HHS Public Access

Author manuscript

Sex Transm Infect. Author manuscript; available in PMC 2016 June 01.

Published in final edited form as:

Sex Transm Infect. 2016 March ; 92(2): 161–167. doi:10.1136/sextrans-2015-052076.

The HIV care continuum among men who have sex with men in Moscow, Russia: a cross-sectional study of infection awareness and engagement in care

AL Wirtz[1,2], **CE Zelaya**[2], **C Latkin**[3], **A Peryshkina**[4], **N Galai**[5], **V Mogilnyi**[4], **P Dzhigun**[4], **I Kostetskaya**[4], **SH Mehta**[5], and **C Beyrer**[2]

[1]Department of Emergency Medicine, Johns Hopkins Medical Institute, Baltimore, USA

[2]Center for Public Health and Human Rights, Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

[3]Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

[4]AIDS Infoshare, Moscow, Russian Federation

[5]Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

Abstract

Objectives—Early diagnosis and treatment of HIV infection is critical to improving clinical outcomes for HIV-infected individuals. We sought to characterise the HIV care continuum and identify correlates of being unaware of one's HIV infection among MSM in Moscow, Russia.

Methods—Participants (N=1,376) were recruited via respondent-driven sampling and completed a socio-behavioural survey and HIV testing from 2010–2013. Sample and population estimates were calculated for key steps along the HIV care continuum for HIV-infected MSM and logistic regression methods were utilized to examine correlates of being unaware of HIV infection.

Results—15.6% (184/1177; population estimate:11.6%; 95%CI:8.5–14.7%) of participants were HIV infected. Of these, only 23.4% (43/184; population estimate:13.2; 95%CI:11.0–15.4) were previously aware of their infection, 8.7% (16/184 population estimate:4.7; 95%CI:1.0–8.5) were on ART, and 4.4% (8/164; population estimate:3.0; 95%CI:0.3 – 5.6) reported an undetectable

Corresponding author: Andrea L. Wirtz, 615 N. Wolfe St., Room E7141, Baltimore MD, 21205 USA, ; Email: awirtz1@jhu.edu

The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

COMPETING INTERESTS:

The authors declare there are no competing interests.

AUTHOR CONTRIBUTIONS:

CB, ALW, CEZ, NG, VM, AP, and CL collaborated in the design and oversight of the overall study. PD and KI collected data. ALW conducted data analysis. SM and CEZ reviewed and provided input to the statistical analysis. ALW wrote the initial drafts of this manuscript. All authors had full access to the data, reviewed and edited the manuscript, and all take responsibility for its integrity as well as the accuracy of the analysis.

viral load. Bisexual identity (reference: homosexual; AOR:3.69; 95%CI:1.19–11.43), having ≥5 sexual partners in the last 6 months (reference: ≤1; AOR:4.23; 95%CI:1.17–15.28), and employment HIV testing requirements (reference: no; AOR:15.43; 95%CI:1.62–147.01) were associated with being unaware of one's HIV infection. HIV testing in a specialized facility (reference: private; AOR: 0.06; 95%CI: 0.01–0.53) and testing ≥2 times in the last 12 months (reference: none; AOR:0.17; 95%CI:0.04–0.73) were inversely associated with being unaware of HIV infection.

Conclusion—There is a steep gradient along the HIV care continuum for Moscow-based MSM beginning with low awareness of HIV infection. Efforts that improve access to acceptable HIV testing strategies, such as alternative testing facilities, and linkage to care are needed for key populations.

Keywords

Men who have sex with men; homosexual; HIV; Russian Federation; HIV care continuum; antiretroviral therapy; sexual behaviour; HIV serodiagnosis

INTRODUCTION

The HIV care continuum provides an excellent heuristic to guide researchers and practitioners in implementing strategies and developing new methods to treat and prevent HIV.[1] For those living with HIV infection, the framework focuses on measurements of the proportion that are diagnosed, enter and are retained in care, initiate antiretroviral therapy, and reach virologic suppression as a means to assess where dropouts occur and inform response.[2] Such monitoring and response has important implications for treatment and improvement of morbidity and mortality of those living with HIV, but also supports secondary prevention of onward transmission.[1, 3]

As one of only nine countries globally in which the burden of HIV is increasing, the Russian Federation plays an important role in global HIV epidemiology and is estimated to contribute 69% of the global number of people living with HIV.[4] New HIV infections are primarily concentrated among key populations at risk for HIV infection, including people who inject drugs (PWID), men who have sex with men (MSM), and sex workers, representing more than 85% of new infections.[5, 6] There has been a major emphasis on HIV testing in the Russian Federation with over 27.8 million tests conducted among Russian citizens and 1.9 million tests reported among foreign nationals in 2014.[6] HIV testing is nationally provided by Federal AIDS Centres, though can also be accessed at cost through private facilities or for free through other specialized facilities or programs, such as non-governmental outreach programs, needle and syringe programs (NSPs), and in prisons and jails. All confirmatory testing, CD4 counts, and viral load tests are publicly available to residents and conducted by the Federal AIDS Center; however, it is not known whether HIV testing is reaching those at highest risk, and whether testing leads to knowledge of positive infection status, access to medical care, and ultimately to viral suppression.

In Russia, however, research among gay, bisexual, and other MSM has been relatively limited. The few studies that have consisted of samples recruited from gay-identified venues

or snowball methods, limiting generalizability.[4, 7–10] Though the Federal AIDS Centres collect data on modes of acquisition among new infections, it is unclear the extent to which MSM and other key populations access HIV services or report their risk behaviours during confirmatory testing. This study used the care continuum perspective to help understand the current status of HIV testing and medical care among MSM in Moscow, Russia and identify impediments to further engagement in care as a viable strategy to address the HIV epidemic among MSM in Russia.

METHODS

The analysis presented here is derived from a large NIH-funded, cross-sectional study that was conducted in Moscow, Russia.[11–13] The primary objectives of that parent study sought to characterize the HIV epidemic among gay, bisexual, and other MSM living in Moscow and compare the use of respondent-driven sampling (RDS) to internet-based sampling (IBS) for recruitment of MSM into HIV testing interventions. This analysis focuses on those MSM who were recruited via RDS and, subsequently, those determined to be living with HIV.

Population and setting

Eligibility requirements for participation included: presented a valid recruitment coupon, born male, aged ≥18, fluent in Russian, were residing or working in the Moscow metropolitan area, reported anal sex with another man in the last 12 months, no prior participation in this study, and provided informed verbal consent to participate. Study activities were conducted in private rooms of a gay-friendly, non-governmental clinic that is centrally located in Moscow. Recruitment and interviews were implemented by a Moscow-based non-governmental HIV prevention organization.

Recruitment

This analysis focuses on participants recruited by RDS, given the small sample that was produced through IBS recruitment strategies (data not shown). RDS was implemented from late October 2010 to April 2013 and study methods have been previously described.[13] RDS recruitment continued in successive waves until the desired sample size of 1,370 was reached.

Survey and measures

Survey measures included sociodemographic and behavioural characteristics; sexual identity and disclosure; substance use; depression symptoms; sexual relationships and practices; and HIV prevention and care. All participants were asked personal network size questions traditionally used for population estimates that account for RDS recruitment.[14, 15]

Information on history of and where HIV testing (lifetime and last 12 months) was obtained was collected, with options of public (Federal AIDS Centres), private clinic, or specialised facility, which included outreach, NSPs, drug treatment, and/or jails/prisons. All steps of the HIV care continuum were measured by self-report. With few exceptions, the continuum measures were consistent with other literature and included: awareness of HIV infection;

linkage to care; current ART use; and achievement of viral suppression.[16] Awareness of one's HIV infection was defined as self-report of being previously tested, diagnosed with HIV infection, and having a positive result during study HIV testing. Conversely, participants were determined to be unaware of their HIV infection if they reported that the result of their last test was negative or if they report never being tested for HIV infection, but had a positive result according to the study HIV testing algorithm. Specific data on linkage to care, which is often defined as attendance at a medication-prescribing facility, was not collected; however, because CD4 testing by the Federal AIDS Centre is required for the first step of care, we used self-report of ever having one's CD4 cell count measured as proxy for linkage to care. No data on retention in care was collected. Viral load was measured by a binary item, which asked if the participants knew their last viral load and, if so, whether it was detectable or undetectable.

Biologic testing

HIV testing procedures have been previously described.[13] Following completion of the survey, participants who had provided separate consent to HIV testing proceeded to biologic testing using OraQuick Rapid HIV 1/2 test (OraSure Technologies, Bethlehem, PA, USA). Additional blood samples from those with positive rapid results were sent for confirmatory testing by Western Blot at the local reference laboratory (Lages Laboratory, Moscow).

Human subjects protection

The study was approved by the Ethics Committee of the State Medical University, IP Pavlov, St. Petersburg, Russia and The Johns Hopkins Bloomberg School of Public Health Institutional Review Board, Baltimore, Maryland.

Statistical analysis

A total of 1,376 MSM were recruited into the study via RDS, reaching up to 31 waves of recruitment. Of these, 1,177 consented to HIV testing and 169 (14.4%) participants were identified with HIV infection through both rapid and confirmatory HIV testing. An additional 15 who had a positive rapid HIV test, but reported a previous diagnosis of HIV infection and declined confirmatory testing were included in the sample as being HIV infected, yielding a total of 184 (15.6%) with a positive HIV status included in the analysis.

Descriptive statistics of the HIV care continuum and HIV testing history among HIV infected MSM were calculated. Data collected via RDS recruitment are often weighted during statistical analysis to provide population prevalence estimates. Population estimates for the care continuum were calculated using the RDS-II estimator (Volz-Heckathorn) and bootstrapping with 1,000 iterations to produce 95% confidence intervals (95%CI).[17] Both crude sample proportions and weighted RDS population prevalence estimates are provided.

Given the large decline in the care continuum with awareness of infection, we focused on identifying correlates of undiagnosed infection to identify factors that may aid in understanding why the MSM are undiagnosed, for considerations in how the national or NGO AIDS response may address these gaps. Chi-square tests were used to evaluate statistical significance in bivariate analysis of sample estimates. Variables that were

significantly or marginally associated with being unaware of one's HIV infection ($p<0.10$) or considered a priori to be a potential confounder (i.e., age)[7] were included in the final multivariable model. Variance inflation tests were conducted to identify co-linearity in the model and goodness of fit tests were used to test final model fit. For the multivariable model two sensitivity analyses were conducted. First, the multivariable model was recalculated to examine any differences in regression estimates by inclusion of participants who only had a study confirmed HIV status (N=169). Second, population multivariable analysis was also conducted using the RDS-II estimator. RDS weights, which are produced based on individual network size, were included in the final weighted unadjusted and adjusted analyses.[17] Statistical analyses were conducted using Stata Version 13.0 (Stata Corporation, College Station, USA) and RDS Analyst version 0.1 for R (Los Angeles, USA).[18]

RESULTS

Table 1 provides the demographic characteristics of study participants and the RDS weighted estimates.

Among the sample, 15.6% were currently living with an HIV infection (184/1177; population estimate: 11.6%; 95%CI: 8.5–14.7%). Among participants who were HIV infected, 86.9% reported ever being tested for HIV and 69.0% had been tested within the last year (population estimate: 78.0; 95%CI: 67.1–88.8). Among those who were HIV infected, 23.4% reported being previously diagnosed and aware of their HIV infection (population estimate: 13.2; 95%CI: 11.0–15.4; 31.2% among those ever tested;), 16.9% reported being linked to care (population estimate: 9.0; 95%CI: 0.0–21.9), 8.7% were currently on ART (population estimate: 4.7; 95%CI: 1.0–8.5; 48.4% among those ever linked to care), and 4.4% reported having an undetectable viral load (population estimate: 3.0; 95%CI: 0.3 – 5.6; 41.7% among those on ART). Eight percent of those living with HIV (53.9% of those with CD4 levels measured) reported their last CD4 count to be ≥500 cells/mm^3. Among those participants who were previously aware of their HIV infection, 73.8% reported ever being linked to care, 38.1% were currently on antiretroviral therapy, and 22.2% reported an undetectable viral load. Figure 1 and Supplementary Table 1 display the sample and population estimates of the HIV care continuum steps for the total group of MSM living with HIV infection.

Of the 184 individuals living with HIV, 76.6% were previously unaware of their HIV infection (population estimate: 86.4%; 95%CI: 80.4–92.5). Among those previously unaware, 92.2% (130/141) returned to receive their HIV test results through this study and were linked to services provided by the clinic. Table 2 presents the bivariate analysis comparing characteristics of MSM who were previously aware of their HIV infection to those previously unaware. Significant differences between the two groups were related to characteristics including sexual identity and numbers of recent partnerships, alcohol use, and HIV testing patterns and motivations. Seventeen percent of those previously unaware had not received the results of their last HIV test, higher than those who were previously aware of their infection (16.5% vs. 0.0%; $p<0.01$). For MSM who were tested for HIV in their lifetime, the median time since last HIV test was 0.29 years (IQR: 0.1 – 0.7) among those

previously aware of their HIV infection, compared to 0.92 years (IQR: 0.4 – 1.7) among those previously unaware.

Table 3 presents the unadjusted and adjusted logistic regression analysis of being unaware of one's HIV infection. Increased odds of being unaware of one's infection were associated with bisexual identity (ref: homosexual identity; AOR: 3.69; 95%CI: 1.19 – 11.43; p<0.02), increased numbers of sex partners in the last 6 months (≥ 5 vs. ≤1 sex partner; AOR: 4.23; 95%CI: 1.17 – 15.28; p=0.03), and HIV testing requirements for employment (ref: not required; AOR: 15.43; 95%CI: 1.62 – 147.01; p=0.02). MSM who reported being tested ≥2 within the last 12 months were less likely to be unaware of their HIV infection (ref: not tested in last 12 months; AOR: 0.17; 95%CI: 0.04 – 0.73; p=0.02) as were those who reported being tested in a setting specifically related to HIV risk behaviours (ref: public facility; AOR: 0.06; 95%CI: 0.01–0.53; p=0.01). The sensitivity analysis of the multivariable model that assessed the inclusion of participants who only had a study confirmed HIV status (N=169) found no substantial differences in estimates (data not shown).

Supplemental Material Table 2 presents the corresponding unadjusted and adjusted population estimates, which were relatively similar to sample estimates, with few exceptions. The magnitude of association for bisexual identity was slightly lower than the sample estimate (ref: homosexual; AOR: 2.96; 95%CI: 0.88 – 9.92; p=0.08). Employment requirements for HIV testing had a higher magnitude of association than the sample estimate, with wide confidence intervals (ref: no; population estimate AOR: 22.04; 95%CI: 2.11 – 229.92; p=0.01).

DISCUSSION

This study highlights critical losses in the HIV care continuum among these men living in Moscow city.[4] Notable declines were observed in regard to awareness of one's HIV infection and subsequently losses in treatment and viral load suppression. Ultimately, less than 5% of MSM living with HIV in this sample had achieved virologic suppression.

While no data exist on engagement of MSM in the HIV care continuum in the Russian Federation, nor the wider EECA, the lack of ART among this sample may be foreshadowed by national estimates that highlight inadequate treatment coverage of the general population living with HIV as of 2013.[4] Prior estimates suggest that only 19% of the 668,032 HIV-infected Russian residents in the Federal AIDS Centre database were reported to have achieved viral suppression.[19] While such findings highlight existing barriers along the HIV care continuum in the Russian Federation, MSM and other key populations may bear the brunt of these inequalities, particularly in light of emergent social stigma.[10]

Awareness of one's HIV infection is the critical barrier along the HIV care continuum among HIV-infected MSM. Despite relatively high levels of HIV counselling and testing, less than one in four HIV infected MSM in the sample were previously aware of their HIV infection (13.6% of the HIV infected MSM population), clearly inhibiting access to subsequent points along the HIV care continuum.

With respect to individual characteristics, bisexual identity and increased numbers of partners were independently associated with lack of awareness of HIV infection. Those reporting bisexual identity may have less knowledge of HIV risk related to unprotected anal intercourse, may not typically access HIV prevention information targeted to homosexually identified men, or may experience greater self-stigma and isolation that prohibits access to and use of HIV prevention programs. Laws banning the 'propaganda of homosexuality' may impede provision of information on HIV risk and may increase concerns related to privacy and confidentiality.[4, 10] Having more sex partners in the last year was also associated with being unaware of one's HIV infection. Despite high levels of recent HIV testing, high risk sexual behaviours may lead to new acquisition after testing.

HIV testing characteristics provide additional insight into issues of lack of awareness among MSM living with HIV. Participants who had been tested for HIV at least twice within the last year were significantly more likely to be aware of their infection. This lends support to CDC guidance on HIV testing and care for MSM, particularly recommendations that high-risk individuals test more than once a year.[20] Improvements in awareness of HIV status were also associated with use of specialised testing programs related to HIV risk behaviours, such as outreach and NSPS, and highlight the importance of targeted, confidential programs for key populations. These programs are often free of charge and provided to key populations, may provide risk reduction counselling that is more specific to their individual risk behaviours, and may be perceived to have lower stigma and discrimination than public or even private facilities. Evidence that a substantial proportion of MSM reported use of private facilities for HIV testing (about 20%), despite generally low income levels, suggests reservations in the use of free, public facilities for HIV testing. Finally, employer HIV testing requirements were associated with being unaware of HIV infection. This may be related to practices of purchasing negative HIV test results, without actual HIV testing, when required for employment or other legal issues, as has been noted with testing requirements for migration.[12] These findings also bring up questions on the quality and confidentiality of public HIV counselling and testing programs.[21]

Research findings should be viewed in light of several limitations. Estimates of the HIV care continuum were based on self-report and thus may be biased by recall of CD4 levels and viral load, as these levels were not biologically confirmed during the study. Clinical measures related to linkage, retention and time from diagnosis to linkage, were not collected given resource constraints and that this was not the primary purpose of the study. Data were collected on current ART use; thus, we did not know the proportion of MSM living with HIV who may have initiated and stopped treatment or experienced treatment interruptions. RDS-weighted estimates provide population-based estimates; however, there is an ongoing debate into which estimators are the most accurate for use and estimates should therefore be reviewed with caution.[22, 23] This is a cross-sectional study which limits temporal analysis and determination of the directionality of association; we do not know if these characteristics and behaviours represent predictors of testing and awareness or were post-diagnosis behavioural changes. Finally, the study sample is comprised of MSM recruited from Moscow city and the number of MSM living with HIV is relatively small, limiting our generalizability to MSM living in the wider Russian Federation and EECA. To our

knowledge, however, these data represent the first HIV care continuum estimates for MSM in the region.

Engagement and retention in the HIV care continuum and, ultimately, reaching viral suppression is a challenge for MSM living with HIV in the Russian Federation. The recent loss of the Global Fund and lack of acknowledgement of key populations by Federal AIDS programs mean that alternative sources of funding to support these important prevention and testing programs are needed.[24] This is further exacerbated by limitations on provision of information related to same-sex practices associated with new laws prohibiting the 'propaganda of homosexuality', which create "new obstacles and disincentives for gay men or other MSM in accessing HIV programmes and services".[4] Gaps identified along the HIV care continuum and benefits of testing characteristics highlight opportunities in which HIV testing interventions can be introduced (or improved) to further engage MSM living with HIV. HIV testing innovations, such as HIV self-testing and CD4 point of care tests have demonstrated success in other challenging settings and may provide improved and alternative means for increasing awareness of one's HIV infection and providing engagement in care in a stigmatized setting.[25, 26]

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We wish to thank SANAM clinic and Tatiana Bondarenko for insight, support, and use of the SANAM clinic for conduct of qualitative research and the Be Safe study. We appreciate the efforts put for by Irina Deobald and Konstantin Dyakonov in the formative phases of this project. We are deeply thankful to the participants who contributed their time and personal experiences to this study.

Funding for this research came from the National Institute of Mental Health (NIMH R01 MH085574-01A2) "High Risk Men: Identity, Health Risks, HIV and Stigma" funded from 2009 – 2014. This research has been facilitated by the infrastructure and resources provided by the Johns Hopkins University Center for AIDS Research, an NIH funded program (P30AI094189), which is supported by the following NIH Co-Funding and Participating Institutes and Centers: NIAID, NCI, NICHD, NHLBI, NIDA, NIMH, NIA, FIC, NIGMS, NIDDK, and OAR.

References

1. Cheever LW. Engaging HIV-infected patients in care: their lives depend on it. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. 2007; 44(11):1500–2. [PubMed: 17479949]
2. Gardner EM, McLees MP, Steiner JF, Del Rio C, Burman WJ. The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. 2011; 52(6):793–800. [PubMed: 21367734]
3. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, et al. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med. 2011; 365(6):493–505. [PubMed: 21767103]
4. UNAIDS. Gap Report. Geneva: UNAIDS; 2014 Jul. Report No
5. Balachova, T.; Batluk, J.; Bryant, K.; Shaboltas, A. AIDS research and human retroviruses. 2014. International Collaboration in HIV Prevention Research: Evidence from a Research Seminar in Russia.

6. Федеральный научн о-методический центр По Профилактике и борьбе со СПИДом, (Federal Research and Methodological Center for Prevention and Control of AIDS). ВИЧ-инфекция в Российской Федерации на 31 декабря 2014 г. (HIV infection in the Russian Federation on December 31, 2014). Москве (Moscow): 2015. Available from: http://hivrussia.org/files/spravkaHIV2014.pdf [12 May 2015]
7. Baral S, Sifakis F, Peryskina A, Mogilnii V, Masenior NF, Sergeyev B, et al. Risks for HIV infection among gay, bisexual, and other men who have sex with men in Moscow and St. Petersburg, Russia. AIDS research and human retroviruses. 2012; 28(8):874–9. [PubMed: 21978380]
8. Kelly JA, Amirkhanian YA, McAuliffe TL, Granskaya JV, Borodkina OI, Dyatlov RV, et al. HIV risk characteristics and prevention needs in a community sample of bisexual men in St. Petersburg, Russia. AIDS care. 2002; 14(1):63–76. [PubMed: 11798406]
9. Baral S, Kizub D, Masenior NF, Peryskina A, Stachowiak J, Stibich M, et al. Male sex workers in Moscow, Russia: a pilot study of demographics, substance use patterns, and prevalence of HIV-1 and sexually transmitted infections. AIDS care. 2010; 22(1):112–8. [PubMed: 20390488]
10. Human Rights Watch. License to Harm: Violence and Harassment against LGBT People and Activists. Russia NY: HRW; 2014 Dec. Report No
11. Wirtz, AL.; Zelaya, CE.; Latkin, C.; Stall, R.; Peryshkina, A.; Galai, N., et al. AIDS and behavior. 2015. Alcohol Use and Associated Sexual and Substance Use Behaviors Among Men Who Have Sex with Men in Moscow, Russia; p. 1-14.
12. Wirtz AL, Zelaya CE, Peryshkina A, Latkin C, Mogilnyi V, Galai N, et al. Social and structural risks for HIV among migrant and immigrant men who have sex with men in Moscow, Russia: Implications for prevention. AIDS care. 2013
13. Wirtz AL, Zelaya CE, Peryshkina A, McGowan I, Cranston RD, Latkin C, et al. Anal human papillomavirus and HIV: A cross-sectional study among men who have sex with men in Moscow, Russia, 2012–2013. Euro Surveill. 2015; 20(15)
14. Magnani R, Sabin K, Saidel T, Heckathorn D. Review of sampling hard-to-reach and hidden populations for HIV surveillance. Aids. 2005; 19(Suppl 2):S67–72. [PubMed: 15930843]
15. Malekinejad M, Johnston LG, Kendall C, Kerr LR, Rifkin MR, Rutherford GW. Using respondent-driven sampling methodology for HIV biological and behavioral surveillance in international settings: a systematic review. AIDS and behavior. 2008; 12(4 Suppl):S105–30. [PubMed: 18561018]
16. Mugavero MJ, Amico KR, Horn T, Thompson MA. The state of engagement in HIV care in the United States: from cascade to continuum to control. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. 2013; 57(8):1164–71. [PubMed: 23797289]
17. Schonlau M, Liebau E. Respondent-driven sampling. Stata Journal. 2012; 12(1):72–93.
18. Handcock, MS.; Fellows, IE.; Gile, KJ. DeducerRDSAnalyst: Graphical User Interface to the RDS package for Respondent-Driven Sampling. Los Angeles, California: 2012.
19. Pokrovskaya A, Popova A, Ladnaya N, Yurin O. The cascade of HIV care in Russia, 2011–2013. J Int AIDS Soc. 2014; 17(4 Suppl 3):19506. [PubMed: 25394015]
20. Branson B. Current HIV epidemiology and revised recommendations for HIV testing in health-care settings. Journal of medical virology. 2007; 79(Suppl 1):S6–10. [PubMed: 17874432]
21. World Health Organization. HIV prevention, diagnosis, treatment, and care for key populations. Geneva: WHO; 2014 Jul. Report No
22. Gile KJ, Handcock MS. Respondent-driven sampling: an assessment of current methodology. Sociological Methodology. 2010; 40(1):285–327. [PubMed: 22969167]
23. Salganik MJ. Commentary: Respondent-driven Sampling in the Real World. Epidemiology. 2012; 23(1):148–50. [PubMed: 22157310]
24. Cohen J. Praised Russian prevention program faces loss of funds. Science. 2010; 329(5988):168. [PubMed: 20616265]
25. Pai NP, Sharma J, Shivkumar S, Pillay S, Vadnais C, Joseph L, et al. Supervised and Unsupervised Self-Testing for HIV in High- and Low-Risk Populations: A Systematic Review. Plos Medicine. 2013; 10(4)

26. Larson BA, Schnippel K, Ndibongo B, Xulu T, Brennan A, Long L, et al. Rapid Point-of-Care CD4 Testing at Mobile HIV Testing Sites to Increase Linkage to Care: An Evaluation of a Pilot Program in South Africa. Jaids-J Acq Imm Def. 2012; 61(2):E13–E7.

KEY MESSAGES

- Little data exists on engagement in the HIV care continuum among men who have sex with men (MSM), in Moscow, Russia
- There is a steep gradient in the HIV care continuum for MSM living with HIV: 76% of the population are unaware of their infection, inhibiting further access to care
- Lack of awareness of infection was associated with sexual identity and behaviours, as well as HIV testing patterns
- Ensuring access to confidential HIV testing is important to enabling early identification and engagement in care for MSM who are living with HIV in the Russian Federation
- HIV testing innovations, such as HIV self-testing and CD4 point-of-care, may provide alternative means for MSM to understand their infection status and engage in care

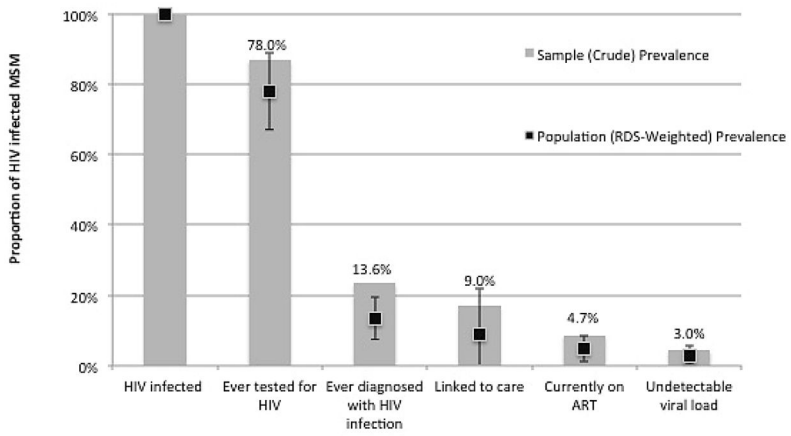

Figure 1. HIV testing and the care continuum, among HIV-infected men who have sex with men in Moscow, Russia (N=184)

Note: Error bars represent 95% confidence intervals for population estimates. Population estimates are weighted for RDS using the Volz-Heckathorn (RDS-II) estimator.

Table 1

Demographic characteristics of men who have sex with men recruited via RDS in Moscow, Russia (N=1376)

Category	n	Sample Prevalence (%)	Population Prevalence (%)	(95%CI:)	
Age (years)	1376				
<25	368	26.7	29.2	24.9	33.6
25–29	319	23.2	20.7	16.5	24.9
30–35	329	23.9	21.2	17.4	25.0
>35	360	26.2	28.9	24.5	33.3
Ethnicity	1366				
Russian only	1101	80.6	77.5	73.2	81.9
Russian plus other	40	2.9	3.2	1.7	4.8
Other	225	16.5	19.2	15.0	23.5
Moved to Moscow	1367				
From Moscow originally	809	59.2	59.1	54.5	63.8
From within or from outside of Russia	558	40.8	40.9	36.2	45.5
Ever married to a woman	1368				
Never	1128	82.5	81.1	77.5	84.6
Past/current marriage	240	17.5	18.9	15.4	22.5
Employment categories	1367				
Full-time	744	54.4	50.3	45.6	54.9
Part-time	457	33.4	34.8	30.3	39.3
Student or other (inc. retired, disabled)	89	6.5	8.4	5.6	11.2
Unemployed	77	5.6	6.5	3.8	9.3
Income categories	1365				
High	23	1.7	0.9	0.2	1.6
Middle	605	44.3	40.7	35.9	45.6
Low	692	50.7	54.2	49.4	59.0
Poverty	45	3.3	4.2	2.1	6.3

Category	n	Sample Prevalence (%)	Population Prevalence (%)	(95%CI:)	
Location where participants normally go for healthcare	1255				
Private	354	28.2	27.4	22.8	32.1
Public	841	67.0	68.9	64.2	73.6
Other	60	4.8	3.7	1.9	5.4
Sexual identity	1347				
Homosexual	741	55.0%	44.8%	39.9%	49.8%
Bisexual	578	42.9%	50.4%	45.5%	55.4%
Other	28	2.1%	4.7%	2.6%	6.9%
HIV characteristics					
HIV infection status, as determined by study or previous diagnosis	1177				
Uninfected	993	84.4	88.4	85.3	91.5
Infected	184	15.6	11.6	8.5	14.7

Note: Sample prevalence are calculated using crude data, while population prevalence (RDS-weighted) estimates are calculated using the RDS-II (Volz-Heckathorn) estimator;

Table 2

Differences in characteristics, by awareness of HIV infection, among Men who have Sex with Men (MSM) and who are living with HIV in Moscow, Russia (N=184)

	Total		Previously aware of infection		Previously unaware		
	n	**col %**	**n**	**col %**	**n**	**col %**	**p-value**
Age category (years)							0.24
<25	28	15.2	4	9.3	24	17.0	
25–29	49	26.6	10	23.3	39	27.7	
30–35	66	35.9	15	34.9	51	36.2	
>35	41	22.3	14	32.6	27	19.1	
Sexual Identity (n=138)							0.01
Homosexual	111	61.7	34	81.0	77	55.8	
Bisexual	67	37.2	8	19.0	59	42.8	
Other	2	1.1	0	0.0	2	1.4	
Gender of sex partner(s) in last 12mo (N=183)							0.01
Only men	134	73.2	37	86.0	97	69.3	
Both men and women	48	26.2	5	11.6	43	30.7	
Did not have sex in the last 12 months	1	0.5	1	2.3	0	0.0	
No. of Male Anal Sex Partners last 12mo							0.24
<=1	41	22.3	13	30.2	28	19.9	
2 to 4	38	20.7	10	23.3	28	19.9	
>=5	105	57.1	20	46.5	85	60.3	
Sold sex (last 12mo; N=180)							0.08
No	131	72.8	35	83.3	96	69.6	
Yes	49	27.2	7	16.7	42	30.4	
Ever disclosed sexuality/sexual practices to parents and siblings							0.15
No	159	86.4	40	93.0	119	84.4	
Yes	25	13.6	3	7.0	22	15.6	
No. of sex partners (last 6 months)							p<0.01

	Total		Previously aware of infection		Previously unaware		
	n	col %	n	col %	n	col %	p-value
<=1	39	21.2	17	39.5	22	15.6	
2 to 4	50	27.2	9	20.9	41	29.1	
>=5	95	51.6	17	39.5	78	55.3	
Frequency of HIV recent testing (last 12mo; N=158)							p<0.01
None	49	31.0	6	14.0	43	37.4	
Once	57	36.1	11	25.6	46	40.0	
Twice or more	52	32.9	26	60.5	26	22.6	
HIV testing facility (N=158)							p<0.01
Private	31	19.6	5	11.6	26	22.6	
Public	115	72.8	30	69.8	85	73.9	
Other (in. other, jail, drug treatment, home, NSP, outreach)	12	7.6	8	18.6	4	3.5	
Tested for HIV because worried have been exposed to HIV (N=160)							0.08
No	131	81.9	39	90.7	92	78.6	
Yes	29	18.1	4	9.3	25	21.4	
Tested for HIV because tests on a regular basis and it was time to get tested again (N=160)							p<0.01
No	114	71.3	19	44.2	95	81.2	
Yes	46	28.7	24	55.8	22	18.8	
Tested for HIV because required to get tested by an employer (N=158)							p<0.01
No	133	83.1	42	97.7	91	77.8	
Yes	27	16.9	1	2.3	26	22.2	
Among those tested, disclosed sexual behaviours to this facility (N=158)							0.04
No	111	70.3	25	58.1	86	74.8	
Yes	47	29.7	18	41.9	29	25.2	
In the past 12 months, had a 1-on-1 conversation or group discussion about preventing HIV							0.07
No	167	90.8	36	83.7	131	92.9	
Yes	17	9.2	7	16.3	10	7.1	

Sex Transm Infect. Author manuscript; available in PMC 2016 June 01.

	Total		Previously aware of infection		Previously unaware		p-value
	n	col %	n	col %	n	col %	
Alcohol use (AUDIT score)							0.03
Non-hazardous drinking	82	44.6	26	60.5	56	39.7	
Hazardous drinking	55	29.9	7	16.3	48	34.0	
Alcohol dependence	47	25.5	10	23.3	37	26.2	
Depressive symptoms (CES-D binary at 23)							0.79
Low depressive symptoms	121	65.8	29	67.4	92	65.2	
High depressive symptoms	63	34.2	14	32.6	49	34.8	

Table 3

Unadjusted and adjusted regression analysis of correlates of being unaware of HIV infection, among MSM who are living with HIV infection in Moscow, Russia (N=184)

	OR	95%CI		*p-value*	AOR	95%CI		*p-value*
Sexual Identity (n=138)[1,2]								
Homosexual		Reference			Reference			
Bisexual	3.26	1.40	7.55	*0.01*	3.69	1.19	11.43	*0.02*
No. of sex partners (last 6mo)[1,3]								
<=1		Reference			Reference			
2 to 4	3.52	1.35	9.19	*0.01*	3.87	0.97	15.42	*0.06*
>=5	3.55	1.56	8.07	*0.00*	4.23	1.17	15.28	*0.03*
Frequency of recent HIV testing (last 12mo; n=158)[1,2]								
None		Reference			Reference			
Once	0.58	0.20	1.71	*0.33*	0.77	0.19	3.16	*0.72*
Twice or more	0.14	0.05	0.38	*0.00*	0.17	0.04	0.73	*0.02*
HIV testing facility (n=158)[1,2]								
Private		Reference			Reference			
Public	0.54	0.19	1.55	*0.25*	0.77	0.19	3.14	*0.72*
Other (in. other, jail, drug treatment, home, NSP, outreach)	0.10	0.02	0.45	*0.00*	0.06	0.01	0.53	*0.01*
Tested for HIV because worried have been exposed to HIV (N=160)								
No		Reference			Reference			
Yes	2.65	0.86	8.12	*0.09*	1.81	0.41	8.08	*0.44*
Tested for HIV because tests on a regular basis and it was time to get tested again (N=160)[1]								
No		Reference			Reference			
Yes	0.18	0.09	0.39	*0.00*	0.67	0.21	2.08	*0.48*
Tested for HIV because required to get tested by an employer (N=158)[1,2]								
No		Reference			Reference			

	OR	95%CI		*p-value*	AOR	95%CI		*p-value*
Yes	12.00	1.58	91.41	*0.02*	15.43	1.62	147.01	*0.02*
In the past 12 months, had a 1-on-1 conversation or group discussion about preventing HIV								
No		Reference				Reference		
Yes	0.39	0.14	1.10	*0.08*	0.29	0.05	1.54	*0.15*
Alcohol use, according to AUDIT scale[1]								
Non-hazardous use		Reference						
Hazardous drinking	3.18	1.27	7.98	*0.01*	1.92	0.57	6.46	*0.29*
Alcohol dependence	1.72	0.21	0.74	*3.98*	1.32	0.40	4.33	*0.65*

[1]Variable significant at p<0.05 in unadjusted model;

[2]Variable significant at p<0.05 in adjusted model;

[3]Variable marginally significant at p<0.10 in adjusted model; final model also adjusted for age (continuous); The final model included age (continuous), sexual identity, number of sex partners, alcohol use, HIV testing facility. Model does not include RDS-weighting (See Supplementary File for model that incorporates RDS weighting).