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Improved Detection of Acute HIV in the United States, 2012–2017

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Background

Acute HIV infection (AHI) is the period from the first appearance of detectable virologic evidence (RNA or DNA) about two weeks after infection until a full antibody response (recognized usually by detection of HIV IgG antibodies) about 6 weeks after infection. AHI has been associated with viral loads much higher than those in later stages, thus individuals are more likely to be infectious to others during AHI. Timely detection of AHI can lead to earlier treatment and viral suppression, thus preventing further transmission. In June 2014, CDC and the Association of Public Health Laboratories recommended use of a laboratory HIV testing algorithm for the diagnosis of HIV that also facilitates detecting AHI (www.cdc.gov/hiv/testing/laboratorytests.html) (Figure 1).

In 2014, CDC also implemented a "stage 0" case definition for HIV surveillance to identify early HIV infection (www.cdc.gov/mmwr/preview/mmwrhtml/rr6303a1.htm). Stage 0 can be identified by a series of discordant test results that include a negative or indeterminate HIV test result ≤180 days before, or ≤60 days after (or on the same date as) the first positive HIV test result.

Stage 0 may be divided into subcategories that are more or less likely to indicate AHI rather than post-acute early HIV infection (PA-EHI). A recent study by Selik & Linley[1] analyzed the combinations of tests used to classify stage 0 and found that a subset of these were associated with high viral load results consistent with AHI. In general, the subcategory that is more likely to indicate AHI may be identified from combinations of HIV test results in which the first positive and the key negative/indeterminate test results are from specimens obtained on the same date or ≤60 days apart from one another.

Using the criteria for AHI established by Selik & Linley, we used laboratory data reported to the National HIV Surveillance System (NHSS) to examine trends in and demographic associations with diagnosis of AHI.

[1]Selik RM, Linley L. Viral Loads Within 6 Weeks After Diagnosis of HIV Infection in Early and Later Stages: Observational Study Using National Surveillance Data. JMIR Public Health Surveill. 2018 Nov 5;4(4):e10770. DOI: 10.2196/10770.

Methods

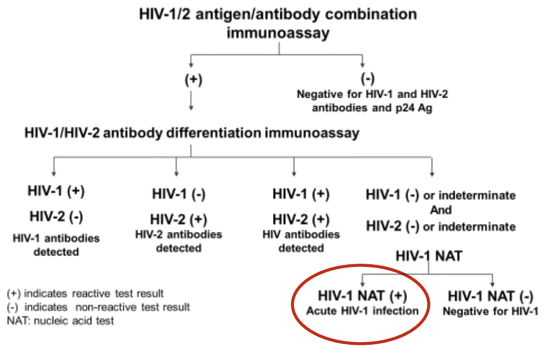
We analyzed data from adults and adolescents (aged ≥13 years at diagnosis) with HIV diagnosed during 2012–2017 and reported to NHSS through June 2018.

Definitions of AHI (acute HIV infection) and PA-EHI (post-acute early HIV infection)

- We defined **AHI** as a subset of the surveillance stage 0 (early infection) classification based on the following combinations of documented (includes data on the type of HIV test and the date of specimen collection) laboratory tests reported at diagnosis:
  - » A negative or indeterminate HIV-1 antibody test ≤60 days after the first confirmed positive HIV-1 test, OR
  - » A negative/indeterminate antibody test or qualitative HIV-1 nucleic acid test (NAT) ≤180 days before the first positive test, if this first positive test was a NAT or detectable viral load.
- Those infections that otherwise met the criteria for stage 0 but not for AHI were classified as **PA-EHI** and had the following combinations of documented laboratory tests at diagnosis:
  - » A negative/indeterminate antibody test or qualitative HIV-1 nucleic acid test (NAT) ≤180 days before the first positive test, if this first positive test was an antibody test.

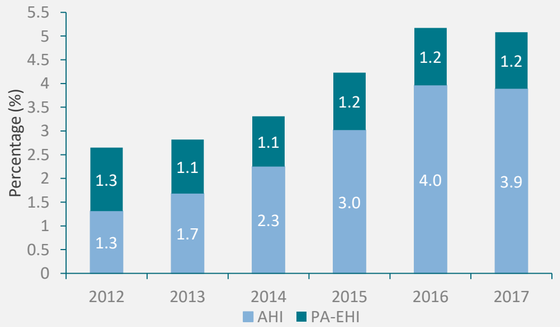
To accommodate reporting delay, for assessing the trend in detecting AHI, we examined data from 2012–2016. Data from 2015–2017 were used to assess characteristics associated with AHI.

Figure 1. Recommended Laboratory HIV Testing Algorithm for Serum or Plasma Specimens



Results

Figure 2. Percentage of Persons Aged ≥13 Years with Diagnosed HIV Classified as Stage 0 Subcategories of Acute or Post-Acute Early HIV Infection at Diagnosis, by Year of Diagnosis, National HIV Surveillance System, 2012–2017



Note: Data for the year 2017 are considered preliminary because they are based on only a 6-month reporting delay. Data for the year 2017 should not be used when assessing trends.

Results, cont.

Figure 3. Percentage of Acute HIV Infections Among Persons Aged ≥13 Years with Diagnosed HIV, by Transmission Category,* National HIV Surveillance System, 2015–2017

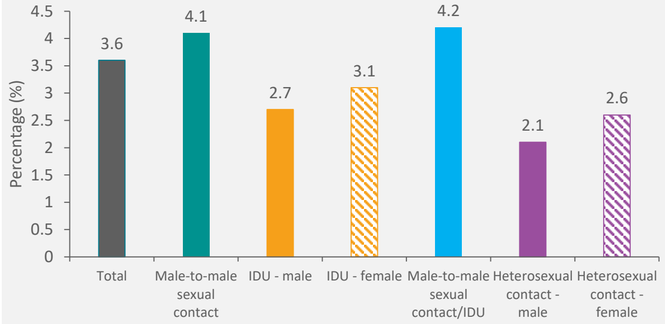


Table. Number and Demographic Distribution of Acute HIV Infections Among Persons Aged ≥13 Years with Diagnosed HIV, National HIV Surveillance System, 2015–2017

		No. Acute HIV Infections (Row %)	p-value*	No. HIV Diagnoses (% of Total)
Sex	Male	3,668 (3.9)	<0.001	95,225 (81.1)
	Female	583 (2.6)		22,240 (18.9)
Race/ethnicity	Black/African American	1,575 (3.1)	<0.001	51,183 (43.6)
	Hispanic/Latino	1,143 (4.0)		28,885 (24.6)
	White	1,257 (4.1)		30,522 (26.0)
	Other	276 (4.0)		6,875 (5.9)
Age at diagnosis (year)	13-24	1,364 (5.3)	<0.001	25,724 (21.9)
	25-34	1,524 (3.9)		39,950 (34.0)
	35-44	628 (2.8)		22,478 (19.1)
	45-54	454 (2.5)		17,943 (15.3)
	55+	263 (2.3)		11,370 (9.7)
Transmission category**	Male-to-male sexual contact	3,207 (4.1)	<0.001	78,153 (66.5)
	IDU	196 (2.9)		6,835 (5.8)
	Male-to-male sexual contact/IDU	161 (4.2)		3,881 (3.3)
	Heterosexual contact	683 (2.4)		28,379 (24.2)
	Other	4 (1.8)		217 (0.2)
Type of facility at diagnosis	Emergency department	222 (8.9)	<0.001	2,486 (2.1)
	Inpatient	964 (5.1)		18,877 (16.1)
	STD	352 (5.8)		6,095 (5.2)
	Counseling and testing	262 (2.6)		10,276 (8.7)
	Other/Unknown	2,451 (3.1)		79,731 (67.9)

IDU: injection drug use
* Differences in percentages of AHI (row %) were assessed using the z test.
** Data have been statistically adjusted for missing transmission category.

Highlights

- From 2012 to 2016, while the annual numbers of HIV diagnoses remained stable, the percentage of those that were classified as acute at diagnosis increased from 1.3% (535 of 40,939) to 4.0% (1,563/39,459) (Figure 2).
- The percentage of HIV diagnoses classified as post-acute early HIV remained stable from 2012–2016 (Figure 2).
- Of the 117,465 cases diagnosed during 2015–2017, 4,251 (3.6%) were AHI. AHI was associated with all demographic characteristics examined (Table).
  - » The percentage of persons whose HIV infection was acute at diagnosis was higher among those who were male, or who were white, Hispanic/Latino, or other race, aged 13-24 years, or who had HIV infection attributable to both male-to-male sexual contact and injection drug use or male-to-male sexual contact alone, or when diagnoses were made in emergency departments, STD clinics, or inpatient settings (Table).
  - » Although the percentage of AHI detected was higher among males than among females, the percentage of AHI among males with infection attributed to injection drug use or heterosexual contact was lower than the percentages among females with the same respective transmission categories (Figure 3).

Conclusions

The increase in the percentage of persons with AHI diagnosed from 2012 to 2017 suggests that implementation of the recommended laboratory HIV testing algorithm has enhanced the ability to identify AHI in surveillance data. This is supported by the lack of increase in the detection of PA-EHI, the classification of which is primarily based on a combination of tests not typically part of the recommended algorithm, while the denominator of annual numbers of HIV diagnoses also remained stable.

Other factors may have played a role as well. For example, in response to implementing the stage 0 surveillance case definition, there may have been increases in the reporting of negative HIV test results to NHSS (health departments are not required to report negative results, although it is recommended to report all HIV test results for an algorithm for which the final result is positive). Increased testing early in infection may have played a role as well.

Health departments should ensure complete and accurate collection of laboratory data and prompt recognition of AHI to prioritize follow-up and optimize opportunities for treatment and prevention. Demographic differences in detection of AHI suggest groups of persons who may benefit from more focused outreach efforts to discern reasons for these differences and address these disparities.

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 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.