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Low Viral Suppression and High HIV Diagnosis Rate Among Men Who Have Sex With Men With Syphilis — Baltimore, Maryland

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Abstract

Background: The burden of syphilis and HIV among gay, bisexual, and other men who have sex with men (MSM) in Baltimore, Maryland, is substantial. Syphilis and HIV surveillance data were analyzed to characterize MSM with syphilis, including those with repeat infection and HIV coinfection, to strengthen prevention efforts.

Methods: MSM 15 years or older from Baltimore City or County diagnosed as having early syphilis in 2010 to 2011 were included. Those previously treated for syphilis in 2007 to 2011 were considered to have repeat syphilis infection. HIV surveillance data were used to identify HIV coinfection and assess viral suppression. For MSM not diagnosed as having HIV at or before their syphilis diagnosis, annual HIV diagnosis rates were estimated, using Baltimore City data.

Results: Of 460 MSM with early syphilis in 2010 or 2011, 92 (20%) had repeat infection; 55% of MSM with a single diagnosis and 86% with repeat infection were HIV coinfecting. Among MSM diagnosed as having HIV, viral suppression was low (25%, or 46% of those with a viral load reported). Among Baltimore City MSM without a prior HIV diagnosis, estimated annual HIV diagnosis rates were high (5% for those with 1 syphilis diagnosis, 23% for those with repeat infection).

Conclusions: Baltimore-area MSM with syphilis, particularly those with repeat infection, represent a unique population for whom coinfection with HIV is high. Increasing frequency of syphilis and HIV testing among Baltimore area MSM with a syphilis diagnosis and prioritizing

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HIV-infected MSM with syphilis in efforts to achieve viral suppression may improve outcomes locally for both infections.

Syphilis diagnoses in the United States have increased substantially over the past decade, and most cases have occurred among gay, bisexual, and other men who have sex with men (collectively, MSM).¹ Nationally, rates of primary and secondary (P&S) syphilis reported among men increased from 3.0 cases per 100,000 population in 2001 to 9.8 in 2013.^{2,3} In 2012, in 35 jurisdictions that reported sex of sexual partners for at least 70% of male cases, approximately 84% of male P&S syphilis cases occurred among MSM,³ among whom new diagnoses of human immunodeficiency virus (HIV) infection have increased.⁴ Syphilis infection increases the likelihood of acquiring and transmitting HIV; moreover, syphilis in an HIV-infected person may indicate behavior that increases the likelihood of HIV transmission.⁵⁻⁹

The population of Baltimore, Maryland, is particularly affected by syphilis and HIV. In 2011, the Baltimore metropolitan statistical area had the second highest rate of reported cases of P&S syphilis (11.4 per 100,000 population)² and the sixth highest estimated rate of diagnoses of HIV infection (33.8 per 100,000 population),⁴ compared with other metropolitan statistical areas in the United States. According to data from Behavioral SURveillance REsearch Study (Baltimore's National HIV Behavioral Surveillance), the percentage of testing HIV-positive among participating MSM was 38% in 2008¹⁰ and 43% in 2011.¹¹ Among 8 sites participating in the Sexually Transmitted Disease (STD) Surveillance Network in 2011, HIV coinfection among MSM with P&S syphilis infection was highest in Baltimore (65%).²

According to current recommendations from the Centers for Disease Control and Prevention (CDC), screening for both syphilis and HIV is recommended at least annually for sexually active MSM^{6,12}; more frequent screening for STDs, including HIV, is recommended for MSM under certain circumstances.⁶ Previous analyses suggest that more frequent HIV testing may be beneficial for all MSM, irrespective of self-reported risk behavior.^{13,14}

HIV viral suppression, which can occur with antiretroviral treatment, can improve the health of HIV-infected individuals and reduce HIV transmission to others.^{15,16} The proportion of HIV-infected individuals with viral suppression is low nationally.¹⁷ Current guidelines define viral suppression as HIV viral load less than 200 copies/mL.¹⁸ According to data from the National HIV Surveillance System, in 19 jurisdictions that reported all CD4 and viral load test results to CDC for 2010, viral loads were suppressed in 43% of persons with an HIV diagnosis by year-end 2009 (who were still alive at year-end 2010) and in 73% of persons with any viral load reported in 2010.¹⁷ By transmission category, viral suppression was highest for MSM (46%, or 77% among those with a viral load reported); by race/ethnicity, viral suppression was lowest for blacks or African Americans, hereafter referred to as blacks (37%, or 65% among those with a viral load reported).¹⁷

Local health officials in Baltimore have identified a subpopulation of MSM with multiple diagnoses of syphilis (hereafter, repeat infection). They suspect that this subpopulation might bear a disproportionate burden of both syphilis and HIV, and that intensifying

syphilis and HIV prevention efforts within this subpopulation might reduce syphilis and HIV transmission overall in the Baltimore area.

Using local syphilis and HIV surveillance data, CDC, the Maryland Department of Health and Mental Hygiene, the Baltimore City Health Department, and the Baltimore County Department of Health and Human Services conducted an investigation to examine demographic and disease-specific characteristics of MSM in the Baltimore area diagnosed as having syphilis, particularly those with repeat infection or HIV coinfection. By characterizing this subpopulation, we sought to identify potential ways to strengthen the local selection and delivery of syphilis and HIV prevention interventions.

MATERIALS AND METHODS

We analyzed STD surveillance data collected in 2007 to 2011, as well as data from interviews conducted by Baltimore area health department staff members for the purpose of contact tracing. Because sexual transmission of syphilis occurs only when lesions are present (during primary or secondary stages) and because early latent syphilis may lapse or relapse into secondary syphilis, our analysis was focused on primary, secondary, and early latent syphilis (collectively, early syphilis).^{19,20} The Baltimore area includes Baltimore City and Baltimore County, which are mutually exclusive jurisdictions (Fig. 1). Analyses were performed using Microsoft Access and SAS 9.3 (SAS Institute, Inc, Cary, NC).

Demographics and Syphilis Diagnoses

In this analysis, we included MSM—as determined by risk behaviors reported in surveillance and interview records—15 years or older who resided in Baltimore City or Baltimore County and were diagnosed as having early syphilis in 2010 or 2011. We extracted demographic data including age, race/ethnicity, and residence at time of diagnosis. Persons reported with early syphilis in 2010 or 2011 who had received appropriate treatment—as documented in electronic STD surveillance records—at least 6 months earlier for another syphilis diagnosis in 2007 to 2011 were considered to have repeat syphilis infection. We defined repeat infection most strictly as having 2 diagnoses with an intervening 4-fold reduction in rapid plasma reagin titer, followed by a 4-fold increase (85% of individuals determined to have repeat infection in this investigation met this criterion). Recognizing that baseline and repeat RPRs are not always obtained, we included other scenarios in our definition in which the second diagnosis (more than 6 months after a treated first diagnosis) seemed to be consistent with a new diagnosis—either demonstrating a rapid plasma reagin titer with a 4-fold increase from baseline (7%) or reported as P&S syphilis (9%). Because it could affect recommendations for frequency of syphilis testing, we analyzed the time elapsed between syphilis diagnoses among MSM with repeat infection. We also analyzed stage of syphilis diagnosis to assess for possible missed opportunities for earlier diagnosis. Finally, we used ZIP Code Tabulation Areas (ZCTAs; created by the US Census Bureau by aggregating census blocks to provide ZIP code–like units of aggregation for tabulating summary statistics) to map the rate of most recent syphilis diagnoses and the percentage of the population reported as black; we then computed the correlation between these 2 factors using a Pearson correlation coefficient.

HIV Coinfection and Viral Suppression

We determined HIV coinfection among all MSM in this analysis by matching identifying information for early syphilis cases against HIV surveillance data. We also extracted viral load results from HIV surveillance data to estimate potential for viral transmission around the time of syphilis infection. For this analysis, we included data from MSM diagnosed as having HIV before, or up to 2 weeks after, their most recent syphilis diagnosis. We assessed viral suppression, defined as last viral load within the year before syphilis diagnosis less than 200 copies/mL. We determined the overall percentage of HIV-infected MSM with viral suppression, as well as the percentage of MSM with viral suppression among those with any viral load reported to HIV surveillance in the year before syphilis diagnosis.

Estimated Annual HIV Diagnosis Rate Among MSM With Syphilis

To approximate risk of acquiring HIV among MSM with syphilis, we estimated annual HIV diagnosis rates. For this analysis, we included MSM not diagnosed as having HIV before, or up to 2 weeks after, their earliest syphilis diagnosis in 2007 to 2011. Because there were no new HIV diagnoses among MSM with syphilis in Baltimore County during this period, this analysis was limited to MSM in Baltimore City. The numerator consisted of the number of susceptible MSM newly diagnosed as having HIV, as reported to HIV surveillance, between the time of their syphilis diagnosis and the end of 2012. The denominator consisted of the total person-years at risk for this group of susceptible MSM, consisting of days from syphilis diagnosis to HIV diagnosis (for MSM diagnosed as having HIV) or from syphilis diagnosis to the end of 2012 (for MSM not diagnosed as having HIV), divided by 365.25. We stratified by number of syphilis diagnoses. We compared these results to an estimate of the annual HIV diagnosis rate for MSM overall in Baltimore City in 2011; this was calculated using estimated number of HIV diagnoses among MSM (per 2011 HIV surveillance data, with missing risk information imputed), divided by estimated number of MSM not diagnosed as having HIV in Baltimore City, which was estimated by subtracting the number of MSM living with diagnosed HIV (per 2011 HIV surveillance data) from estimated number of MSM in Baltimore City (i.e., the number of adult/adolescent males per 2011 census data,²¹ multiplied by 3.9%, a national estimate of the percentage of males who are MSM.²²)

Estimated Burden of Syphilis and HIV Among MSM

Finally, to understand the feasibility of delivering prevention interventions, we estimated the size of various subpopulations of MSM in Baltimore City, the area with the highest HIV burden. A population size estimate of MSM was derived from 2011 US census population data for adult/adolescent males,²¹ multiplied by 3.9%²². To stratify by HIV status, we used 2011 HIV surveillance data, with missing risk information imputed, to determine the number of MSM living with diagnosed HIV. We then used 2011 STD surveillance data to calculate the percentage of MSM with a syphilis diagnosis, both single and repeat. All numbers were rounded to the nearest 10.

RESULTS

Demographics and Syphilis Diagnoses

In all, 493 early syphilis cases in 2010 and 2011 were reported among 460 MSM; the number of diagnoses increased 29%, from 215 in 2010 to 278 in 2011. As shown in Table 1, the median age of MSM with syphilis was 28 years (range, 16–62 years); 85% (389/460) were black. For the 460 MSM, Figure 1 shows, by ZCTA, the rate of most recent syphilis diagnoses and percent black. Higher rates of syphilis diagnoses among MSM were concentrated in ZCTAs with a higher percentage black, with a Pearson correlation coefficient of 0.64 (95% confidence interval, 0.41–0.79). Of the 460 MSM with syphilis, 380 (83%) diagnoses occurred among Baltimore City residents; 92 (20%) were determined to have repeat syphilis infection, 15 of whom had 3 or more syphilis diagnoses in 2007 to 2011. The median time between the 2 most recent syphilis diagnoses was approximately 18 months; 26% occurred 12 months apart or less. Overall, only 11% of the most recent syphilis diagnoses were determined to be primary syphilis.

HIV Coinfection and Viral Suppression

Seventy-nine (86%) Baltimore area MSM with repeat syphilis infection and 204 (55%) with a single syphilis diagnosis were HIV infected at the time of their most recent syphilis diagnosis (Fig. 2A). Among MSM diagnosed as having HIV, viral suppression was low. According to HIV surveillance data, 72 MSM with syphilis demonstrated viral suppression, that is, 25% of all HIV-diagnosed MSM at the time of their most recent syphilis diagnosis and 46% of MSM with a viral load drawn in the year before their most recent syphilis diagnosis (Fig. 2B).

Estimated Annual HIV Diagnosis Rate Among MSM With Syphilis

For MSM in Baltimore City who were not HIV diagnosed at the time of their syphilis diagnosis, the estimated annual HIV diagnosis rate was 5% for MSM with a single syphilis diagnosis and 23% for MSM with repeat infection, compared with 3% for MSM overall in Baltimore City in 2011.

Estimated Burden of Syphilis and HIV Among MSM

We estimated that approximately 9160 MSM 15 years or older were living in Baltimore City in 2011 (Fig. 3). According to HIV surveillance data, approximately 3450 (38%) MSM were living with diagnosed HIV at the end of 2011 in Baltimore City, leaving approximately 5710 (62%) MSM not diagnosed as having HIV. Of the HIV-diagnosed MSM, 153 (4%) were diagnosed as having syphilis in 2011, 47 of whom were diagnosed as having repeat infection (1% of HIV-diagnosed MSM). Of MSM not diagnosed as having HIV, 84 (1%) were diagnosed as having syphilis in 2011, 10 of whom were diagnosed as having repeat infection (0.2% of MSM not diagnosed as having HIV).

DISCUSSION

Syphilis case reports increased among MSM in the Baltimore area from 2010 to 2011, and 1 in 5 MSM diagnosed as having syphilis in the Baltimore area in 2010 or 2011 had repeat

infection. The burden of HIV among MSM was substantial, particularly among MSM with repeat syphilis infection, and viral suppression was suboptimal. In Baltimore City, among MSM with syphilis but without a prior HIV diagnosis, HIV diagnosis rates were extremely high. These findings demonstrate the urgency of reaching MSM in the Baltimore area, especially those diagnosed as having syphilis, with effective interventions for prevention of syphilis and HIV acquisition and transmission.

There is a drive nationally to focus prevention efforts on populations disproportionately affected by HIV,²³ particularly young black MSM, who bear a particularly heavy burden of both syphilis and HIV.^{1,4,24} Most MSM with syphilis in our investigation were also young and black, and most of them resided in Baltimore City. These demographic characteristics might be used to improve the selection and delivery of syphilis and HIV prevention interventions in the Baltimore area.^{25,26}

Few MSM were diagnosed as having primary syphilis, perhaps because signs and symptoms were not apparent, which can occur with oropharyngeal or rectal chancres,^{19,20} or because symptoms were atypical, which can occur with HIV coinfection.⁵ A lack of primary syphilis diagnoses suggests that there may have been missed opportunities for early diagnosis and longer periods for potential transmission of syphilis. Twenty-six percent of repeat syphilis infections occurred 12 months apart or less, suggesting that annual testing might not always be sufficient. Because it is known that syphilis infection increases the likelihood of acquiring and transmitting HIV,⁵⁻⁹ it is important to urgently address this increase in syphilis diagnoses among MSM. Among MSM with a prior syphilis diagnosis, increasing the frequency of syphilis testing to every 3 to 6 months could reduce the time to diagnosis and could interrupt onward transmission of syphilis and possibly HIV, if present. Furthermore, providing optional syphilis testing reminders (for patients) and creating alerts in the medical record (for providers) might increase the frequency of repeat testing, particularly if augmented by active outreach for individuals who miss appointments for repeat syphilis testing. Periodic updates regarding STD epidemiology and clinical management might improve provider participation. Finally, even without a prior syphilis diagnosis, enforcing current recommendations for syphilis testing at least annually among HIV-infected MSM is critical, considering that approximately 4% of MSM living with diagnosed HIV infection in Baltimore City were diagnosed as having syphilis in 2011.

According to our data, most MSM with syphilis in the Baltimore area, particularly those with repeat infection, are living with HIV. Consistent with national data, few seem to have achieved viral suppression at the time of syphilis diagnosis. A new syphilis diagnosis in an HIV-infected person can indicate engagement in high-risk behaviors associated with HIV transmission; condomless discordant sex, especially when coupled with unsuppressed viral replication, may provide opportunities for HIV transmission. Based on these low levels of HIV viral suppression, providers and health officials might consider prioritizing MSM with syphilis in active efforts to achieve HIV suppression through clinical care; achieving higher levels of HIV viral suppression within this subpopulation could reduce HIV transmission overall in the Baltimore area.

Considering the extremely high estimated annual HIV diagnosis rate among MSM with syphilis in this investigation, it will be important to reinforce current recommendations to screen sexually active MSM for HIV at least annually. Providers may choose to screen more frequently.¹⁴ Furthermore, providers could consider prioritizing MSM with a prior syphilis diagnosis for prevention services, such as risk reduction counseling, particularly where resources are limited. The CDC currently recommends considering preexposure prophylaxis as part of a comprehensive set of prevention services among MSM at very high risk for HIV acquisition.^{9,27} This investigation demonstrates that MSM with syphilis are at very high risk for HIV and would likely benefit from preexposure prophylaxis (or nonoccupational postexposure prophylaxis after a known recent exposure to HIV).

Focusing treatment and prevention efforts on subpopulations most at risk for syphilis and HIV infection might increase the yield of prevention spending and improve outcomes for both syphilis and HIV in the Baltimore area. Nevertheless, although MSM with a syphilis diagnosis are of particular interest, we demonstrated that they comprise a small percentage of MSM overall; furthermore, MSM *without* a syphilis diagnosis are also at high risk for HIV acquisition. Where resources permit, it will be important to deliver prevention interventions as broadly as possible and to enforce current guidelines for STD and HIV screening at least annually among all sexually active MSM. Moreover, it is important to recognize that STD and HIV prevention efforts are just part of a larger, more holistic approach to sexual health among MSM; addressing these and other factors, such as social marginalization and discrimination, which challenge the sexual health of MSM and likely contribute to the disproportionately high rates of disease among MSM, may require improved training and support of providers in the community, within health departments, and in school health clinics.^{28,29}

Our study had several limitations. Although we attempted to exclude treatment failures and misdiagnoses using stringent criteria, overreporting of repeat infection may have occurred. Underreporting may have also occurred, particularly for individuals with additional syphilis diagnoses predating 2007. Our data may underestimate the burden of disease because not all syphilis or HIV infections have been diagnosed or reported. Our method of determining HIV viral suppression, which relies on data in Maryland's HIV surveillance system, may miss individuals who had laboratory testing performed outside the jurisdiction or whose laboratory values were not reported; as a result, true levels of viral suppression may be underestimated. Our estimate of the number of MSM in Baltimore, used to calculate the annual HIV diagnosis rate, is based on national estimates and may not accurately reflect the population in Baltimore City because evidence suggests that large urban areas have higher percentages of MSM.³⁰

We found high levels of repeat syphilis infection, low HIV viral suppression, and high HIV diagnosis rates among MSM with syphilis in the Baltimore area. Although it has been well established that all sexually active MSM comprise a population of priority for syphilis and HIV prevention efforts, our data suggest that there may be subpopulations at greater risk for HIV acquisition and transmission who are in need of additional attention from prevention programs. Prioritizing MSM with syphilis (and their sexual partners) for prevention services,

frequent syphilis and HIV screening, and aggressive disease management could potentially mitigate the spread of syphilis and HIV among MSM overall in the Baltimore area.

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Disclaimer:

The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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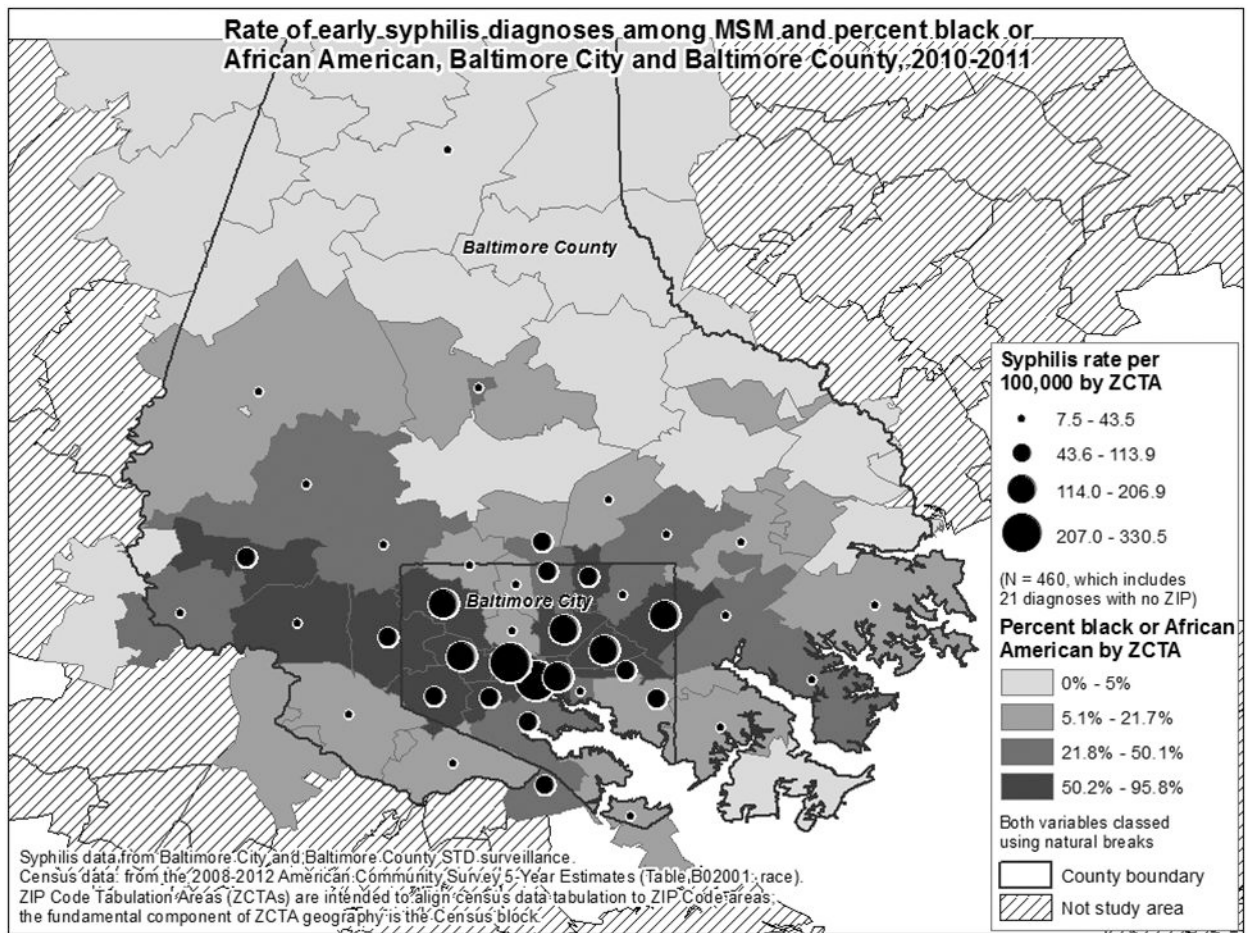


Figure 1. Rate of early syphilis diagnoses among MSM and percent black or African American by ZCTAs, Baltimore City and Baltimore County, 2010–2011.

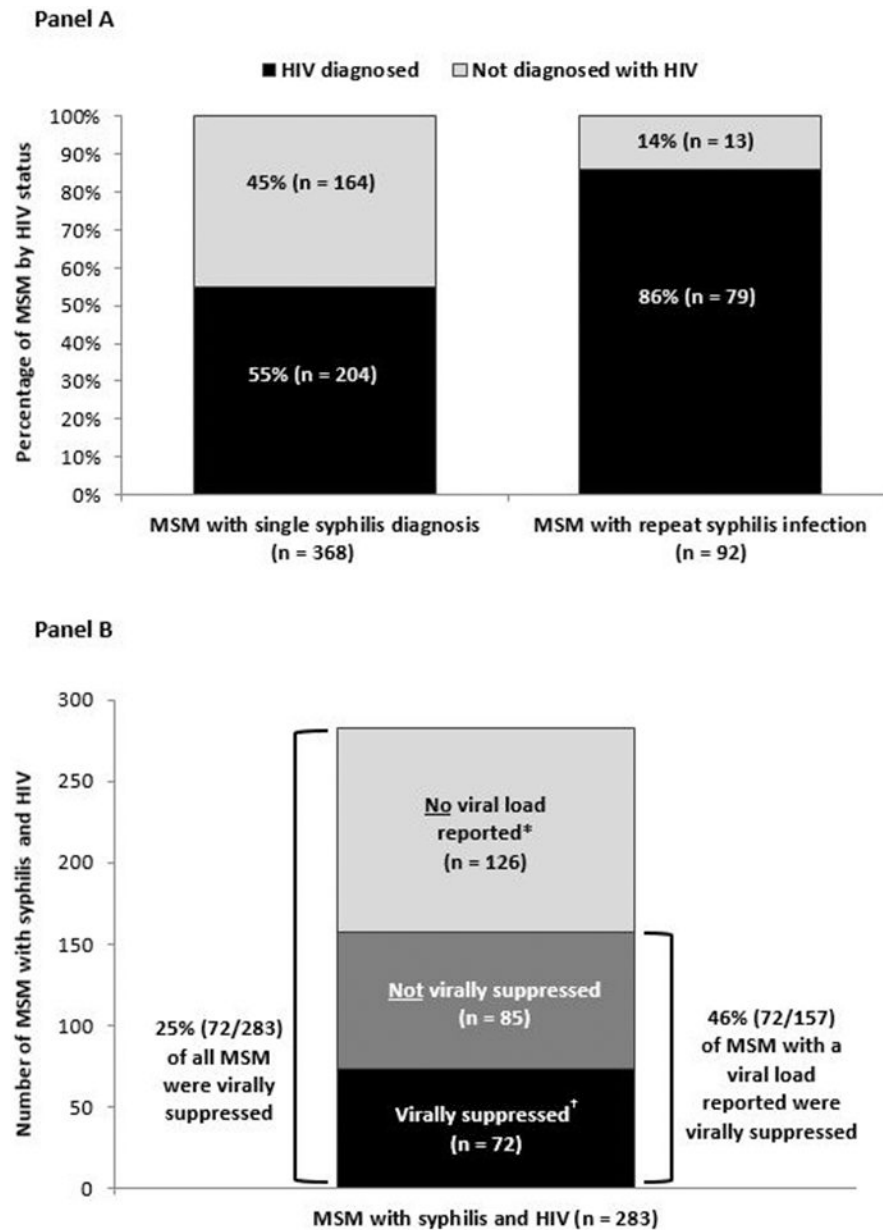


Figure 2. HIV coinfection and viral suppression, 2010–2011, Baltimore City and Baltimore County. A, HIV status for MSM at the time of most recent syphilis diagnosis. B, HIV viral suppression among MSM with early syphilis and HIV.

MSM = Gay, bisexual, and other men who have sex with men

*Within 1 year before most recent syphilis diagnosis

†Last viral load within year before most recent syphilis diagnosis <200 copies/mL

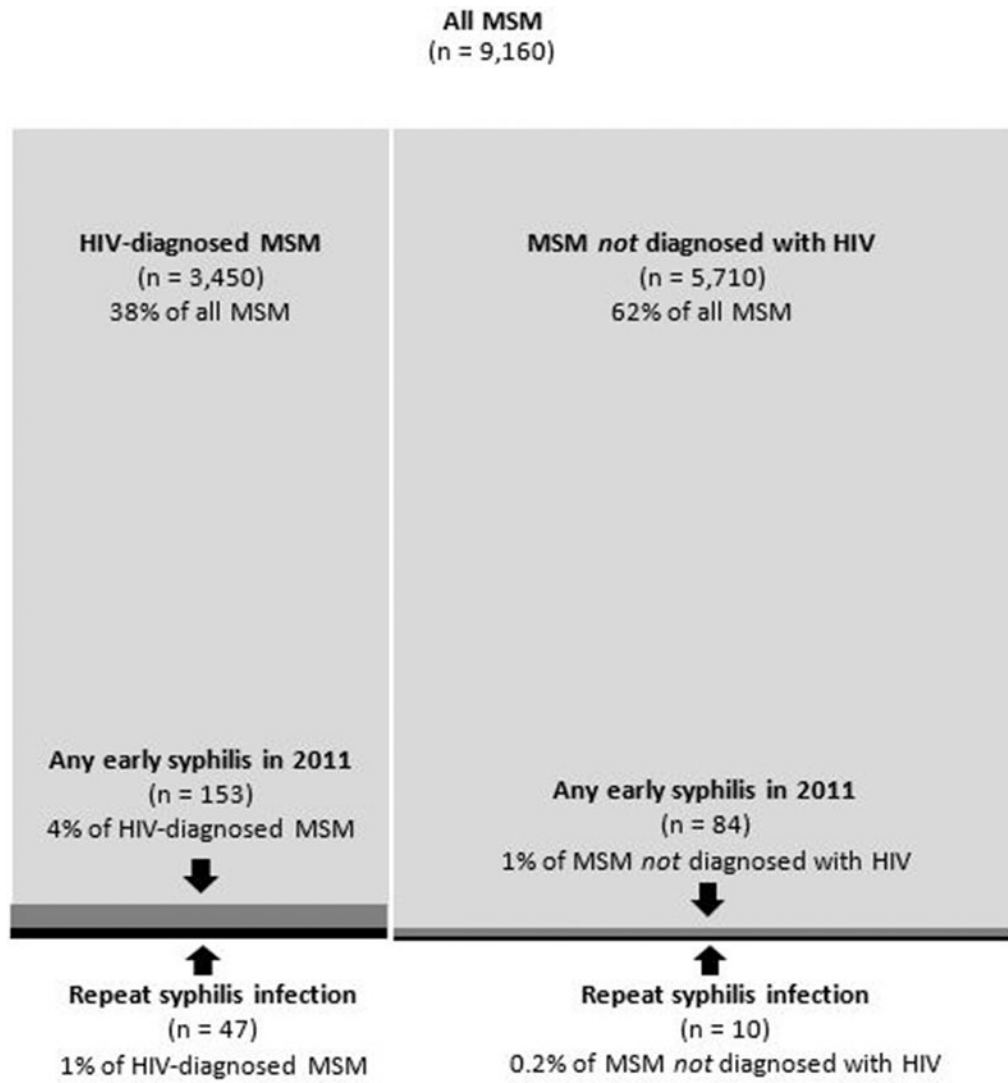


Figure 3. Population size estimates for MSM with and without HIV and syphilis, Baltimore City. MSM = Gay, bisexual, and other men who have sex with men

TABLE 1.

Characteristics of MSM with early syphilis, using syphilis and HIV surveillance data from 2010–2011, Baltimore City and Baltimore County

Characteristic	MSM with Early Syphilis, 2010 and 2011	
	No.	(%)
Year of most recent syphilis diagnosis		
2010	183	(40)
2011	277	(60)
Age group (years) at time of most recent syphilis diagnosis		
15-19	29	(6)
20-24	133	(29)
25-29	87	(19)
30-39	98	(21)
40-49	85	(18)
50	28	(6)
Median age (years) at time of most recent syphilis diagnosis		
	28	
Race/Ethnicity		
Black or African American (non-Hispanic)	389	(85)
White (non-Hispanic)	56	(12)
Other*	15	(3)
County of residence at time of most recent syphilis diagnosis		
Baltimore City	380	(83)
Baltimore County	80	(17)
Syphilis diagnoses		
Single syphilis diagnosis (2010-2011)	368	(80)
Repeat syphilis** diagnosis (2007-2011)	92	(20)
2 diagnoses	77	(84)
3 diagnoses	15	(16)
Stage of most recent syphilis diagnosis		
Primary syphilis	50	(11)
Secondary syphilis	250	(54)
Early latent syphilis	160	(35)
Total	460	(100)

MSM = Gay, bisexual, and other men who have sex with men

* Includes Hispanic or Latino, American Indian or Alaskan Native, Asian or Pacific Islander, multiple race, and other race MSM

** Persons reported with early syphilis in 2010 or 2011 who had received appropriate treatment—as documented in electronic STD surveillance records—at least six months earlier for another syphilis diagnosis during 2007–2011