. Petersburg AIDS Center. In Kohtla-Järve, serum samples obtained by venipuncture were tested using commercially available kits for HIV antibodies (ADVIA Centaur HIV Antigen/Antibody Combo Assay, Siemens Healthcare Diagnostics, Erlangen, FDR).

Cascade steps

Data from the survey were used to construct a 6-state, 5-step treatment cascade based on self-report from participants who tested positive for HIV when recruited into the study. Data for the cascade was obtained by self-report from all participants in each location who tested positive for HIV at enrolment in the study.

Step 1. HIV testing coverage: was determined through the use of a question about ever having been tested for HIV.

Step 2. HIV-diagnosed: indicates, among those ever tested for HIV, those who were aware of their HIV positive status before they took part in our study. This required a response of HIV to question about the result of the respondent's last HIV test.

Step 3. Linkage to regular care: indicates, among those HIV-positive PWID who knew their status, that an individual had made a clinical visit to an HIV care facility at least once in the six months prior to being interviewed.

Step 4. Offered HAART: indicates, among those in regular care, that an individual had received a physician's recommendation to initiate HAART.

Step 5. Currently receive HAART: indicates, among those offered HAART, that an individual was receiving it at the time of interview.

Analysis of Factors Associated with Cascade Failure

Factors associated with failure to make a transition from one step to the next were identified through bivariate regression using SPSS 16. Factors included sociodemographics, drug and alcohol use including CAGE scores, variables associated with stigma, use of other services, place of residence relative, and modes of transportation to treatment locations. Multivariate models for the transitions at steps two, three, and four were generated separately for the two study sites using the PredictABEL: Assessment of Risk Prediction Models package in *R* accompanied by Akaike Information Criterion of model fitness (40). These models are presented as supplemental materials.

RESULTS

HIV-1 prevalence was 55.7% (95% CI: 52.3–59.1) in St. Petersburg and 62.9% (95% CI: 59.0–66.8) in Kohtla-Järve. A comparison HIV+ study participants covering nine key sociodemographic and life history variables revealed differences between the two sites in seven of them (Table 1). HIV-positive PWID in Kohtla-Järve were more likely to be younger, married, living with their children, have only a basic secondary school education, receive financial subsidies from family or the state, have difficulty in coping financially, and have been incarcerated. Differences were detected in two of five drug use-related services. HIV-positive PWID in Kohtla-Järve were more likely to be receiving treatment for drug abuse and more likely to use services offered by syringe exchange programs (Table 1). Differences were also detected on three of four stigma-related variables. HIV-positive PWID in Kohtla-Järve reported significantly lower stigma regarding internalized stigma for both HIV and injection drug use and regarding anticipated stigma for injection drug use (Table 1).

The five-step treatment cascade comparing the two locations is depicted in Figure 1. Overall, progress was greater in Kohtla-Järve, where 32.7% of HIV+ PWID were receiving antiretroviral medications, than in St. Petersburg, where 9.7% were ($\chi^2=65.47$, $p<0.0001$).

More than 95% of each sample reported having been tested for HIV-1. For those who tested HIV positive, 3.8% on Kohtla-Järve and 3.3% in St. Petersburg had never been previously tested (Step 1, Figure 1). However, only 85% of the HIV-positive sample in St. Petersburg

and 78.1% in Kohtla-Järve reported being aware of a positive test result. A significantly smaller percentage of people in Kohtla-Järve made the transition from having been tested to being aware of their infection (Step 2, Figure 1).

In bivariate analysis, there were two common factors associated with being aware of a positive HIV-1 test result in the two locations and some that were identified only in Kohtla-Järve (Table 2). Higher frequencies of alcohol use and drug injection were associated with being aware of the HIV positive status. While no additional factors associated with an increased likelihood of being aware of a positive test result were identified in St. Petersburg, several were in Kohtla-Järve. These included having no legal income, not being married, having been incarcerated, and having lower anticipated stigma regarding injection drug use (Table 2).

Success in achieving next step in the cascade, receiving regular HIV care, was far more common in Kohtla-Järve than in St. Petersburg (Figure 1, Step 3). In Kohtla-Järve, 73% PWID made this transition whereas in St. Petersburg only 32% did so. Factors in bivariate analysis associated with successful transition to care in both locations included having basic medical insurance, less injection both in terms of number of times per day and number of days in the month prior to interview, obtaining financial support from others, and being in drug treatment (Table 3). High alcohol consumption and daily tobacco use were more likely among PWID who failed to seek regular treatment in St. Petersburg. Also associated with failure to seek regular treatment in St. Petersburg were several measures of stigma including anticipated stigma for HIV and internalized stigma for both HIV and injection drug use (Table 3).

Although national guidelines at the time of the study did not specify that all HIV-positive individuals should be receiving HAART, we determined the proportion of those in regular care who had been offered an opportunity to initiate HAART. The proportion was significantly higher in Kohtla-Järve (74%) than in St. Petersburg (45%) (Figure 1, Step 4). Comparison of the factors significantly associated with being offered HAART revealed no overlaps between the two sites (Table 4). In Kohtla-Järve, living with a person of the opposite sex and not having insurance were associated with not having been offered HAART. In St. Petersburg, there were differences in the types of drug injected while injecting on more days in the past month was associated with not having been offered HAART.

Finally, we found that similar percentages of those offered HAART were receiving it (77% in both locations) (Figure 1, Step 5). However, the overall percentage of HIV-positive PWID who were receiving HAART in St. Petersburg was only a third of those Kohtla-Järve. This was also true were restricting the analysis to those HIV+ PWID who were aware of being infected. We could identify no factors in St. Petersburg or Kohtla-Järve that distinguished those receiving HAART from those offered but not receiving it.

We developed multivariate models to determine which of the factors, significant in the bivariate analyses, remained associated with steps two, three, and four in the cascade. These analyses were hampered by the decreasing sample size with each step in the cascade. This

was especially true in St. Petersburg, where only step three – the transition from receiving a positive diagnosis and being in regular HIV care – yielded significant covariates. Here, injecting on few days (adjusted odds ratio of 0.953; 95% CI: 0.920 to 0.987) and higher internalized stigma (adjusted odds ratio of 1.072; 95% CI: 1.015 to 1.133) remained significantly associated (AIC = 284.2). In Kohtla-Järve we identified significant covariates for each of the three steps (Table 5). For step two – awareness of a positive diagnosis – the drug and alcohol use variables remained significantly associated. For step three – receiving regular HIV care – medical insurance and three variables related to drug use remained significant. For step four – receiving an offer to initiate HAART – having insurance remained significant, as was living with a sex partner.

DISCUSSION

The driving force of HIV infection at the population level in Estonia and Russia remains transmission among PWID and thence sexual transmission from PWID to their partners. The surest route to epidemic control is to focus efforts on controlling HIV spread in these populations. A major goal for epidemic control would be reduction in community viral load through universal provision of effective antiretroviral therapy. As noted by Risher et al., such efforts must include analysis of the cascade in key populations in order to reach those most at risk.(41)

In this paper, we analyzed the HIV care cascade among PWID, demonstrating that engagement in HIV care among large samples of PWID in Kohtla-Järve and St. Petersburg is that engagement is further along in Kohtla-Järve. Overall, approximately one in three HIV-infected PWID in Kohtla-Järve versus only one in ten in St. Petersburg was receiving antiretroviral medications in 2012. Both numbers will need to increase for epidemic control. At the level of specific steps, our analysis has identified those steps that see the greatest failure to progress and produced multivariate models that have identified key factors associated with failure to progress along the cascade.

The first step with substantial failure to progress is the transition from having ever been tested to knowing that one is HIV infected. However, our cross-sectional study design does not allow us to distinguish between three alternative reasons: is the failure to progress due to an infection since the last test, an individual's reluctance to obtaining a test result, or a system failure to inform individuals of an HIV-positive test result. Regardless of the reason, closing this gap will require providing more frequent HIV testing that includes a concerted effort at post-test counseling and referral to care. Efforts to increase awareness common to both locations could include making special efforts to test and counsel individuals whose alcohol consumption is problematic. The association of increasing injection frequency with receiving an HIV-positive diagnosis could have many causes, but our study was not designed to distinguish between alternatives.

The next major step with substantial failure to progress is the transition from receiving a positive diagnosis to being in regular care. Among PWID aware of being infected, engagement in regular care at stage 4 in Kohtla-Järve was more than twofold greater than in St. Petersburg. Since St. Petersburg is far larger than Kohtla-Järve, it is possible that the

shorter distance to care services might explain the greater access in Kohtla-Järve. To address this issue, we conducted a spatial analysis to determine if proximity of residence to existing care facilities in St. Petersburg was associated with more engagement, but we could not detect any significant associations (data not shown). Nor were residential locations a significant factor associated with any other step in the cascade. Previous work has suggested that stigma and strength of the patient-physician bond can play important roles in accessing and remaining in HIV care.(37,42). This study adds additional factors that appear to influence this step including drug use, drug treatment, and medical insurance.

Higher proportions of PWID were offered and were receiving HAART in Kohtla-Järve than in St. Petersburg. In Kohtla-Järve, medical insurance and not living with a partner were associated with receiving HAART whereas in St. Petersburg, drug use factors predicted transition to receiving care but not HAART.

There were several disparate findings. The first concerns injection drug use, which is often held to hamper retention in HIV care. Variables measuring the intensity of drug use were associated with a higher likelihood of having received an HIV-positive diagnosis (step two), but were associated with decreased receipt of ongoing HIV care, and in St. Petersburg with a decreased likelihood of having been offered HAART. The second concerns stigma, which is also thought to present barriers to engagement in HIV care. We found that of the four stigma variables, only higher anticipated stigma for injecting was positively associated with receiving a positive diagnosis and only in Kohtla-Järve. This association, contrary to expectations suggests a level of stigma resilience in the Estonian sample, perhaps resulting from the increased efforts to engage PWID in HIV prevention and treatment.

This study has limitations due to sampling and the use of self-reported data for everything but current HIV serostatus. Sampling of PWID cannot be done at random and although RDS is used to reach across multiple networks of PWID, there is no guarantee that the sample is representative of the underlying population. Therefore, it is not possible to generalize our results to PWID in other locations or even to all PWID in the two locations studied. The findings reported for PWID in the two locations cannot be generalized to other regions of Russia or Estonia. Nevertheless, each of these two locations has among the highest HIV prevalence within its country and each is burdened by a large population of PWID. Since this study is, to our knowledge, the first to explore the HIV treatment cascade for HIV-positive PWID in the two countries, it sets a benchmark against which other studies exploring engagement in HIV care in the two countries can be compared, consistent with recommendations recently developed for studying the cascade.(43) Another limitation is that self-reported data are insufficient to learn about the next step in the treatment cascade: has HAART resulted in undetectable viral loads. For this, we would need medical chart data, which was not possible to obtain since participation was anonymous. Conversely, using survey data from samples recruited outside of the treatment setting is the most efficient way to study the early steps in the cascade.(44) Another limitation is based on the decision to analyze the data as contingent, i.e., only those who have completed the prior step were considered in the next step. This may introduce a bias as to the composition of the remaining subsample. A separate analysis might reveal factors other than those we identified that differentiate the entire sample of PWID from those achieving a given step in the cascade.

However, this report is focused on identifying factors associated with success or failure in making each transition, which is important in guiding HIV care providers as they seek to move their patients along the cascade to the end goal of viral load suppression.

Conclusions and Recommendations

We have demonstrated that efforts to provide treatment for HIV-positive PWID were more successful in Kohtla-Järve than in St. Petersburg. It also revealed that efforts on several levels might be needed to improve engagement with HIV care in both locations. Factors associated with transitions failures along the cascade included those at the levels of individual behavior, especially related to drug and alcohol use, but also suggest significant roles for location-specific familial and structural issues. The influence of family at several stages of the cascade in both locations suggests that a better understanding of social support mechanisms might prove useful in developing interventions to improve engagement in treatment. Increasing the provision of health insurance and the availability of drug treatment and syringe exchange could also increase the proportion of PWID in care and who are receiving antiretroviral medications. Finally, stigma seemed to play a role in transition failures although in at least one case higher stigma was associated with better outcomes. This suggests evidence for the existence of stigma resilience. This seems to be especially true for the situation in Kohtla-Järve where, as we have previously reported,⁽³⁷⁾ levels of stigma equivalent to that observed in St. Petersburg have not deterred PWID from achieving a more than threefold higher proportion of PWID who are benefiting from HAART therapy. More research will need to be conducted to determine the extent to which resilience accounts for successful transitions among the cascade.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Treatment Cascade for (A) St. Petersburg, RF and (B) Kohtla-Järve, Estonia
 Progress along the cascade is plotted as the percentage of people remaining at each stage and the number of individuals at each of the six steps in the cascade appears at the top of each bar. The numbers between the bars indicate the decrease in the percentage of people at the prior stage who had not yet made the transition to the next step.

Table 1

Characteristics of HIV + PWID in Kohtla-Järve and St. Petersburg¹.

	Kohtla-Järve		St. Petersburg		p-value
Age, mean $\pm$ s.d.	30.4 $\pm$ 4.5		32.1 $\pm$ 4.2		8.6 $\times 10^{-8}$
	n	%	n	%	
Sex, female	98	26.6	92	20.4	0.0509
Married, legal or common law	145	39.2	135	29.9	0.0133
Living with children	88	24.0	73	16.2	0.0154
Educational Achievement					
Secondary only	260	70.3	186	41.2	2.2 $\times 10^{-16}$
Vocational, post-secondary	110	29.7	226	50.0	
Academic, post-secondary	0	0	40	8.8	
Primary Source of Income ²					
Legal Employment	95	25.9	312	69.2	2.2 $\times 10^{-16}$
Illegal activity	11	3.0	90	20.0	
State welfare or personal gifts	261	71.1	49	10.9	
Financial Status ³					
Very difficult to cope	166	45.2	60	13.4	2.2 $\times 10^{-16}$
Difficult to cope	168	45.8	280	62.4	
Getting by or comfortable	33	9.0	109	24.2	
Ever Been Jailed or Imprisoned	234	63.2	176	38.9	2.4 $\times 10^{-12}$
Current Medical Insurance ⁴	306	82.7	354	78.5	0.446
Any form of substance abuse treatment ⁵	83	22.4	11	2.4	4.0 $\times 10^{-16}$
Syringe exchange services ⁶	334	90.3	127	28.1	2.2 $\times 10^{-16}$

Stigma Scales	Kohtla-Järve		St. Petersburg		p-value
	Score	s.d.	Score	s.d.	
Internalized stigma for drug use ⁷	2.45	0.72	3.40	1.28	2.2×10 ⁻¹⁶
Internalized stigma for HIV disease ^{7,8}	3.68 n=312	0.83	3.48 n=384	1.32	0.0190
Anticipated stigma for drug use ⁷	3.24	0.43	2.96	0.50	2.2×10 ⁻¹⁶
Anticipated stigma for HIV disease ^{7,8}	2.83 n=312	0.45	2.93 n=384	0.98	0.917

Notes:

- ¹ Number of subjects was 370 in Kohtla-Järve and 452 in St. Petersburg unless otherwise noted. Differences in age and the four stigma variables were determined by t-test, with means and standard deviations reported. All other differences were determined by chi-squared test.
- ² Number of subjects for primary source of income was 367 in Kohtla-Järve and 451 in St. Petersburg.
- ³ Number of subjects for financial status was 367 in Kohtla-Järve and 449 in St. Petersburg.
- ⁴ Number of subjects for financial status was 370 in Kohtla-Järve and 451 in St. Petersburg.
- ⁵ Number for Kohtla-Järve includes 77 people in methadone substitution treatment, which is illegal in Russia.
- ⁶ Syringe exchange service question covered any use in the four weeks prior to interview.
- ⁷ Internalized and anticipated stigma were based on six questions for each of the four items scored on an answer of 1 (not at all) to 5 (very much) for. A composite score for each participant was computed by taking an unweighted mean of the six items.
- ⁸ Stigma data for HIV disease could only be obtained from those who were already aware of being HIV infected at the time of interview.

Table 2

Factors Associated in Bivariate Analysis with the Transition from Having Been Tested to Receiving an HIV-Positive Diagnosis in Kohtla-Järve (N=356) and St. Petersburg (N=437). Values are presented as percentages or means $\pm$ standard deviations.

Variables	Kohtla-Järve			St. Petersburg		
	Not aware of diagnosis n=67	Aware of diagnosis n=289	p-value	Not aware of diagnosis n=51	Aware of diagnosis n=386	p-value
Legally or common law married	50.7	36.0	0.0434	16.7	10.9	0.223
Main source of money, last 6 months						
Income from legal activities	48.5	19.9	5.7×10^{-6}	76.4	67.6	0.090
Allowance/income of others	50.0	77.0		17.6	9.8	
Income from illegal activities	1.5	3.1		11.8	21.8	
Ever been in jail or prison	35.8	70.9	3.3×10^{-7}	29.4	40.4	0.068
Days of alcohol consumption, last 4 weeks,						
Every day	17.9	14.5	0.00306	17.6	35.3	0.00031
More than once per week	28.4	14.5		17.6	27.8	
Once per week	17.9	21.8		35.3	19.0	
Less than once per week	14.9	8.7		23.5	8.1	
Not once in the last 4 weeks	20.9	40.5		5.9	9.9	
CAGE score indicative of alcohol problems ¹	58.2	52.3	0.30	47.1	74.1	2.9×10^{-7}
Do you currently smoke cigarettes/tobacco						
No	6.0	5.9	0.0148	1.9	2.8	0.422
Yes, currently every day	82.1	90.0		98.0	92.6	
Yes, currently occasionally	11.9	4.2		0	4.1	
On the last day you injected, how many times did you injected						
1	62.7	50.2	0.062	70.6	43.6	5.0×10^{-7}
2	22.4	33.6		27.5	39.7	
3 and more	10.4	18.1		2.0	16.6	

Variables	Kohltla-Järve		St. Petersburg	
	Not aware of diagnosis n=67	Aware of diagnosis n=289	Not aware of diagnosis n=51	Aware of diagnosis n=386
Days injecting, mean, last 4 weeks	11.6±7.9	17.4±9.4	16.8±8.1	21.4±7.6
Injected heroin, last 4 weeks	0.0	2.8	68.6	86.3
Injected amphetamine, last 4 weeks	61.2	25.6	13.7	15.0
Anticipated stigma for injection drug use ²	20.9±3.5	22.1±2.9	17.1±2.8	17.9±3.0

Notes:

- ¹ Problematic alcohol consumption was defined as >14 drinks per week for men or >7 drinks per week for women with a CAGE score 1 or a CAGE score of 2.
- ² Scores for anticipated stigma for injection drug use were based on six questions, scored 0 to 4 for a range of 0–30, where a higher score was indicative of greater stigma.

Table 3

Factors Associated in Bivariate Analysis with the Transition to Regular Care Following Receiving an HIV-Positive Diagnosis in Kohtla-Järve (N=289) and St. Petersburg (N=386). Values are presented as percentages or means $\pm$ standard deviations.

Variables	Kohtla-Järve			St. Petersburg		
	Not Current Patient n=78	Current Patient n=211	p-value	Not Current Patient n=262	Current Patient n=124	p-value
Living with your own children	15.6	27.3	0.0246	24.5	33.7	0.419
Have a Russian passport	58.7	93.8	2.6×10^{-8}	90.0	95.9	0.0182
Have basic medical insurance	60.3	92.9	2.6×10^{-8}	76.0	85.4	0.0203
Main source of money, last 6 months			0.00697			1.0×10^{-4}
Own income, legal or illegal	33.8	19.0		94.3	81.3	
Family or government support	66.2	81.0		5.7	18.7	
Alcohol consumption, last 4 weeks			0.490			1.2×10^{-6}
Once per week or less	67.5	72.2		31.6	47.9	
More than once per week	18.8	13.2		27.5	28.5	
Every day	13.8	14.6		40.8	23.6	
Problematic alcohol consumption ¹	58.7	52.3	0.832	84.0	53.2	2.2×10^{-16}
Currently smoke cigarettes/tobacco			0.942			9.8×10^{-4}
No	6.2	5.7		2.7	3.2	
Currently, on occasion	3.8	3.8		1.5	9.7	
Currently, daily	90.0	90.6		95.8	87.1	
Times injected, the last day you injected,			7.6×10^{-4}			5.8×10^{-5}
1–2	74.3	85.8		79.3	91.9	
3	25.6	14.2		20.7	8.1	
Days injected, past 4 weeks	21.0 $\pm$ 8.3	16.1 $\pm$ 9.4	9.0×10^{-6}	22.1 $\pm$ 7.1	19.9 $\pm$ 8.5	0.0255
Main injected drug last 4 weeks ²			0.089			2.5×10^{-4}

Notes:

²There are difference in drug markets between the two cities. In Kohtla-Järve, the main opioids are fentanyl and its derivative; in St. Petersburg, the main opioids are heroin and methadone.

³ Anticipated stigma score is the sum of answers ranging from 0 to 4 in response to 6 questions. Higher scores are indicative of lesser stigma.

⁴ Internalized stigma score is the sum of answers ranging from 1 to 5 in response to 6 questions. Higher scores are indicative of lesser stigma.

Table 4

Factors Associated in Bivariate Analysis with the Transition to Being Offered HAART among those in Regular Care in Kohtla-Järve (N=211) and St. Petersburg (N=124). Values are presented as percentages or means $\pm$ standard deviations.

Variables	Kohtla-Järve			St. Petersburg		
	In regular care, not offered HAART n=53	In regular care, offered HAART n=158	p-value	In regular care, not offered HAART n=68	In regular care, offered HAART n=56	p-value
Living with a sex partner	52.8	34.0	0.0499	33.8	29.8	0.64
Has basic medical insurance	86.8	94.9	0.0461	83.8	82.4	0.84
Main injected drug, past 4 weeks						
Heroin	NA	NA	0.86	61.8	66.1	2.5×10^{-9}
Methadone	NA	NA		38.2	23.2	
Fentanyl derivatives	75.4	74.2		NA	NA	
Other	24.6	25.8		0.0	10.7	
Days injected, past 4 weeks	16.3 $\pm$ 9.4	15.9 $\pm$ 9.3	0.79	21.6 $\pm$ 7.6	18.0 $\pm$ 9.3	0.0348

Table 5

Factors Associated in Multivariate Analysis with steps in the treatment cascade in Kohtla-Järve. Values are presented as adjusted odds ratios with 95% confidence intervals and p-values plus the values for the Akaike Information Criterion (AIC)¹ and degrees of freedom (df).

5A: the transition from having been tested (N=356) to receiving an HIV-positive diagnosis (N=289).				
	Adjusted Odd Ratio	95% Confidence Interval	p-value	
History of Incarceration	2.052	1.364–4.589	0.0031	
Days Injected, last 4 weeks	1.052	1.015–1.090	0.0056	
Injection of Amphetamine	0.329	0.179–0.604	0.0003	
Usual Alcohol Consumption				
Not in last 4 weeks	Referent			
More than once a week	0.283	0.121–0.660	0.0035	
Daily	0.396	0.157–0.994	0.0413	
AIC = 302.47; DF = 356				
5B: the transition from receiving an HIV-positive diagnosis (N=289) to receiving regular HIV care (N=211).				
	Adjusted Odd Ratio	95% Confidence Interval	p-value	
Medical Insurance	6.208	1.017–13.07	0.0002	
In Current Substance Abuse Treatment	2.337	1.039–5.258	0.0401	
Injection Frequency	0.673	0.492–0.922	0.0137	
Days Injected, last 4 weeks	0.937	0.898–0.978	0.0026	
AIC = 198.78; DF = 199				
5C: the transition from receiving regular HIV care (N=211) to receiving a recommendation to initiate HAART (N=158).				
	Adjusted Odd Ratio	95% Confidence Interval	p-value	

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5A: the transition from having been tested (N=356) to receiving an HIV-positive diagnosis (N=289).				
	Adjusted Odd Ratio	95% Confidence Interval	p-value	
Medical Insurance	1.900	0.585–6.169	0.195	
Living with Sex Partner ²	0.528	0.281–0.993	0.0476	
AIC = 286.84				

Notes:

¹ Akaike H. A new look at the statistical model identification, IEEE Transactions on Automatic Control 1974; 19: 716–723.

² Living with sex partner compared to all other living arrangements including living with legal spouses.