



Full length article

Heterosexual male and female disparities in HIV infection at the end of an epidemic: HIV infection among persons who inject drugs in New York City, 2001–2005 and 2011–2015



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ABSTRACT

Background: We examined whether sex disparities (heterosexual male:female) in HIV infection continue to persist at the “end of the HIV epidemic” among persons who inject drugs (PWID) in New York City (NYC). An “end of the epidemic” was operationally defined as 1) prevalence of untreated HIV infection < 5%, and 2) estimated HIV incidence < 0.5/100 person-years.

Methods: PWID were recruited from persons entering substance use treatment programs at Mount Sinai Beth Israel in 2001–2005 and 2011–2015. A structured interview was administered, and HIV and HSV-2 testing was conducted. Incidence was estimated using newly diagnosed cases of HIV. Disparity analyses compared prevalence of HIV, of untreated HIV, HIV risk behaviors, and estimated HIV incidence.

Results: By 2011–2015, both heterosexual male and female PWID met the two criteria for an “end of the epidemic,” and there were no significant differences in the prevalence of untreated HIV infection. A large sex difference remained in estimated HIV incidence. In 2013–2015, estimated HIV incidence was 2.8/10,000 PY for males and 7.1/10,000 PY for females. Females had greater risk for HIV on several factors.

Conclusion: While NYC has reached an “end of the epidemic” for both heterosexual male and female PWID, sex disparities persist, particularly differences in HIV incidence. Eliminating the sex disparities may require a greater focus on factors associated with sexual transmission.

1. Introduction

Sex differences in HIV infection among persons who inject drugs (PWID) have been observed in many different countries. There are geographic areas without significant differences in HIV prevalence among male and female PWID, but where in the areas in which differences have been observed, the direction has almost always been that of female PWID having higher HIV prevalence than male PWID. In an international systematic review and meta-analysis of female/male differences in HIV prevalence, the weighted summary odds ratio showed a significant difference, with females having an average 18% higher odds of being HIV seropositive (Des Jarlais et al., 2012a).

There are multiple mechanisms that may place female PWID at higher risk for HIV infection compared to male PWID. Female PWID may face greater stigmatization than male PWID and thus have greater

difficulties in obtaining sterile injection equipment (UNODC, 2006). Females may have less interpersonal power than male PWID and may not be able to refuse engaging in risk behavior, particularly engaging in unsafe sex (Auerbach and Smith, 2015; Blankenship et al., 2015). Females are also more biologically susceptible than males to sexual transmission of HIV (Boily et al., 2009). The prevalence of herpes simplex virus II (HSV-2) is generally higher among females than males, and HSV-2 infection facilitates HIV acquisition (Barnabas and Celum, 2012). (Additional mechanisms that may generate female/male disparities are considered in more detail in the Discussion below.)

Larger female/male disparities have usually been noted in later stages of HIV epidemics among PWID, after reductions in injecting risk behavior have reduced injecting-related transmission and sexual transmission becomes relatively more important (Des Jarlais et al., 2012b). This would support a prediction that the relative disparities

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between male and female PWID are likely to persist or even increase over time in a local HIV epidemic.

Reducing HIV transmission among PWID has been one of the notable successes in HIV prevention in many high-income settings (Des Jarlais et al., 2016b). Estimated HIV incidence among PWID in the US fell by approximately 80% from 1996 through 2011 (Hall et al., 2008) and there was an additional 83% reduction in newly diagnosed cases of HIV among PWID between 2005 and 2014 (Prevention, 2016). These reductions are generally attributed to full implementation of “combined prevention and care,” including syringe service programs, medication-assisted treatment for substance use disorders, and antiretroviral treatment for HIV infection (Des Jarlais et al., 2016b). The large reduction in HIV transmission among PWID over the last several decades would support a prediction that male/female disparities in HIV infection among PWID can eventually be greatly reduced or even eliminated.

We thus see two contrasting hypotheses regarding the persistence of sex disparities over time:

1. As injecting-related HIV transmission is reduced over the course of an HIV epidemic among PWID, sexual transmission becomes relatively more important, and sex disparities persist or even become more pronounced.
2. With commitment from public health authorities and community-based organizations, it should be possible to provide equally effective prevention and care services to female and male PWID so that disparities are eliminated over time.

The “end of the epidemic” (New York State Department of Health, 2015) does not mean a total absence of HIV infection among PWID—to our knowledge HIV has not yet been eliminated in any large, diverse population of PWID. Rather an “end of the epidemic” occurs when a stable, “endemic” state of low HIV prevalence with “close to zero” new HIV infections has been achieved. Based on studies of cities where HIV was introduced into the PWID population but HIV prevalence remained at very low levels (Des Jarlais et al., 1995) and studies of large reductions in HIV transmission in high prevalence settings, (Des Jarlais et al., 2016b) we have proposed the following as an operational definition of an “end to an HIV epidemic” among PWID (Des Jarlais et al., 2018; Des Jarlais et al., 2018 in press):

1. The prevalence of untreated HIV infection (HIV seropositives not receiving antiretroviral treatment) is 5% or less.
2. HIV incidence is 0.50/100 (50/10,000) person-years (PY) or less.

In this paper we examine current differences in HIV prevalence by sex (female versus heterosexual male) among PWID in New York City. With over 60,000 cases of AIDS among PWID, New York City has experienced the largest HIV epidemic among PWID of any city in the world. Male/female disparities were noted early as 1984, with prevalence among males at 48% compared to 58% HIV prevalence among females (Marmor et al., 1987). With implementation of full “combined prevention and care,” including treatment as prevention, HIV incidence among PWID in New York City has now fallen to 0.1/100 PY at risk (Des Jarlais et al., 2016a). Given this decrease, we are examining sex disparities in HIV infection at what may be termed the “end of the HIV epidemic” among PWID in New York City. We also explore differences in risk behavior and in HSV-2 infection as possible causal factors in disparities.

2. Materials and methods

The data presented here were collected as part of a long-running research study of persons entering Mount Sinai Beth Israel drug detoxification and methadone maintenance programs in New York City. The methods for this “Risk Factors” study have been previously described (Des Jarlais et al., 2009; Des Jarlais et al., 1989) so only a

summary will be presented here. The programs serve New York City as a whole and there were no changes in the requirements for entrance into the program over the study period.

In the detoxification program, research staff visited the general admission wards of the program in a preset order and examined all intake records of a specific ward to construct lists of patients admitted within the prior 3 days. All of the patients on the list for the specific ward were asked to participate in the study. As there was no relationship between the assignment of patients to wards and the order that the staff rotated through the wards, these procedures should produce an unbiased sample of persons entering the detoxification program. In the methadone program, newly admitted patients (those admitted in the previous month) were asked to participate in the research.

Participants were paid \$20 for their time and effort. In both programs, approximately 95% of those asked agreed to participate. Common reasons for non-participation included medical appointments or other scheduled activities that would not permit completion of study in a single visit.

Written informed consent was obtained and a trained interviewer administered a computer-assisted structured questionnaire covering demographics, drug use, risk behavior, and use of HIV prevention services. Participants were also asked if they had previously been tested for HIV and the results of their most recent test. Over 98% of the participants in these analyses reported that they had been previously tested for HIV. Those who replied that they had tested HIV seropositive were then asked if they had received antiretroviral treatment (ART) in the 6 months prior to the interview. In examining the percentage of HIV seropositive PWID who were/were not receiving ART, we used the numbers of PWID who tested positive for HIV in the study, and not the numbers who self-reported being HIV seropositive. There were a modest (5%) percentage of participants who tested HIV positive but did not report being HIV positive. We believe that the majority of these did not report being seropositive because of concerns over possible stigmatization.

Participants were seen by counselors for HIV pretest counseling and serum collection. HIV testing was conducted at the NYC Department of Health Laboratory using a commercial, enzyme-linked, immunosorbent assays (EIA) test with Western blot confirmation (BioRad Genetic Systems HIV-1-2 + 0 EIA and HIV-1 Western Blot, BioRad Laboratories, Hercules, CA). HSV-2 testing was conducted for all subjects beginning in 2005 and was performed by BioReference Laboratories using the Focus HerpeSelect 1 and 2 ELISA. We used an index value of 1.1 or greater for classifying a subject as HSV-2 seropositive.

For the analyses presented here, only persons who reported having injected drugs in the 6 months prior to program entry are included. Males who reported male-with-male sexual behavior in the previous five years were excluded from these analyses (a separate paper will be prepared for this group). The number of participants who reported “transgender” was too small for statistical analyses, and they are also not included. In this paper, we compare HIV infection and risk behavior among female and heterosexual male PWID from 2001 to 2005 to 2011–2015. These two periods coincide with a marked reduction in HIV incidence among PWID in New York City, from 0.8/100 PY in 1999–2002 (Des Jarlais et al., 2005) to 0.1/100 PY in 2011–2014, (Des Jarlais et al., 2016a) and permit us to assess whether sex disparities changed over these two time periods.

Subjects were permitted to participate on multiple occasions, though only once per calendar year. For trend analyses, we included persons who participated in different years in the data for each year, as these subjects were part of the population of interest (persons entering Mount Sinai Beth Israel drug treatment programs in each year). The numbers of repeat participants were small—approximately 5%—and results after removing later interviews from repeat subjects were nearly identical (1% difference in absolute values, identical patterns of statistical significance).

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