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Estimated time from HIV infection to diagnosis and diagnosis to first viral suppression during 2014–2018

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Abstract

Objective: To examine changes in the lengths of time from HIV infection to diagnosis (Infx-to-Dx) and from diagnosis to first viral suppression (Dx-to-VS), two periods during which HIV can be transmitted.

Design: Data from the National HIV Surveillance System (NHSS) for persons who were aged ≥13 years at the time of HIV diagnosis during 2014–2018 and resided in one of 33 U.S. jurisdictions with complete laboratory reporting.

Methods: The date of HIV infection was estimated based on a CD4-depletion model. Date of HIV diagnosis, and dates and results of first CD4 test and first viral suppression (<200 copies/mL) after diagnosis were reported to NHSS through December 2019. Trends for Infx-to-Dx and Dx-to-VS intervals were examined using estimated annual percentage change.

Results: During 2014–2018, among persons aged ≥13 years, 133,413 HIV diagnoses occurred. The median length of infx-to-Dx interval shortened from 43 months (2014) to 40 months (2018), a 1.5% annual decrease (7.0% relative change over the 5-year period). The median length of Dx-to-VS interval shortened from 7 months (2014) to 4 months (2018), an 11.4% annual decrease (42.9% relative change over the 5-year period). Infx-to-Dx intervals shortened in only some subgroups, while Dx-to-VS intervals shortened in all groups by sex, transmission category, race/ethnicity, age, and CD4 count at diagnosis.

Conclusion: The shortened Infx-to-Dx and Dx-to-VS intervals suggest progress in promoting HIV testing and earlier treatment; however, diagnosis delays continue to be substantial. Further shortening both intervals and eliminating disparities are needed to achieve Ending the HIV Epidemic goals.

Keywords

HIV infection; HIV diagnosis delay; time to viral suppression

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INTRODUCTION

Advances in HIV prevention and treatment allow setting national goals for reducing all new HIV infections by 75% in the United States by 2025 [1, 2]. Persons aware of their HIV infection are more likely to reduce their transmission risk behaviors [3–4]. HIV treatment with simpler and more potent and tolerable treatment regimens started earlier in the course of HIV disease have helped many people with HIV to achieve and maintain viral suppression, stay healthy, live longer, and reduce onward transmission [5–12]. A recent model estimated that 38% of HIV transmissions occur from persons with undiagnosed HIV, and 62% of HIV transmissions occur from persons with diagnosed HIV who are not virally suppressed regardless of whether they have ever been or are currently engaged in HIV care [13]. Diagnosing HIV as early as possible after infection and treating HIV rapidly and effectively to achieve viral suppression are two of the key pillars of the Ending the HIV Epidemic (EHE) in the United States [1] and the HIV National Strategic Plan, 2021-2025 [2].

To reach the EHE targets by 2025, substantial improvement is needed for reducing new HIV infections by 75% from a 2017 baseline of 37,000; increasing knowledge of status to 95% from a 2017 baseline of 85.8%; and increasing viral suppression among people with diagnosed HIV to 95% from a 2017 baseline of 63.1% [2]. The likelihood of transmitting HIV can be reduced if HIV is diagnosed earlier or persons with HIV achieve viral suppression soon after diagnosis. Examining the lengths of time from HIV infection to diagnosis (Infx-to-Dx) and from diagnosis to first viral suppression (Dx-to-VS) could supplement the information gathered from the EHE indicators and inform testing and prevention efforts.

In this analysis, we built on previous studies that estimated the time from HIV infection to diagnosis during 2003–2011 and in 2015 [14, 15] and that estimated the time from HIV diagnosis to first viral suppression during 2012–2017 [16]. More specifically, we used data reported to the US Centers for Disease Control and Prevention's (CDC's) National HIV Surveillance System (NHSS) to simultaneously assess changes in the lengths of Infx-to-Dx and Dx-to-VS intervals over time among persons with HIV diagnosed during 2014–2018 by demographic variables and across jurisdictions and identify factors (e.g., sex, transmission category, race/ethnicity, age at HIV diagnosis, Medicaid Expansion) associated with shortened intervals.

METHODS

We analyzed NHSS data reported through December 2019 for HIV diagnoses occurring during 2014–2018 among persons aged ≥13 years who resided at diagnosis in one of the 33 U.S. jurisdictions that had complete laboratory reporting. Complete laboratory reporting requires meeting three criteria: (1) the jurisdiction's laws/regulations required the reporting of all CD4 and viral load results to the state or local health department; (2) laboratories that perform HIV-related testing for the jurisdictions had reported a minimum of 95% of HIV-related test results to the state or local health department; and (3) the jurisdiction had reported to CDC at least 95% of all CD4 and viral load test results [17]. The 33 jurisdictions accounted for 68.4% of all HIV diagnoses among persons ≥13 years in the United States during 2014–2018. We analyzed data reported to NHSS through December 2019, which allowed for at least 12 months after HIV diagnosis to observe viral suppression and be reported to NHSS.

Time from HIV infection to diagnosis (Infx-to-Dx Interval)

The date of HIV infection was estimated based on a well-characterized CD4-depletion model [18–21], and the date of HIV diagnosis was reported to NHSS. Because HIV targets CD4 cells, without treatment, HIV reduces the number of CD4 cells after infection. The trajectory of the CD4 depletion can be projected [18,19]. The duration of time between infection and the date of the first CD4 test can be estimated by CD4 depletion model parameters (i.e., the initial CD4 value at infection; the linear depletion rate, estimated in previous studies [18,19]; and the CD4 value at the first CD4 test date). By using the first CD4 test result after HIV diagnosis but before ART initiation for each person and the projected CD4 depletion trajectory [20–22], we estimated the date of HIV infection by subtracting the expected duration of time since infection from the first CD4 test date. CD4 test results for persons with evidence of ART use or a viral load result <200 prior to their first CD4 test result were treated as missing (without a CD4 test). We assigned inverse probability weights (i.e., one divided by the probability of having a CD4 test before the end of 2019) to persons with a CD4 test to account for persons without a CD4 test after HIV diagnosis. Weights were generated within each population group stratified by the year of HIV diagnosis, sex at birth, race/ethnicity, transmission category, age at diagnosis, and disease classification (based on vital status and having ever been classified as AIDS) at year-end 2018 [20–22]. The median length of the Infx-to-Dx interval was then derived from the distribution of the difference between the estimated HIV infection date and the reported HIV diagnosis date.

Time from HIV diagnosis to first viral suppression (Dx-to-VS Interval)

The length of the Dx-to-VS interval was calculated using the dates of HIV diagnosis and of first viral suppression (<200 copies/mL) reported to NHSS. We adopted a Kaplan-Meier estimation procedure to account for persons who were censored before achieving viral suppression [23]. Censored persons include those who, by December 2019, had died and not achieved viral suppression before death (2.2%); had had no viral load test reported (6.3%); or had reported viral load results, but had not achieved viral suppression (9.4%). The median length of the Dx-to-VS interval was derived from the distribution of the difference between the reported HIV diagnosis date and the reported date of first viral suppression, taking censoring into account.

Statistical Analyses

The median and interquartile range (IQR) of the lengths for both intervals were examined by year of HIV diagnosis. We further examined both intervals by year of HIV diagnosis, stratified by sex (male, female); transmission category (based on a presumed hierarchical order of probability of infection, for males: male-to-male sexual contact, injection drug use, male-to-male sexual contact and injection drug use, heterosexual contact; for females: heterosexual contact, injection drug use); race and ethnicity (Black/African American

[Black], Hispanic/Latino, other, and White); age at HIV diagnosis (13-24, 25-34, 35-44, 45-55, 55 years and older); jurisdiction (32 states and the District of Columbia with complete laboratory reporting); and residing in states that expanded Medicaid coverage in 2014 under the Affordable Care Act (yes or no). The four states (Alaska, Indiana, Louisiana, and Maine) that implemented Medicaid Expansion after 2014 were combined with the states that did not expand Medicaid. We also examined the Dx-to-VS interval by CD4 count at diagnosis (first CD4 ≥500, 200-499, <200 cells/μL, or no CD4 test within 3 months of diagnosis). The analysis of Infx-to-Dx interval by CD4 count at diagnosis was not conducted because the first CD4 count after diagnosis was used to estimate the date of HIV infection and determine the duration of infection at HIV diagnosis. The median time from HIV infection to having a CD4 count of less than 500 varies by age and transmission group [18, 19]. Due to the large variability of CD4 counts, particularly measured within a short time (a few months) after infection, the accuracy of estimates of the time from HIV infection to diagnosis is less certain when the measured duration of infection is short. Therefore, the first quartile of the estimated length of Infx-to-Dx intervals are considered less reliable and are not reported.

Trends during 2014–2018 for the lengths of the Infx-to-Dx and Dx-to-VS intervals were examined using estimated annual percentage change (EAPC) which was calculated using a log-linear regression, assuming that annual percentage change is constant during the time period under consideration [24]. EAPC and its 95% confidence interval were calculated. Differences were deemed statistically significant if the P value for testing no change in median interval (EAPC=0) was less than 0.05. Relative change (in percentage) over the 5-year period was calculated as the difference between the median months in 2014 and 2018 divided by the median months in 2014.

To determine the reliability of estimates of Infx-to-Dx and Dx-to-VS interval lengths, relative standard errors (RSEs) were calculated for all stratified variables [22]. RSEs are specifically relevant for the jurisdiction-level analyses because of the small numbers of diagnoses in some jurisdictions. We applied the following rules and used the indicated notations if any interval in a given year during 2014–2018 met the condition. RSEs of <30% indicate that estimates meet a higher standard of reliability, and such estimates are displayed. RSEs of 30% to 50% indicate that estimates meet a lower standard of reliability; these estimates are displayed, designated by an asterisk (*), and should be interpreted with caution. RSEs >50% indicate that the estimates are statistically unreliable; these estimates are not displayed and are indicated with an ellipsis (…).

RESULTS

During 2014–2018, a total of 133,413 HIV diagnoses occurred among persons aged ≥13 years in the 33 jurisdictions with complete laboratory reporting. The demographic characteristics were similar among persons with HIV diagnosed from the 33 jurisdictions compared with those from the remaining 18 jurisdictions (Table 1).

Results for time from infection to diagnosis (Infx-to-Dx Interval)

The median length of Infx-to-Dx intervals shortened from 43 months for persons with HIV diagnosed in 2014 to 40 months for persons with HIV diagnosed in 2018 (Table 2). During 2014–2018, the Infx-to-Dx interval shortened 1.5% per year (7.0% relative change over the 5-year period). In 2018, the median time was 40 months, indicating that one in two persons was living with HIV for more than 3.25 years before diagnosis. The third quartile was 98 months, indicating that a quarter of persons had contracted HIV more than 8 years before diagnosis.

Table 3 shows the median length of Infx-to-Dx intervals, stratified by selected variables during 2014–2018. Intervals shortened ($P < 0.05$) for females; men with HIV infection attributed to injection drug use; women with HIV infection attributed to heterosexual contact; Blacks; Hispanics/Latinos; persons aged 35-44 years and 55 years and older. In 2018, the longest median Infx-to-Dx interval length was among men with HIV infection attributed to heterosexual contact (65 months), followed by men with HIV infection attributed to male-to-male sexual contact (42 months). Among racial/ethnic groups, the median length of Infx-to-Dx intervals in 2018 was still longer for Blacks (40 months) and Hispanics/Latinos (44 months) than for Whites (32 months) despite the shortened intervals for the two former groups during 2014-2018. In 2018, the interval was shortest among persons aged 13-24 years (32 months) and longest among persons aged 55 years and older (58 months) despite a shortened interval for the older age group.

During 2014–2018, the infx-to-Dx interval shortened ($P < 0.05$) for persons with HIV diagnosed in the states that did not expand Medicaid coverage in 2014 (EAPC: −2.4%). Yet, the median was 41 months in 2018 which is still higher than the median (i.e., 38 months) for persons with HIV diagnosed in states that expanded Medicaid coverage in 2014.

Of 25 jurisdictions that had estimates with a RSE ≤50%, seven (28.0%) showed shortened Infx-to-Dx intervals during 2014–2018, and one (4%) showed an increased interval ($P < 0.05$). In 2018, the median Infx-to-Dx time was less than 36 months for 6 (24.0%) jurisdictions; 36–47 months for 15 (60.0%) jurisdictions; and 48 months or greater for 4 (16.0%) jurisdictions (Appendix A).

Results for time from diagnosis to viral suppression (Dx-to-VS Interval)

The median length of Dx-to-VS intervals shortened from 7 months for persons with HIV infection diagnosed in 2014 to 4 months for persons with HIV infection diagnosed in 2018 (Table 2). During 2014–2018, the median Dx-to-VS interval length shortened 11.4% per year (42.9% relative change over the 5-year period). In 2018, one in two persons achieved first viral suppression within 4 months after HIV diagnosis; a quarter achieved first viral suppression within 2 months of HIV diagnosis; another quarter achieved the first viral suppression 11 months or longer after diagnosis.

Table 4 shows that the median length of Dx-to-VS intervals have shortened in all sex, transmission category, race/ethnicity, age, and CD4 count at diagnosis during 2014-2018. The annual percentage decrease was comparable between males and females, and the median length of interval for both groups in 2018 was 4 months. By transmission categories, the annual percentage decease ranged from 9.2% (female injection drug use) to 13.1% (male-to-male sexual contact and injection drug use) during 2014-2018, with the median interval length ranging from 4 to 6 months in 2018. Among racial/ethnic groups, Blacks had the greatest annual percentage decrease during 2014–2018, and the median length of Dx-to-VS intervals was 4 to 5 months for all racial/ethnic groups in 2018. In general, the Dx-to-VS intervals were longer among younger age groups (e.g., 13-24 and 25-34 years); however, the annual percentage decreases in the intervals were greater in the younger age groups. In 2018, the median length of Dx-to-VS intervals ranged 4 to 5 months for all age groups. By CD4 count at diagnosis, the annual percentage decrease in the interval during 2014–2018 was greatest in persons with CD4 ≥500 at diagnosis, and the decrease was smallest in persons with CD4 <200 at diagnosis.

During 2014-2018, the median length of Dx-to-VS intervals have shortened for Medicaid Expansion states (EAPC = −12.8%; 42.9% relative change over the 5-year period) and non-Expansion states (EAPC = 10.0%; 28.6% relative change over the 5-year period) with a greater decrease for persons with HIV diagnosed in states with Medicaid Expansion.

Of 29 jurisdictions that had estimates with a RSE ≤50%, 28 (96.6%) showed shortened Dx-to-VS intervals during 2014–2018 ($P < 0.05$). In 2018, the median length of Dx-to-VS intervals was 2-3 months for 11 (37.9%) jurisdictions; 4 months for 12 (41.4%) jurisdictions and 5 months and longer for 6 (20.7%) jurisdictions (Appendix B).

DISCUSSION

Using national HIV surveillance data from 33 jurisdictions, we found that, overall, both Infx-to-Dx and Dx-to-VS intervals shortened during 2014–2018, suggesting progress made in HIV testing to improve earlier HIV diagnosis and in prompt treatment with effective regimens to achieve viral suppression. The shortened Infx-to-Dx interval (7.0% relative change over the 5-year period) might indicate better access to testing; however, delayed HIV diagnoses continue to be substantial with one in two persons living with HIV for 3.25 years before diagnosis. Delays in diagnosis were longer among men with HIV infection attributed to heterosexual contact and male-to-male sexual contact, racial/ethnic minorities (Blacks, Hispanics/Latinos, other races), and older adults, compared with their counterparts. Some subgroups and jurisdictions showed shortened Infx-to-Dx intervals. In contrast, all of the subgroups and most of the jurisdictions showed shortened Dx-to-VS intervals (42.9% relative change over the 5-year period), indicating a greater and broader success in helping persons with HIV achieve viral suppression than in promoting earlier HIV diagnosis during 2014–2018.

HIV diagnosis delays are challenging to address for several reasons. Lack of perceived risk, limited access to healthcare services, residing in rural areas, less education, stigma, discrimination, incarceration, and language barriers are frequently cited as individual barriers to HIV testing [25–28]. Despite the recommendations from CDC and the US Preventative Service Task Force for performing routine HIV screening for most individuals aged 13 to 64 [29, 30], recent national surveillance data showed only 38.9% of the U.S. adults had ever been tested for HIV [31]. A sizable proportion of men who have sex with men and persons with injection drug use reported not having been offered HIV testing, despite having visited a health care provider [32]. A recent systematic review of clinician barriers to conducting routine HIV testing showed that intrapersonal factors (e.g., lack of awareness of guidelines, lack of familiarity with HIV test procedure, lack of knowledge among some culture, language, sexual orientation, gender, race or age groups) are predominated reasons. Institutional factors (e.g., time constraints, staffing shortage) and public policy (e.g., costs, reimbursement, incompatibility of guidelines with state or local policies) are also frequently cited as clinician barriers [33]. Multifaceted approaches are needed to address diagnosis delay – for example, increasing the awareness of the benefits of early diagnosis and addressing stigma through social media platforms, communities, and providers; promoting the social norms and policies that encourage HIV testing; increasing access to HIV testing by implementing routine screening in healthcare and non-healthcare settings (e.g., jail, prison) and promoting HIV home testing; providing training/education to change provider's knowledge of, and attitudes toward routine screening; and enhancing systems of referrals between primary care settings and HIV specialty care [2, 33].

The shortened Dx-to-VS interval may result from a shortened time from diagnosis to linkage to HIV care, from linkage to care to ART initiation, or from ART initiation to first viral suppression. Because the date of ART initiation is not well captured in NHSS, we were not able to examine these sub-intervals separately. However, national surveillance data show that a high proportion of persons with HIV was linked to HIV medical care within 1 month of HIV diagnosis (74.5% in 2014; 80.2% in 2018) [17, 34]. A recent study showed that the median time from linkage to care to first viral suppression decreased for persons across CD4 groups during 2012 to 2017, indicating benefit from implementation of HIV treatment guidelines that recommend early HIV treatment with more potent, convenient and tolerable ART regimens [16]. Despite the progress in shortening the time from diagnosis to viral suppression found in our analysis, there is still room for improvement to achieve the EHE target of having 95% of persons with diagnosed HIV who have a suppressed viral load [2].

Progress toward reducing the length of both Infx-to Dx and Dx-to-VS intervals varied greatly across jurisdictions, suggesting the importance of addressing jurisdiction-specific factors. Other studies have suggested that Medicaid Expansion might increase the likelihood of HIV testing, engagement in care, and viral suppression [35–38]. Our findings show that median lengths of Infx-to-Dx intervals for persons residing in states with Medicaid Expansion remained stable (39 months during 2014-2017 and 38 months in 2018) and consistently shorter than the length of intervals for persons with HIV diagnosed in states that did not expand Medicaid coverage (46 months in 2014 and 41 months in 2018). However, the shortened Infx-to-Dx intervals during 2014-2018 among states without Medicaid Expansion is encouraging. We also found that median length of Dx-to-VS intervals have shortened for both Medicaid Expansion and non-Expansion states. More research is needed to explore factors that may contribute to shortened intervals for persons with HIV regardless of Medicaid Expansion (e.g., proportion of people with HIV on Ryan White HIV/AIDS program; increased federal or local funding for HIV testing and treatment in areas disproportionally affected by HIV, such as the Southern States which also did not expand Medicaid coverage).

Our findings are subject to the following limitations. First, results were based on 33 jurisdictions with complete laboratory reporting and may not be generalizable to the entire United States, as they represent 68.4% of persons aged ≥13 years with HIV infection diagnosed during 2014–2018. Second, HIV infection date was estimated based on a CD4 depletion model [20–22], which did not take into account potential differences in trajectories of CD4 depletion based on race/ethnicity groups due to lack of necessary CD4 history data to model CD4 depletion in these population groups [39]. Third, the changes in the lengths of Infx-to-Dx and Dx-to-VS intervals were assessed by comparison of the median number of months over time. Caution is warranted as medians do not provide the whole picture of the interval distributions – both distributions were asymmetrical with a long right tail. Fourth, the power to detect trends could be low in some jurisdictions and population groups because of small numbers of diagnoses. Fifth, it is plausible that 5-year data examined in our analysis might not be enough for assessing changes in trends as a result of national or local policy changes. Thus, it is recommended to continue monitoring Infx-to-DX and Dx-to-VS intervals to supplement information gathered from the EHE indicators.

In summary, our findings show the shortened lengths of time from HIV infection to diagnosis and from diagnosis to first viral suppression during 2014–2018. However, delayed HIV diagnoses continue to be substantial, especially among men with infection attributed to heterosexual contact and male-to-male sexual contact, Blacks, Hispanics/Latinos, other races, and older people. Multifaceted approaches are needed to address barriers to HIV testing and to eliminate missed opportunities for HIV testing. Even though time to first viral suppression shortened for almost all subgroups and jurisdictions, there is still room for improvement for meeting the 95% EHE target. Further addressing jurisdiction-specific factors and providing needed resources and assistance will be critical for reducing disparities in diagnosis delays and time to viral suppression. Continued efforts are needed to shorten diagnosis delays and time to viral suppression and eliminate disparities for achieving Ending HIV Epidemic goals.

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NC conceptualized the paper idea and led the writing of the manuscript. RS obtained the national HIV surveillance data and conducted analyses. RS and NC checked data and analysis results. NC, RS, SL, and HIH conceptualized the analysis approach and contribute to the finding interpretation, review and editing of the final manuscripts.

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Appendix A.

Estimated Median Number of Months From HIV Infection to Diagnosis Among Persons Aged ≥13 Years at the Time of HIV Diagnosis During 2014 – 2018 by Jurisdictions

	2014 Median Mo (IQR), No.	2015 Median Mo (IQR), No.	2016 Median Mo (IQR), No.	2017 Median Mo (IQR), No.	2018 Median Mo (IQR), No.	2014– 2018 EAPC (95% CI) P value
Jurisdictions						
Overall	43 (§ – 103) n = 27612	40 (§ – 100) n = 27458	40 (§ – 99) n = 26991	41 (§ – 98) n = 25972	40 (§ – 98) n = 25380	−1.5 (−2.4 to −0.5) **P = 0.002**
Alaska	… n = 38	… n = 25	… n = 37	… n = 29	… n = 23	…
Alabama	50 (§ – 105) n = 667	54 (§ – 113) n = 661	38 (§ – 94) n = 655	38 (§ – 100) n = 649	46 (§ – 100) n = 607	−5.3 (−12.2 to 2.1) P = 0.158
California	36 (§ – 97) n = 5183	35 (§ – 94) n = 5132	36 (§ – 94) n = 5221	37 (§ – 94) n = 4878	35 (§ – 93) n = 4712	−0.1 (−1.5 to 1.3) P = 0.873
District of Columbia	34 (§ – 93) n = 417	30 (§ – 83) n = 368	27 (§ – 81) n = 350	27 (§ – 82) n = 312	39 (§ – 87) n = 275	1.8 (−6.7 to 11.2) P = 0.687
Georgia	50 (§ – 109) n = 2378	44 (§ – 103) n = 2622	41 (§ – 96) n = 2506	46 (§ – 104) n = 2587	39 (§ – 99) n = 2501	−4.6 (−8.1 to −0.9) **P = 0.015**
Hawaii	… n = 99	… n = 118	… n = 78	… n = 77	… n = 70	…
Iowa	56 (§ – 119) n = 94	52 (§ – 127) n = 124	44 (§ – 106) n = 133	45 (§ – 99) n = 126	32 (§ – 84) n = 115	−11.9 (−15.0 to −8.6) **P < 0.001**
Illinois	43 (§ – 102) n = 1535	41 (§ – 99) n = 1545	48 (§ – 102) n = 1478	42 (§ – 94) n = 1362	41 (§ – 99) n = 1361	−0.6 (−4.2 to 3.2) P = 0.768
Indiana	52 (§ – 121) n = 465	18 (§ – 85) n = 632	42 (§ – 101) n = 486	42 (§ – 112) n = 517	43 (§ – 105) n = 512	0.8 (−15.7 to 20.6) P = 0.927
Louisiana	46 (§ – 109) n = 1201	44 (§ – 106) n = 1096	47 (§ – 107) n = 1107	42 (§ – 104) n = 1002	33 (§ – 90) n = 971	−5.9 (−10.3 to −1.2) **P = 0.014**
Massachusetts	37 (§ – 97) n = 649	37 (§ – 101) n = 599	35 (§ – 95) n = 641	34 (§ – 88) n = 600	28 (§ – 95) n = 650	−6.1 (−8.7 to −3.4) **P < 0.001**
Maryland	43 (§ – 107) n = 1234	42 (§ – 105) n = 1170	39 (§ – 101) n = 1095	46 (§ – 106) n = 1023	37 (§ – 101) n = 995	−1.8 (−5.9 to 2.5) P = 0.409
Maine	… n = 60	… n = 47	… n = 53	… n = 29	… n = 30	…
Michigan	43 (§– 107) n = 778	37 (§ – 100) n = 726	45 (§ – 100) n = 742	42 (§ – 90) n = 776	48 (§ – 104) n = 714	3.9 (−0.1 to 8.1) P = 0.058
Minnesota	43 (§ – 110) n = 310	45 (§ – 111) n = 295	45 (§ – 106) n = 297	56 (§ – 107) n = 275	38 (§ – 109) n = 288	1.5 (−6.5 to 10.2) P = 0.719

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	2014 Median Mo (IQR), No.	2015 Median Mo (IQR), No.	2016 Median Mo (IQR), No.	2017 Median Mo (IQR), No.	2018 Median Mo (IQR), No.	2014– 2018 EAPC (95% CI) P value
Missouri	39 (§ – 107) n = 465	37 (§ – 97) n = 463	44 (§ – 105) n = 508	30 (§ – 89) n = 503	39 (§ – 107) n = 446	−2.1 (−8.6 to 5.0) P = 0.553
Mississippi	63 (§ – 113) n = 472	55 (§ – 103) n = 503	68 (§ – 126) n = 425	64 (§ – 125) n = 427	72 (§ – 131) n = 476	4.3 (0.3 to 8.5) **P = 0.035**
North Dakota	… n = 20	… n = 20	… n = 45	… n = 37	… n = 36	…
Nebraska	… n = 87	… n = 79	… n = 76	… n = 88	… n = 79	…
New Hampshire	… n = 41	… n = 25	… n = 40	… n = 33	… n = 38	…
New Mexico*	47 (§– 126) n = 134	38 (§– 110) n = 134	36 (§– 93) n = 145	34 (§– 95) n = 140	28 (§– 111)* n = 122	−10.3 (−12.2 to −8.4) **P < 0.001**
New York	39 (§ – 97) n = 3314	42 (§ – 99) n = 3057	36 (§ – 94) n = 2821	41 (§ – 97) n = 2730	41 (§ – 101) n = 2456	0.6 (−2.7 to 4.0) P = 0.726
Oregon	68 (§ – 137) n = 238	52 (§ – 108) n = 222	44 (§ – 101) n = 228	33 (§ – 103) n = 203	43 (§ – 112) n = 229	−14.2 (−20.9 to −6.9) **P < 0.001**
South Carolina	51 (§ – 102) n = 761	55 (§ – 115) n = 670	44 (§ – 108) n = 745	52 (§ – 114) n = 709	54 (§ – 106) n = 715	0.7 (−4.0 to 5.7) P = 0.774
South Dakota	… n = 29	… n = 24	… n = 43	… n = 39	… n = 29	…
Tennessee	36 (§ – 105) n = 757	38 (§ – 95) n = 737	28 (§ – 87) n = 724	34 (§ – 93) n = 719	38 (§ – 93) n = 762	0.3 (−6.3 to 7.3) P = 0.939
Texas	44 (§ – 101) n = 4422	42 (§ – 103) n = 4521	43 (§ – 101) n = 4524	42 (§ – 98) n = 4352	39 (§ – 95) n = 4387	−2.8 (−4.0 to −1.6) **P < 0.001**
Utah*	26 (§ – 87)* n = 114	32 (§ – 105) n = 123	31 (§ – 88)* n = 140	40 (§ – 92) n = 114	22 (§ – 80)* n = 119	0.4 (−11.8 to 14.3) P = 0.953
Virginia	41 (§ – 103) n = 900	31 (§ – 93) n = 957	46 (§ – 110) n = 907	40 (§ – 97) n = 861	44 (§ – 100) n = 856	3.9 (−3.2 to 11.5) P = 0.286
Washington	42 (§ – 104) n = 440	50 (§ – 106) n = 450	44 (§ – 111) n = 423	38 (§ – 101) n = 428	40 (§ – 99) n = 502	−3.9 (−8.5 to 0.9) P = 0.108
Wisconsin	55 (§ – 108) n = 216	38 (§ – 97) n = 225	41 (§ – 88) n = 229	40 (§ – 95) n = 261	43 (§ – 106) n = 206	−6.5 (−13.2 to 0.7) P = 0.074
West Virginia*	39 (§ – 109)* n = 84	65 (§ – 155) n = 72	35 (§ – 112)* n = 68	47 (§ – 123) n = 76	53 (§ – 118) n = 86	1.0 (−13.3 to 17.7) P = 0.895
Wyoming	… n = 10	… n = 16	… n = 21	… n = 10	… n = 12	…

Median Mo = Median number of months; IQR = Interquartile range

[a] Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[b] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[c] Hispanics/Latinos can be of any race.

[d] Other includes American Indian/Alaska Native, Asian, Native Hawaiian/other Pacific Islander, and persons who report multiple races.

[§] Due to the large variability of CD4 counts, particularly measured within a short time (a few months) after infection, the accuracy of estimates of the time from HIV infection to diagnosis is less certain when the measured duration of infection is short. Therefore, the first quartiles of the estimated times from HIV infection to diagnosis are considered less reliable and are not reported.

Note: Estimates with a Relative standard error (RSE) of 30%-50% are indicated with an asterisk (*) and should be use with caution because they do not meet the standard of reliability. Estimates with an RSE of >50% are not shown and are indicated with an ellipsis (…).

Appendix B.

Estimated Median Number of Months From HIV Diagnosis to First Viral Suppression Among Persons Aged ≥13 Years at the Time of HIV Diagnosis During 2014 – 2018 by Jurisdictions

	2014 Median Mo (IQR), No.	**2015 Median Mo (IQR), No.**	**2016 Median Mo (IQR), No.**	**2017 Median Mo (IQR), No.**	**2018 Median Mo (IQR), No.**	**2014– 2018 EAPC (95% CI) P value**
Jurisdiction						
Overall	7 (3 – 25) n = 27612	6 (3 – 23) n = 27458	5 (3 – 20) n = 26991	5 (2 – 15) n = 25972	4 (2 – 11) n = 25380	−11.4 (−11.6 to −11.2) **P < 0.001**
Alaska	… n = 38	… n = 25	… n = 37	… n = 29	… n = 23	…
Alabama	6 (3 – 19) n = 667	5 (3 – 16) n = 661	5 (3 – 15) n = 655	5 (3 – 12) n = 649	4 (2 – 9) n = 607	−8.5 (−9.6 to −7.3) **P < 0.001**
California	7 (3 – 27) n = 5183	7 (3 – 30) n = 5132	6 (3 – 25) n = 5221	5 (2 – 19) n = 4878	4 (2 – 15) n = 4712	−13.5 (−14.2 to −12.8) **P < 0.001**
District of Columbia	10 (4 – 30) n = 417	6 (2 – 26) n = 368	5 (2 – 23) n = 350	5 (2 – 15) n = 312	4 (2 – 12) n = 275	−23.4 (−26.3 to −20.3) **P < 0.001**
Georgia	8 (3 – 30) n = 2378	6 (3 – 26) n = 2622	6 (3 – 23) n = 2506	5 (2 – 17) n = 2587	4 (2 – 14) n = 2501	−13.3 (−13.5 to −13.0) **P < 0.001**
Hawaii	5 (3 – 16) n = 99	6 (3 – 20) n = 118	6 (3 – 26) n = 78	7 (3 – 25) n = 77	5 (2 – 16) n = 70	−0.4 (−3.0 to 2.3) P =0.781
Iowa	4 (3 – 6) n = 94	4 (3 – 7) n = 124	4 (2 – 7) n = 133	3 (2 – 6) n = 126	3 (2 – 5) n = 115	−7.2 (−8.1 to −6.3) **P < 0.001**
Illinois	7 (3 – 31) n = 1535	5 (3 – 24) n = 1545	5 (2 – 21) n = 1478	6 (3 – 17) n = 1362	4 (2 – 13) n = 1361	−8.6 (−11.0 to −6.3) **P < 0.001**
Indiana	7 (4 – 21) n = 465	6 (3 – 15) n = 632	6 (3 – 19) n = 486	6 (3 – 16) n = 517	5 (3 – 20) n = 512	−7.5 (−8.3 to −6.6) **P < 0.001**
Louisiana	7 (4 – 24) n = 1201	6 (3 – 20) n = 1096	5 (3 – 14) n = 1107	4 (2 – 9) n = 1002	4 (2 – 10) n = 971	−17.4 (−18.1 to

	2014 Median Mo (IQR), No.	2015 Median Mo (IQR), No.	2016 Median Mo (IQR), No.	2017 Median Mo (IQR), No.	2018 Median Mo (IQR), No.	2014– 2018 EAPC (95% CI) P value
						−16.8) **P < 0.001**
Massachusetts	4 (2 – 9) n = 649	3 (2 – 8) n = 599	3 (2 – 8) n = 641	3 (1 – 7) n = 600	3 (1 – 7) n = 650	−7.2 (−8.2 to −6.2) **P < 0.001**
Maryland	7 (3 – 30) n = 1234	6 (3 – 20) n = 1170	5 (3 – 18) n = 1095	4 (2 – 11) n = 1023	3 (2 – 7) n = 995	−14.9 (−15.6 to −14.2) **P < 0.001**
Maine	3 (2 – 7) n = 60	3 (1 – 5) n = 47	3 (2 – 6) n = 53	3 (2 – 5) n = 29	3 (2 – 5) n = 30	−3.2 (−4.5 to −1.8) **P < 0.001**
Michigan	6 (3 – 18) n = 778	5 (3 – 12) n = 726	5 (3 – 11) n = 742	4 (2 – 7) n = 776	4 (2 – 8) n = 714	−14.2 (−14.9 to −13.5) **P < 0.001**
Minnesota	4 (2 – 13) n = 310	4 (2 – 9) n = 295	4 (2 – 10) n = 297	3 (2 – 6) n = 275	3 (2 – 7) n = 288	−10.5 (−11.6 to −9.4) **P < 0.001**
Missouri	5 (3 – 15) n = 465	6 (3 – 14) n = 463	5 (3 – 18) n = 508	5 (3 – 16) n = 503	5 (2 – 16) n = 446	−2.9 (−3.9 to −1.9) **P < 0.001**
Mississippi	11 (4 – 32) n = 472	8 (4 – 26) n = 503	6 (3 – 20) n = 425	6 (3 – 19) n = 427	7 (3 – 23) n = 476	−16.1 (−18.6 to −13.5) **P < 0.001**
North Dakota	… n = 20	… n = 20	… n = 45	… n = 37	… n = 36	…
Nebraska	5 (3 – 17) n = 87	5 (3 – 12) n = 79	6 (3 – 17) n = 76	4 (3 – 8) n = 88	4 (3 – 7) n = 79	−6.9 (−9.4 to −4.3) **P < 0.001**
New Hampshire	4 (3 – 8) n = 41	4 (2 – 9) n = 25	4 (2 – 10) n = 40	3 (2 – 6) n = 33	3 (2 – 6) n = 38	−8.4 (−9.5 to −7.3) **P < 0.001**
New Mexico	8 (4 – 24) n = 134	6 (3 – 17) n = 134	4 (2 – 9) n = 145	3 (2 – 7) n = 140	3 (2 – 6) n = 122	−25.4 (−26.9 to −23.8) **P < 0.001**
New York	8 (3 – 39) n = 3314	7 (3 – 34) n = 3057	7 (3 – 30) n = 2821	5 (2 – 21) n = 2730	4 (2 – 23) n = 2456	−13.6 (−15.5 to −11.7) **P < 0.001**
Oregon	5 (3 – 12) n = 238	4 (3 – 7) n = 222	3 (2 – 7) n = 228	4 (2 – 9) n = 203	3 (2 – 7) n = 229	−10.5 (−12.1 to −9.0) **P < 0.001**
South Carolina	7 (4 – 19) n = 761	6 (3 – 15) n = 670	5 (3 – 14) n = 745	5 (3 – 11) n = 709	4 (2 – 8) n = 715	−12.2 (−12.8 to −11.7) **P < 0.001**
South Dakota	… n = 29	… n = 24	… n = 43	… n = 39	… n = 29	…
Tennessee	8 (4 – 29) n = 757	8 (4 – 31) n = 737	8 (4 – 25) n = 724	7 (3 – 22) n = 719	5 (3 – 16) n = 762	−6.9 (−8.9 to −5.0) **P < 0.001**

	2014 Median Mo (IQR), No.	2015 Median Mo (IQR), No.	2016 Median Mo (IQR), No.	2017 Median Mo (IQR), No.	2018 Median Mo (IQR), No.	2014– 2018 EAPC (95% CI) P value
Texas	7 (4 – 26) n = 4422	6 (3 – 25) n = 4521	6 (3 – 22) n = 4524	6 (3 – 18) n = 4352	5 (3 – 21) n = 4387	−6.8 (−7.1 to −6.6) **P < 0.001**
Utah	6 (3 – 12) n = 114	5 (3 – 12) n = 123	5 (2 – 14) n = 140	3 (2 – 7) n = 114	3 (2 – 7) n = 119	−13.7 (−15.0 to −12.4) **P < 0.001**
Virginia	8 (4 – 22) n = 900	6 (3 – 16) n = 957	6 (3 – 18) n = 907	5 (3 – 14) n = 861	4 (2 – 10) n = 856	−16.2 (−17.3 to −15.2) **P < 0.001**
Washington	4 (2 – 8) n = 440	4 (2 – 7) n = 450	3 (2 – 6) n = 423	3 (2 – 6) n = 428	2 (1 – 5) n = 502	−9.9 (−10.8 to −9.1) **P < 0.001**
Wisconsin	4 (3 – 11) n = 216	4 (2 – 8) n = 225	4 (2 – 7) n = 229	3 (2 – 11) n = 261	3 (2 – 8) n = 206	−8.3 (−9.1 to −7.6) **P < 0.001**
West Virginia	6 (3 – 13) n = 84	6 (3 – 11) n = 72	5 (3 – 15) n = 68	5 (3 – 9) n = 76	4 (3 – 13) n = 86	−6.0 (−6.9 to −5.1) **P < 0.001**
Wyoming	… n = 10	… n = 16	… n = 21	… n = 10	… n = 12	…

Median Mo = Median number of months; IQR = Interquartile range

[a]Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[b]Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[c]Hispanics/Latinos can be of any race.

[d]Other includes American Indian/Alaska Native, Asian, Native Hawaiian/other Pacific Islander, and persons who report multiple races.

Note: Estimates with a Relative standard error (RSE) of 30%-50% are indicated with an asterisk (*) and should be use with caution because they do not meet the standard of reliability. Estimates with an RSE of >50% are not shown and are indicated with an ellipsis (…).

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Table 1.

Characteristics of persons aged ≥13 years with HIV infection diagnosed during 2014-2018 from 33 jurisdictions with complete laboratory reporting compared with those from 18 jurisdictions without complete reporting[*]

	All 50 States and District of Columbia		33 Jurisdictions with Complete Laboratory Reporting		18 Jurisdictions without Complete Laboratory Reporting	
	No.	%[g]	No.	%[g]	No.	%[g]
Total	195052	100	133413	100	61639	100
Sex						
Male	158265	81.1	108824	81.6	49441	80.2
Female	36787	18.9	24589	18.4	12198	19.8
Transmission Category [a]						
Male-to-male sexual contact	129119	66.2	90505	67.8	38614	62.6
Male injection drug use	6449	3.3	4273	3.2	2176	3.5
Male-to-male sexual contact and injection drug use	7090	3.6	4772	3.6	2318	3.8
Male heterosexual contact[b]	15496	7.9	9186	6.9	6310	10.2
Female heterosexual contact[b]	31538	16.2	21100	15.8	10439	16.9
Female injection drug use	5126	2.6	3395	2.5	1732	2.8
Other	234	0.1	182	0.1	52	0.1
Race/Ethnicity						
Black	83700	42.9	58074	43.5	25626	41.6
Hispanic/Latino[c]	49052	25.1	33849	25.4	15203	24.7
White	49984	25.6	32153	24.1	17831	28.9
Other[d]	12316	6.3	9337	7.0	2979	4.8
Age at diagnosis						
13-24 years	42859	22.0	30039	22.5	12820	20.8
25-34 years	66005	33.8	45844	34.4	20161	32.7
35-44 years	37626	19.3	25636	19.2	11990	19.5
45-54 years	29682	15.2	19653	14.7	10029	16.3
55 years and older	18880	9.7	12241	9.2	6639	10.8

	All 50 States and District of Columbia		33 Jurisdictions with Complete Laboratory Reporting		18 Jurisdictions without Complete Laboratory Reporting	
	No.	%[g]	No.	%[g]	No.	%[g]
CD4 count at HIV diagnosis						
CD4 ≥500	50815	26.1	35150	26.3	15665	25.4
CD4: 200-499	60907	31.2	43111	32.3	17796	28.9
CD4 <200	42027	21.5	28195	21.1	13832	22.4
Unknown	41303	21.2	26957	20.2	14346	23.3
Residing in States Expanded Medicaid Coverage in 2014						
Yes[e]	92338	47.3	68157	51.1	24181	39.2
No[f]	102714	52.7	65256	48.9	37458	60.8

[a]Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[b]Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[c]Hispanics/Latinos can be of any race.

[d]Other includes American Indian/Alaska Native, Asian, Native Hawaiian/other Pacific Islander, and persons who report multiple races.

[e]Among 33 jurisdictions with complete laboratory reporting, California, District of Columbia, Hawaii, Illinois, Iowa, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Mexico, New York, North Dakota, Oregon, Washington, and West Virginia expanded Medicaid coverage under the Affordable Care Act in 2014. Among 18 Jurisdictions without complete laboratory reporting, Arizona, Arkansas, Colorado, Connecticut, Delaware, Kentucky, Nevada, New jersey, Ohio, Rhode Island, and Vermont implemented Medicaid Expansion in 2014.

[f]Among 33 jurisdictions with complete laboratory reporting, Alaska, Alabama, Georgia, Indiana, Louisiana, Maine, Mississippi, Missouri, Nebraska, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Wisconsin, and Wyoming did not expand Medicaid coverage in 2014. Among 18 Jurisdictions without complete laboratory reporting, Florida, Idaho, Kansas, Montana, North Carolina, Oklahoma, and Pennsylvania did not expand Medicaid coverage in 2014.

[g]Column percentage

[*]33 jurisdictions with complete lab reporting include: Alabama, Alaska, California, District of Columbia, Georgia, Hawaii, Illinois, Indiana, Iowa, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Mexico, New York, North Dakota, Oregon, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming. The 18 jurisdictions without complete lab reporting include: Arizona, Arkansas, Colorado, Connecticut, Delaware, Florida, Idaho, Kansas, Kentucky, Montana, Nevada, New Jersey, North Carolina, Oklahoma, Ohio, Pennsylvania, Rhode Island, and Vermont.

Table 2.

Estimated Median Number of Months From HIV Infection to Diagnosis and From Diagnosis to First Viral Suppression Among Persons Aged ≥13 Years at the Time of HIV Diagnosis During 2014 – 2018, 33 U.S. Jurisdictions

Year when HIV diagnosis occurred	**HIV diagnosis** (N)	**Estimated time from HIV infection to diagnosis** Median number of months (Interquartile range)	**Estimated time from diagnosis to first viral suppression** Median number of months (Interquartile range)
2014	27612	43 (§ – 103)	7 (3 – 25)
2015	27458	40 (§ – 100)	6 (3 – 23)
2016	26991	40 (§ – 99)	5 (3 – 20)
2017	25972	41 (§ – 98)	5 (2 – 15)
2018	25380	40 (§ – 98)	4 (2 – 13)
Estimated annual percentage change (EAPC)	---	−1.5% (95% CI = −2.4 to −0.5) **P = 0.002**	−11.4% (95% CI = −11.6 to −11.2) **P < 0.001**
Relative change over the 5-year period		7.0%	42.9%

§ Due to the large variability of CD4 counts, particularly measured within a short time (a few months) after infection, the accuracy of estimates of the time from HIV infection to diagnosis is less certain when the measured duration of infection is short. Therefore, the first quartiles of the estimated times from HIV infection to diagnosis are considered less reliable and are not reported.

Table 3.

Estimated Median Number of Months From HIV Infection to Diagnosis Among Persons Aged ≥13 Years at the Time of HIV Diagnosis During 2014 – 2018 by Selected Characteristics, 33 U.S. Jurisdictions

	2014 Median Mo (IQR), No.	2015 Median Mo (IQR), No.	2016 Median Mo (IQR), No.	2017 Median Mo (IQR), No.	2018 Median Mo (IQR), No.	2014– 2018 EAPC (95% CI) P value
Sex						
Male	43 (§ – 102) n = 22521	42 (§ – 100) n = 22535	42 (§ – 99) n = 22026	42 (§ – 98) n = 21163	42 (§ – 99) n = 20579	−0.6 (−1.3 to 0.2) P = 0.135
Female	40 (§ – 105) n = 5091	33 (§ – 102) n = 4923	34 (§ – 101) n = 4965	34 (§ – 100) n = 4809	27 (§ – 94) n = 4801	−6.7 (−10.3 to −3.1) **P < 0.001**
Transmission Category [a]						
Male-to-male sexual contact	41 (§ – 98) n = 18818	40 (§ – 96) n = 18602	40 (§ – 95) n = 18275	41 (§ – 95) n = 17700	42 (§ – 96) n = 17110	0.2 (−0.5 to 1.0) P = 0.529
Male injection drug use	63 (§ – 119) n = 832	35 (§ – 98) n = 903	44 (§ – 107) n = 812	37 (§ – 95) n = 838	39 (§ – 100) n = 888	−11.7 (−21.2 to −1.1) **P = 0.032**
Male-to-male sexual contact and injection drug use	29 (§ – 87) n = 972	31 (§ – 93) n = 985	28 (§ – 85) n = 978	33 (§ – 87) n = 915	22 (§ – 81) n = 923	−2.8 (−9.2 to 4.0) P = 0.409
Male heterosexual contact[b]	69 (§ – 157) n = 1883	70 (§ – 155) n = 2026	66 (§ – 149) n = 1946	73 (§ – 155) n = 1692	65 (§ – 151) n = 1639	−0.8 (−3.2 to 1.6) P = 0.500
Female heterosexual contact[b]	41 (§ – 110) n = 4443	35 (§ – 108) n = 4193	35 (§ – 106) n = 4258	35 (§ – 105) n = 4104	27 (§ – 98) n = 4102	−7.3 (−10.6 to −3.9) **P < 0.001**
Female injection drug use	35 (§ – 78) n = 636	26 (§ – 70) n = 714	30 (§ – 76) n = 685	30 (§ – 76) n = 683	27 (§ – 69) n = 677	-3.7 (−9.4 to 2.4) P = 0.226
Race/Ethnicity						
Black/African American	45 (§ – 102) n = 11919	42 (§ – 98) n = 11881	42 (§ – 98) n = 11800	43 (§ – 98) n = 11311	40 (§ – 96) n = 11163	−2.2 (−3.5 to −0.9) **P = 0.001**
Hispanic/Latino[c]	47 (§ – 107) n = 6811	45 (§ – 107) n = 6844	46 (§ – 106) n = 6837	45 (§ – 103) n = 6710	44 (§ – 104) n = 6647	−0.9 (−1.5 to −0.4) **P = 0.002**
Other[d]	49 (§ – 107) n = 2060	43 (§ – 101) n = 2006	44 (§ – 99) n = 1958	44 (§ – 102) n = 1770	49 (§ – 105) n = 1543	0.3 (−3.4 to 4.1) P = 0.893
White	33 (§ – 98) n = 6822	29 (§ – 97) n = 6727	30 (§ – 93) n = 6396	32 (§ – 93) n = 6181	32 (§ – 95) n = 6027	0.1 (−2.6 to 3.0) P = 0.921

	2014 Median Mo (IQR), No.	2015 Median Mo (IQR), No.	2016 Median Mo (IQR), No.	2017 Median Mo (IQR), No.	2018 Median Mo (IQR), No.	2014– 2018 EAPC (95% CI) P value
Age at diagnosis						
13-24 years	32 (§ – 72) n = 6458	30 (§ – 70) n = 6388	33 (§ – 71) n = 6046	32 (§ – 71) n = 5756	32 (§ – 71) n = 5391	0.5 (−0.9 to 2.0) P = 0.473
25-34 years	35 (§ – 100) n = 8888	34 (§ – 98) n = 9191	33 (§ – 95) n = 9372	34 (§ – 96) n = 9206	33 (§ – 95) n = 9187	−0.6 (−1.5 to 0.3) P = 0.170
35-44 years	54 (§ – 131) n = 5545	50 (§ – 129) n = 5262	49 (§ – 125) n = 5038	46 (§ – 119) n = 4911	43 (§ – 117) n = 4880	−5.1 (−5.9 to −4.3) **P < 0.001**
45-54 years	57 (§ – 138) n = 4275	57 (§ – 139) n = 4205	55 (§ – 132) n = 4006	59 (§ – 137) n = 3678	56 (§ – 133) n = 3489	0.0 (−1.6 to 1.7) P = 0.985
55 years and older	67 (§ – 135) n = 2446	61 (§ – 122) n = 2412	59 (§ – 120) n = 2529	60 (§ – 118) n = 2421	58 (§ – 123) n = 2433	−3.1 (−4.9 to −1.3) **P = 0.001**
Residing in States that Expanded Medicaid Coverage in 2014						
Yes	39 (§ – 100) n = 14570	39 (§ – 98) n = 14057	39 (§ – 97) n = 13805	39 (§ – 96) n = 13076	38 (§ – 98) n = 12649	−0.5 (−1.1 to 0.1) P = 0.076
No	46 (§ – 105) n = 13042	42 (§ – 102) n = 13410	42 (§ – 101) n = 13186	43 (§ – 101) n = 12896	41 (§ – 99) n = 12731	−2.4 (−4.0 to −0.7) **P = 0.006**

Median Mo = Median number of months; IQR = Interquartile range

[a] Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[b] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[c] Hispanics/Latinos can be of any race.

[d] Other includes American Indian/Alaska Native, Asian, Native Hawaiian/other Pacific Islander, and persons who report multiple races.

[§] Due to the large variability of CD4 counts, particularly measured within a short time (a few months) after infection, the accuracy of estimates of the time from HIV infection to diagnosis is less certain when the measured duration of infection is short. Therefore, the first quartiles of the estimated times from HIV infection to diagnosis are considered less reliable and are not reported.

Table 4.

Estimated Median Number of Months From HIV Diagnosis to First Viral Suppression Among Persons Aged ≥13 Years at the Time of HIV Diagnosis During 2014 – 2018 by Selected Characteristics, 33 U.S. Jurisdictions

	2014 Median Mo (IQR), No.	2015 Median Mo (IQR), No.	2016 Median Mo (IQR), No.	2017 Median Mo (IQR), No.	2018 Median Mo (IQR), No.	2014– 2018 EAPC (95% CI) P value
Sex						
Male	7 (3 – 26) n = 22521	6 (3 – 23) n = 22535	6 (3 – 21) n = 22026	5 (3 – 15) n = 21163	4 (2 – 13) n = 20579	−11.5 (−11.7 to −11.2) **P < 0.001**
Female	6 (3 –24) n = 5091	6 (3 – 22) n = 4923	5 (2 – 18) n = 4965	5 (2 – 15) n = 4809	4 (2 – 14) n = 4801	−10.8 (−11.0 to −10.6) **P < 0.001**
Transmission Category [a]						
Male-to-male sexual contact	7 (3 – 24) n = 18818	6 (3 – 22) n = 18602	5 (3 – 19) n = 18275	5 (2 – 15) n = 17700	4 (2 – 13) n = 17110	−11.4 (−11.7 to −11.2) **P < 0.001**
Male injection drug use	9 (4 – 39) n = 832	8 (3 – 31) n = 903	7 (3 – 32) n = 812	6 (3 – 25) n = 838	6 (3 – 22) n = 888	−9.5 (−10.6 to −8.6) **P < 0.001**
Male-to-male sexual contact and injection drug use	8 (4 – 27) n = 972	8 (3 – 24) n = 985	7 (3 – 24) n = 978	6 (3 – 17) n = 915	4 (2 – 15) n = 923	−13.1 (−14.0 to −12.2) **P < 0.001**
Male heterosexual contact[b]	8 (4 – 34) n = 1883	6 (3 – 26) n = 2026	6 (3 – 24) n = 1946	5 (3 – 17) n = 1692	4 (2 – 15) n = 1639	−12.1 (−12.7 to −11.5) **P < 0.001**
Female heterosexual contact[b]	6 (3 – 22) n = 4443	5 (3 – 21) n = 4193	5 (2 – 17) n = 4258	4 (2 – 14) n = 4104	4 (2 – 12) n = 4102	−11.1 (−11.3 to −10.9) **P < 0.001**
Female injection drug use	8 (3 – 35) n = 636	8 (3 – 31) n = 714	6 (3 – 34) n = 685	7 (3 – 26) n = 683	6 (2 – 22) n = 677	−9.4 (−10.5 to −8.4) **P < 0.001**
Race/Ethnicity						
Black/African American	8 (4 – 34) n = 11919	7 (3 – 30) n = 11881	6 (3 – 26) n = 11800	5 (3 – 19) n = 11311	5 (2 – 16) n = 11163	−13.8 (−13.9 to −13.7) **P < 0.001**
Hispanic/Latino[c]	7 (3 – 25) n = 6811	6 (3 – 24) n = 6844	5 (3 – 19) n = 6837	5 (2 – 15) n = 6710	4 (2 – 13) n = 6647	−11.2 (−11.7 to −10.8) **P < 0.001**
Other[d]	6 (3 – 20) n = 2060	5 (3 – 17) n = 2006	5 (3 – 19) n = 1958	4 (2 – 12) n = 1770	4 (2 – 10) n = 1543	−11.4 (−12.0 to −10.7) **P < 0.001**
White	6 (3 – 16) n = 6822	5 (3 – 14) n = 6727	5 (2 – 14) n = 6396	4 (2 – 11) n = 6181	4 (2 – 10) n = 6027	−8.8 (−9.0 to −8.6) **P < 0.001**
Age at diagnosis						

	2014 Median Mo (IQR), No.	2015 Median Mo (IQR), No.	2016 Median Mo (IQR), No.	2017 Median Mo (IQR), No.	2018 Median Mo (IQR), No.	2014– 2018 EAPC (95% CI) P value
13-24 years	9 (4 – 32) n = 6458	7 (3 – 27) n = 6388	6 (3 – 22) n = 6046	5 (3 – 17) n = 5756	5 (2 – 15) n = 5391	−14.9 (−15.1 to −14.6) **P < 0.001**
25-34 years	7 (3 – 26) n = 8888	6 (3 – 24) n = 9191	6 (3 – 21) n = 9372	5 (2 – 16) n = 9206	4 (2 – 14) n = 9187	−12.4 (−12.6 to −12.2) **P < 0.001**
35-44 years	6 (3 – 22) n = 5545	6 (3 – 21) n = 5262	5 (2 – 19) n = 5038	5 (2 – 14) n = 4911	4 (2 – 10) n = 4880	−10.0 (−10.4 to −9.5) **P < 0.001**
45-54 years	6 (3 – 19) n = 4275	5 (3 – 16) n = 4205	5 (3 – 17) n = 4006	4 (2 – 14) n = 3678	4 (2 – 13) n = 3489	−8.4 (−8.6 to −8.1) **P < 0.001**
55 years and older	6 (3 – 23) n = 2446	5 (3 – 19) n = 2412	5 (3 – 18) n = 2529	5 (2 – 13) n = 2421	4 (2 – 14) n = 2433	−7.6 (−7.9 to −7.3) **P < 0.001**
CD4 at HIV diagnosis						
CD4 ≥ 500	5 (3 – 17) n = 6676	5 (2 – 13) n = 6998	4 (2 – 11) n = 7205	4 (2 – 8) n = 7025	3 (2 – 7) n = 7246	−13.2 (−13.3 to −13.0) **P < 0.001**
CD4: 200 to 499	5 (3 – 12) n = 8582	5 (3 – 11) n = 8756	4 (3 – 10) n = 8742	4 (2 – 9) n = 8613	3 (2 – 7) n = 8418	−9.2 (−9.6 to −8.9) **P < 0.001**
CD4 < 200	5 (3 – 11) n = 6106	5 (3 – 9) n = 5800	4 (3 – 9) n = 5627	4 (2 – 9) n = 5423	4 (2 – 8) n = 5239	−6.3 (−6.6 to −6.1) **P < 0.001**
Unknown	29 (11 – 71) n = 6248	30 (11 – 59) n = 5904	29 (10 – 47) n = 5417	23 (9 – 35) n = 4911	23 (8 – 24) n = 4477	−6.6 (−7.7 to −5.4) **P < 0.001**
Residing in States that Expanded Medicaid Coverage in 2014						
Yes	7 (3 – 26) n = 14570	6 (3 – 24) n = 14057	5 (2 – 21) n = 13805	4 (2 – 15) n = 13076	4 (2 – 12) n = 12649	−12.8 (−13.2 to −12.5) **P < 0.001**
No	7 (4 – 25) n = 13042	6 (3 – 22) n = 13401	6 (3 – 20) n = 13186	5 (3 – 16) n = 12896	5 (2 – 15) n = 12731	−10.0 (−10.2 to −9.8) **P < 0.001**

Median Mo = Median number of months; IQR = Interquartile range

[a] Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[b] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[c] Hispanics/Latinos can be of any race.

[d] Other includes American Indian/Alaska Native, Asian, Native Hawaiian/other Pacific Islander, and persons who report multiple races.