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Detection of Acute HIV Infection, U.S. National HIV Surveillance System, 2008-2012

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BACKGROUND

- Early identification of HIV infection is essential to delay disease progression and reduce the spread of HIV.
- Acute HIV infection (AHI) describes the interval between the appearance of HIV RNA in plasma and that of detectable antibodies, about 2-4 weeks.[1]
- During AHI, persons typically have high viral load levels and are at greater risk of HIV transmission; thus, detection and rapid treatment of persons with AHI is important for preventing further transmission.[2]
- In June 2011, an updated laboratory HIV diagnostic testing algorithm that facilitates detecting acute HIV was included in the revised laboratory-based HIV testing guidelines issued by the Clinical and Laboratory Standards Institute (CLSI). [1]
- Laboratory and testing history data are collected as part of the U.S. National HIV Surveillance System (NHSS).

OBJECTIVE

To use laboratory and testing history data collected through NHSS to identify persons with AHI, assess potential shifts in identifying AHI related to recent changes in HIV testing technology, and describe populations newly acquiring HIV.

METHODS

- This analysis included data for adults and adolescents (age ≥ 13 years) with HIV diagnosed during 2008-2012 and reported to CDC through June 2014 from 50 U.S. states and the District of Columbia.
- To measure AHI, this analysis used a convenience sample of HIV-diagnosed persons who had a date of a negative diagnostic HIV test prior to the date of diagnosis.
- Among HIV-diagnosed persons who had a date of a previous negative HIV test, AHI was defined by a previous negative diagnostic HIV test within 60 days before the date of HIV diagnosis.
- Information on the date of the most recent negative HIV test before HIV diagnosis was collected through either a documented laboratory test result or testing history information reported by a patient or provider.
- Risk factors were assigned according to the following transmission category hierarchy:
  - Male-to-male sexual contact (MSM)
  - Injection drug use (IDU)
  - Male-to-male sexual contact and injection drug use (MSM/IDU)
  - Heterosexual contact (i.e., sexual contact with a person known to have, or to be at high risk for, HIV infection)
  - Other (i.e., all other risk factors combined, and risk factor not reported or identified)
- Race/ethnicity information was classified as non-Hispanic white (white), non-Hispanic black/African American (black), Hispanic/Latino (Hispanic), and other.
- To assess the association between CD4, viral load, and AHI, we included the first CD4 and viral load test results after HIV diagnosis for persons who had a CD4 or viral load test within 3 months after diagnosis.
- Log binomial regression was used to calculate P-values.

[1] Clinical and Laboratory Standards Institute (CLSI). Criteria for laboratory testing and diagnosis of human immunodeficiency virus infection; approved guideline; 2011. Document No. M53-A.
[2] Owen SM. Testing for acute HIV infection: implications for treatment as prevention. Curr Opin HIV AIDS 2012; 7:125-130.

FIGURE 1. Demographic Distribution of Persons with Acute HIV Infections Compared with All HIV-Diagnosed Persons, National HIV Surveillance System, 2008-2012

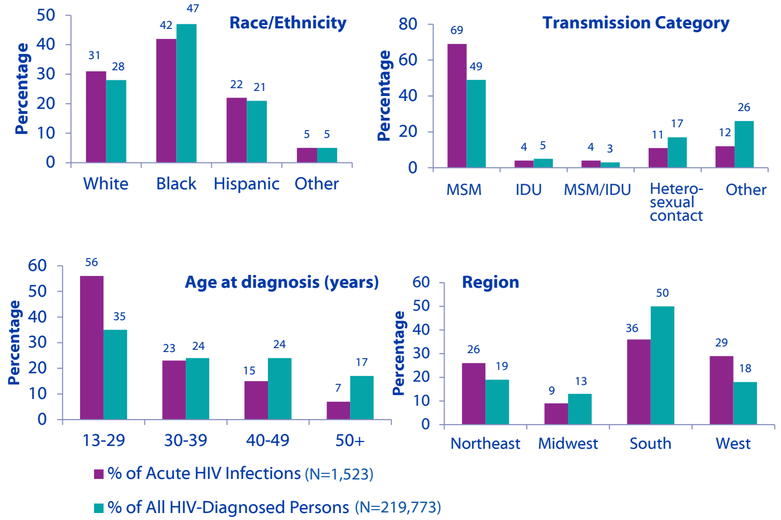

FIGURE 2. Percentage with acute HIV infection (AHI) among HIV-diagnosed persons who had a date of a previous negative HIV test, by year, 2008-2012

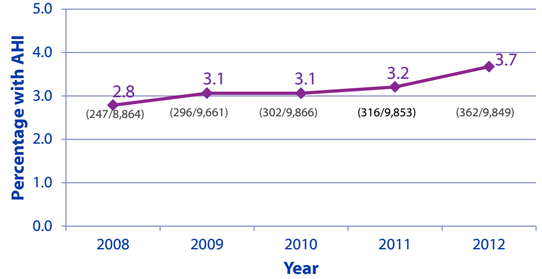

Table 1. Number and percentage with acute HIV infection (AHI) among HIV-diagnosed persons who had a date of a previous negative HIV test, by selected characteristics, 2008-2012

	No. with Previous Negative HIV Test	No. AHI (%)	% of Total AHI	P-value
Sex				
Male	39,455	1,277 (3.2)	83.8	P=0.06
Female	8,638	246 (2.9)	16.2	**Reference**
Race/ethnicity				
Black/African American	20,306	634 (3.1)	41.6	P=0.17
Hispanic/Latino [a]	11,336	341 (3.0)	22.4	P=0.09
White	13,900	471 (3.4)	30.9	**Reference**
Other	2,551	77 (3.0)	5.1	P=0.34
Age at diagnosis (years)				
13-29	22,890	850 (3.7)	55.8	P<0.0001
30-39	12,253	349 (2.9)	22.9	P=0.13
40-49	8,823	225 (2.6)	14.8	P=0.61
50+	4,127	99 (2.4)	6.5	**Reference**
Transmission category				
Male-to-male sexual contact	31,404	1,057 (3.4)	69.4	P<0.001
Injection drug use	1,840	58 (3.2)	3.8	P=0.12
Male-to-male sexual contact and injection drug use	1,744	55 (3.2)	3.6	P=0.13
Heterosexual contact	6,554	164 (2.5)	10.8	**Reference**
Other [b]	6,551	189 (2.9)	12.4	P=0.18
Source of HIV test report				
Laboratory	12,197	485 (4.0)	31.8	P<0.0001
Patient/provider report	35,896	1,038 (2.9)	68.2	**Reference**
Facility of diagnosis				
CTS/STD [c]	12,103	325 (2.7)	21.3	**Reference**
Emergency room	706	24 (3.4)	1.6	P=0.26
Inpatient	5,495	202 (3.7)	13.3	P<0.001
Outpatient	21,540	693 (3.2)	45.5	P=0.006
Other	5,692	190 (3.3)	12.5	P=0.02
Unknown	2,557	89 (3.5)	5.8	P=0.03
Region				
Northeast	11,421	397 (3.5)	26.1	P<0.0001
Midwest	4,360	135 (3.1)	8.9	P=0.11
South	20,737	552 (2.7)	36.2	**Reference**
West	11,575	439 (3.8)	28.8	P<0.0001
CD4 count				
<200	5,511	118 (2.1)	7.7	**Reference**
200-349	6,283	162 (2.6)	10.6	P=0.12
350-499	7,412	259 (3.5)	17.0	P<0.0001
≥500	11,736	482 (4.1)	31.6	P<0.0001
Unknown	17,151	502 (2.9)	33.0	P=0.002
Viral load (copies/µl)				
≤200	1,434	41 (2.9)	2.7	**Reference**
201-10,000	7,922	242 (3.1)	15.9	P=0.69
10,001-100,000	12,792	389 (3.0)	25.5	P=0.70
100,001-1,000,000	7,706	273 (3.5)	17.9	P=0.19
>1,000,000	2,689	149 (5.5)	9.8	P=0.0001
Unknown	15,550	429 (2.8)	28.2	P=0.82
Total	48,093	1,523 (3.2)		

Note. AHI defined by having a previous negative HIV test < 60 days before HIV diagnosis date.
[a] Hispanics/Latinos can be of any race.
[b] Includes hemophilia, blood transfusion, perinatal exposure, and risk factor not reported or not identified.
[c] HIV counseling and testing site or sexually transmitted disease clinic.

RESULTS

- Of 219,773 HIV-diagnosed persons, 48,093 (21.9%) had a previous negative diagnostic HIV test date, of whom 1,523 (3.2%) met criteria for AHI.
- The majority (68%) of the negative HIV test result information came from patient self-report or provider report; only 32% were from documented laboratory test results (Table 1).
- Compared with all HIV-diagnosed persons, higher percentages (by a difference of 10 percentage points or more) of persons with AHI were aged 13-29 years, had HIV infection attributable to male-to-male sexual contact, and were from the Western region of the U.S.; lower percentages (by a difference of 10 percentage points or more) of persons with AHI had HIV infection attributable to other, were aged 50 years and older, or from the Southern region (Figure 1).
- Among HIV-diagnosed persons who had a date of a previous negative HIV test, the percentage of persons categorized as having AHI increased 16% from 3.2% in 2011 to 3.7% in 2012 (Figure 2).
- Among HIV-diagnosed persons who had a date of a previous negative HIV test, by characteristic, the percentage of AHI was significantly higher among persons who: were aged 13-29 years vs. those aged 50 years and older; had HIV infection attributable to male-to-male sexual contact vs. heterosexual contact; had information about the date of most recent HIV negative test collected through a documented laboratory test vs. testing history information reported by a patient or provider; were diagnosed in inpatient, outpatient, or other or unknown facilities vs. CTS/STD facilities; were from the Northeast or Western vs. the Southern region of the U.S.; had CD4 counts above 350 or unknown vs. below 200; or had viral loads greater than 1,000,000 copies/µl vs ≤200 copies/µl (Table 1).

LIMITATIONS

- Only one-fifth of the cases diagnosed during the analysis period had information on previous negative HIV test date. It is unknown what proportion of persons with missing previous negative HIV test date had information on AHI that was not reported to NHSS.
- Implementation of the updated HIV testing algorithm following the June 2011 release of the revised CLSI guidelines[1] was limited.
- Although the validity of self-reported information is unknown, given the short time frame since the last negative test used for defining AHI, recall bias might be minimal. Social desirability bias might lead to overestimating AHI, but infrequent testing might lead to underestimating AHI.

CONCLUSIONS

- NHSS data indicate demographic and geographic disparities in the detection of AHI among HIV-diagnosed persons. This may be due to differences in testing frequency or testing technology.
- By including testing history information as part of the definition of AHI, three times as many persons were identified with AHI than would have been found through documented laboratory reports alone.
- More efforts are needed to improve the rapid detection of persons with AHI, including increasing the frequency of routine HIV testing among populations at high risk for HIV infection, and following recommended HIV diagnostic testing algorithms designed to detect AHI.
- The increase in AHI in 2012 may suggest a potential shift in testing technology and reporting to public health. Widespread implementation of CDC's updated recommendations for laboratory HIV testing released in June 2014 (http://www.cdc.gov/hiv/testing/lab/) may enhance the detection of AHI and optimize opportunities for treatment and prevention.

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