Estimated HIV Transmissions to Female Partners of HIV-Infected Men

Cyprian Wejnert[1], Jeremy Grey[2], Heather Bradley[1], Gabriela Paz-Bailey[1], Irene Hall[1], Jacek Skarbinski[1], Jonathan Mermin[1], and Eli Rosenberg[2]

[1]Centers for Disease Control and Prevention, Atlanta, GA; [2]Emory University, Atlanta, GA

INTRODUCTION

Approximately 1 in 4 HIV diagnoses in the U.S. occur among females. The majority of HIV-positive females acquired HIV through sexual contact with a male. The majority of males living with HIV in the U.S. acquired HIV through male-to-male sex. It is unclear to what extent HIV acquired through male-to-male sex is being transmitted to females. Understanding the dynamics of male-to-female HIV transmission can inform potential secondary benefits of targeted HIV prevention efforts among men. We used data on behaviors and viral suppression among HIV-positive males to model HIV transmissions to their female partners.

OBJECTIVES

Estimate the distribution of HIV transmission from HIV-positive males to females:

- by males' primary risk factor for acquiring HIV and,
- by males' race/ethnicity, among males who acquired HIV through male-to-male sex (MSM) or MSM and injection drug use (MSM/IDU).

METHODS

Using weighted respondent-level data on risk behaviors, continuum of care, and viral load of HIV-positive persons in the U.S. from three CDC HIV surveillance systems, we developed a static, deterministic model to estimate the number of HIV transmissions in the U.S. This analysis presents model results focused only on HIV transmission to females from males and the males' primary risk of acquiring HIV.

Model inputs include data from three CDC surveillance systems:

- National HIV Surveillance System (NHSS): Data used to estimate population size of HIV-positive persons;
- Medical Monitoring Project (MMP): Data informed risk behaviors and viral load for HIV-positive persons in care;
- National HIV Behavioral Surveillance (NHBS): Data informed risk behaviors for HIV-positive persons out of care.

For a full description of data sources and methods see:

Skarbinski J, et al. 2015. Human Immunodeficiency Virus Transmission at Each Step of the Care Continuum in the United States. *JAMA Internal Medicine*. 175, 588-596.

Primary risk – The primary risk categories for persons with HIV reported to CDC include male-to-male sex (MSM), injection drug use (IDU), and heterosexual sex. Patients reporting both MSM and IDU are classified as having MSM/IDU primary risk. To improve stability of estimates, this analysis combined MSM and MSM/IDU risk into a single category. Risks presented refer to the primary risk category of males transmitting HIV to females.

The presented model results focus on transmissions to females through sexual contact with a male. Transmissions to females due to unsafe injection are not included.

SEXUAL HIV TRANSMISSION FROM MALES TO FEMALES

While the majority of HIV-positive men have MSM or MSM/IDU as their primary risk for HIV, (Figure 1), these men report, on average, 3-5 times fewer serodiscordant female sex partners than other HIV-positive men (Figure 2). One-third, 33%, of estimated males transmitting HIV to females had MSM or MSM/IDU as their primary risk for acquiring HIV, 39% heterosexual sex, and 28% IDU. Most sexual HIV transmissions to females were from main partners (82%).

Figure 1: Males living with HIV infection, by primary risk category, U.S., 2009

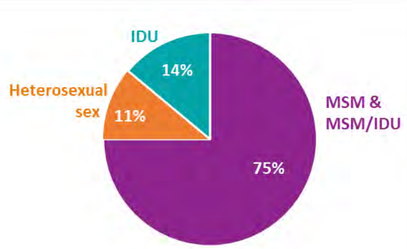
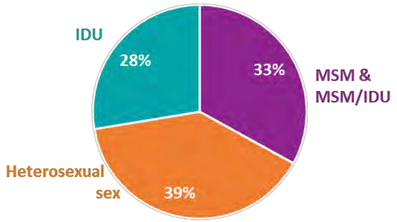


Figure 2: Estimated number of serodiscordant* female sexual partners in the past year per HIV-positive male, by males' primary risk category, U.S., 2009



Figure 3: Estimated HIV transmissions from males to females by males' primary risk category, U.S., 2009



Abbreviations for primary risk: MSM, male to male sex; MSM/IDU, male to male sex and injection drug use; IDU, injection drug use
* Serodiscordant includes females of HIV-negative or unknown HIV status.

SEXUAL HIV TRANSMISSION FROM MSM AND MSM/IDU TO FEMALES

The largest percentage of HIV-positive males with MSM or MSM/IDU as their primary risk for HIV in 2009 were whites (45%), followed by blacks (29%), and Hispanics (20%) (Figure 4). White males reported 10 times fewer serodiscordant female partners than black males and nearly 9 times fewer serodiscordant female partners than Hispanic males (Figure 5). Racial differences in partnering with females combined with differences in awareness and treatment of HIV infection (not shown) resulted in blacks accounting for an estimated 67% of HIV transmissions from gay, bisexual and other men who have sex with men to females (Figure 6); 22% of all sexual transmissions to females (not shown).

Figure 4: Gay, bisexual and other men who have sex with men living with HIV infection, by males' race, U.S., 2009

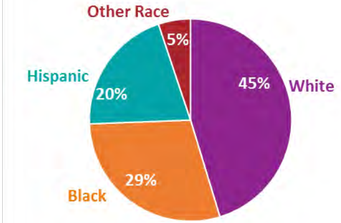


Figure 5: Estimated number of serodiscordant* female sexual partners in the past year per HIV-positive MSM and MSM/IDU, by males' race, U.S., 2009

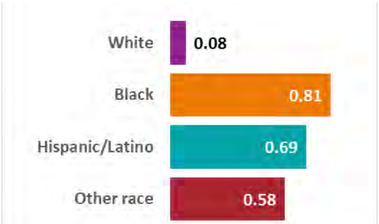
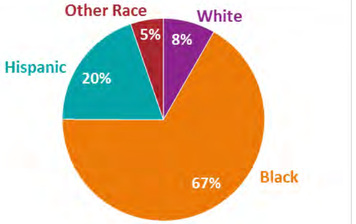


Figure 6: Estimated HIV transmissions from gay, bisexual and other men who have sex with men to females by males' race, U.S., 2009



Abbreviations for primary risk: MSM, male to male sex; MSM/IDU, male to male sex and injection drug use; IDU, injection drug use
* Serodiscordant includes females of HIV-negative or unknown HIV status.

SUMMARY OF RESULTS

- Women are primarily at risk for acquiring HIV from their main partners.
- Despite having few female sex partners, gay, bisexual and other men who have sex with men play an important role in HIV transmission to women: 1/3 of men transmitting HIV to women were classified as MSM or MSM/IDU at time of diagnosis.
- In part due to racial differences in number of female partners and also racial differences in awareness of infection, HIV care and treatment (not shown), black MSM account for two thirds of all sexual transmission of HIV from MSM or MSM/IDU to women.

LIMITATIONS

- Model estimates a static representation of HIV transmission circa 2009 and may not represent current trends.
- Model combines data from three surveillance systems with distinct sampling methods, time periods, and definitions.
- Behavioral and risk data are self-reported and subject to social desirability bias.
- Sample size limitations precluded analysis of HIV transmissions from males with IDU or heterosexual primary risk by race.
- Model does not account for all factors associated with HIV transmission (e.g. acute HIV).

DISCUSSION

- These results highlight that there are important inter-relationships between the populations affected by HIV in the U.S. It is likely that racial disparities in sexual partnering, HIV infection, awareness of infection, access to care and viral suppression among MSM contribute to the differential risk of transmission of HIV to women by race.
- Improvements in HIV prevention and care among high-prevalence populations can have important benefits for other populations. This analysis shows improving prevention and care among persons who inject drugs and black men who have sex with men are likely to reduce HIV transmissions to women.

ACKNOWLEDGEMENTS

We would like to thank the MMP, NHBS, and NHSS staff, as well as the MMP and NHBS participants.

CONTACT INFO

Gabriela Paz-Bailey, Email: gmb5@cdc.gov

MEDICAL MONITORING PROJECT

NHBS

Disclaimer: The findings and conclusions in this study are those of the authors and do not necessarily represent the views of the CDC.

National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
Division of HIV/AIDS Prevention

www.cdc.gov | Contact CDC at: 1-800-CDC-INFO or www.cdc.gov/info
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.