

# Date of First Positive HIV Test: Reliability of Information Collected for HIV/AIDS Surveillance in the United States

---

H. IRENE HALL, PhD<sup>a</sup>  
JIANMIN LI, DPE<sup>a</sup>  
MICHAEL CAMPSMITH, PhD<sup>a</sup>  
PATRICIA SWEENEY<sup>a</sup>  
LISA M. LEE, PhD<sup>a</sup>

## SYNOPSIS

**Objectives.** This study examined the reliability of the first positive HIV test date reported in the U.S. HIV/AIDS Reporting System (HARS). This date is essential to determine case counts for resource allocation for HIV treatment and prevention efforts.

**Methods.** The dates of first positive HIV tests reported by individuals with HIV in an interview survey conducted in 16 states ( $n=16,394$ , interviewed 1995–2002) were compared with the dates of HIV diagnosis reported to HARS. The percentage of agreement for the year of diagnosis and the weighed kappa ( $k$ ) with 95% confidence intervals (CIs) was calculated.

**Results.** Self-reported year of diagnosis agreed with the year of diagnosis in HARS for 56% of date pairs ( $k=0.69$ ; 95% CI 0.68, 0.70); 30% reported an earlier diagnosis year. Agreement differed by sex, age, race, exposure, and reason or place of testing ( $p<.01$ ). Lower agreement was found when the self-reported diagnostic test was anonymous ( $k=0.57$ ; 95% CI 0.52, 0.62) compared with confidential tests ( $k=0.66$ ; 95% CI 0.64, 0.68). Lower agreement was also found for cases first reported with AIDS ( $k=0.58$ ; 95% CI 0.55, 0.62) compared with cases first reported with HIV not AIDS ( $k=0.71$ ; 95% CI 0.70, 0.73) as well as for participants interviewed three years or more after their HARS diagnosis date ( $k=0.55$ ; 95% CI 0.52, 0.57) compared with those interviewed within one year ( $k=0.62$ ; 95% CI 0.61, 0.63). More than 20% of participants in almost all groups, however, reported earlier diagnosis years than those recorded in HARS.

**Conclusion.** As many as 30% of HIV diagnoses may have occurred earlier than recorded in HARS. Additional studies need to determine mechanisms to adequately capture diagnosis dates in HARS.

---

<sup>a</sup>Division of HIV/AIDS Prevention, National Center for HIV, STD and TB Prevention, Centers for Disease Control and Prevention, Atlanta, GA

Address correspondence to: H. Irene Hall, PhD, MS E-47, Centers for Disease Control and Prevention, 1600 Clifton Rd. NE, Atlanta, GA 30333; tel. 404-639-4679; fax 404-639-2980; e-mail <ixh1@cdc.gov>.

The date of an individual's first positive HIV test is a key variable in accurately counting diagnoses per year and in assessing intervals between initial HIV diagnosis and accessing care, AIDS diagnosis, death, or other events. Few studies of the validity of HIV/AIDS surveillance data elements have been published, although routine surveillance activities may verify data during case follow-up investigations or reabstraction studies. The few studies that have been published have assessed the agreement between surveillance data and original medical records or patient interviews with regard to sex, race/ethnicity, and mode of exposure;<sup>1-3</sup> no information is available on the accuracy of the date of HIV diagnosis, defined as the date of the first positive HIV test. A review of medical records to confirm the date of AIDS diagnosis recorded in one state's surveillance system found an agreement of 55% for month and year, and 76% for year alone.<sup>1</sup>

To assess the accuracy of data elements (that is, the degree to which a measurement represents the true value of the attribute that is being measured), a "gold standard" needs to be defined to which the recorded data elements are compared. The date of HIV diagnosis may be reported from a variety of sources, such as inpatient records, physician offices, laboratories, or HIV testing and counseling clinics, and is taken from the earliest reported positive laboratory test result or physician diagnosis of HIV infection. It is therefore not possible to define a gold standard on the basis of any one of these data sources. We used dates of the first positive HIV test reported by respondents in an interview study (the Supplement to HIV and AIDS Surveillance Project [SHAS]<sup>4</sup>) and compared them with the HIV diagnosis date reported to the Centers for Disease Control and Prevention (CDC) through routine surveillance activities (CDC's HIV/AIDS Reporting System [HARS]). We calculated the agreement between the dates of diagnosis recorded in HARS and the interview study to determine the potential for errors in the surveillance data. We did not, however, consider the survey data to represent the standard.

## METHODS

### Data systems used

HARS includes reports on AIDS cases from all states and territories, and reports on HIV cases that have not progressed to AIDS from all areas with name-based reporting of individuals tested confidentially.<sup>5</sup> Only confidential (name-based) HIV tests are captured in HARS. Many areas that have a policy of reporting HIV-infected individuals by name also offer anonymous testing. Such anonymous tests are not captured in the surveillance system; however, a physician record of HIV infection based on results from an anonymous test and the physician diagnosis would be reported to HARS. Information on demographic characteristics, laboratory test results, opportunistic infections, and other factors for individuals with HIV/AIDS is collected by states or territories from a variety of sources, entered into the HARS software system, and electronically forwarded to CDC each month without personal identifying information.

SHAS is an ongoing cross-sectional interview study that began in 1990 in 12 areas; four additional areas were added in subsequent years. It was designed to obtain supplemental descriptive information on a range of behavioral topics for

individuals with HIV infection or AIDS aged 18 or older who have been reported through routine surveillance to state or local health departments.<sup>4</sup> SHAS is conducted by state and local health departments; trained interviewers administer a standardized questionnaire. All states except one offered anonymous testing (Table 1). We used information about the date of first positive HIV test and the reasons for being tested and place of testing. Since May 2000, a question was added about whether the first positive HIV test was anonymous or confidential.

The sites participating in the SHAS project identified potential study participants from cases reported to HARS, and the HARS case identification number was retained to enable later linkage between the two data sources. We used interview data from 1995 through June 2002. The CDC implemented HIV reporting from states with confidential, name-based HIV reporting in 1994. A 1995 start date for this study allowed time for better data quality to assess participant-reporting of earlier HIV tests. Of 35,147 individuals identified for SHAS interview, 13% were deceased, and 16% could not be located. Among the remainder, 71% completed the interview, 18% refused, 9% were too sick to participate, and 2% were not interviewed for other reasons.

### Data matching and merging

Information for HIV-infected individuals from SHAS was merged with information reported to HARS for these same individuals. Case identification numbers were used to create data pairs. Of 16,543 matched cases, information on the date of the first positive HIV test was missing from the SHAS dataset for 149 cases, leaving 16,394 cases for analyses. Of these, 6,712 (41%) were initially reported with HIV infection without AIDS, and 4,303 (26%) were interviewed for SHAS after May 2000 and had information available on whether the HIV test that produced their first positive result was an anonymous or confidential test.

**Table 1. Data collection sites for SHAS**

Site	Start date of name-based HIV reporting
Arizona	January 1987
Colorado	November 1985
Connecticut	No name-based HIV reporting
Delaware	No name-based HIV reporting
Florida	July 1997
Georgia	No name-based HIV reporting
Kansas <sup>a</sup>	July 1999
Los Angeles	No name-based HIV reporting
Maryland <sup>a</sup>	No name-based HIV reporting
Michigan	April 1992
Minnesota <sup>a</sup>	October 1985
New Jersey	January 1992
New Mexico	January 1998
South Carolina <sup>b</sup>	February 1986
Texas <sup>a</sup>	January 1999
Washington	No name-based HIV reporting

<sup>a</sup>These sites started data collection for SHAS in 2000.

<sup>b</sup>This state offers confidential testing only, not anonymous HIV testing.

SHAS = Supplement to HIV and AIDS Surveillance Project

## Variables

The information obtained from HARS for this analysis included age, sex, race/ethnicity, and mode of exposure. In HARS, the date of HIV diagnosis is considered to be the date of the earliest confidential laboratory HIV test with a positive result or the date of physician diagnosis. For individuals first reported to CDC as having HIV infection without AIDS, the date of HIV diagnosis was considered to be the date of the first positive HIV test. For individuals first reported to CDC as having HIV infection with AIDS (i.e., HIV and AIDS diagnosis occurred within one month), the date of HIV diagnosis was used when available. If the earliest reported date of HIV diagnosis for an individual with AIDS was later than the date of AIDS diagnosis, or if the date of HIV diagnosis was missing, the date of AIDS diagnosis was used as the date of first HIV diagnosis. For 35.5% of individuals with AIDS, the reported dates of HIV diagnosis and AIDS diagnosis occurred within the same month. We further stratified the data by whether a case was first reported to CDC with (1) HIV without AIDS, (2) with AIDS from a state with confidential HIV reporting, or (3) with AIDS from a state without confidential HIV reporting. We were unable to construct a variable indicating states with electronic laboratory reporting of HIV cases because few states had fully implemented laboratory reporting or had had such reporting for a substantial period of time.

The information obtained from SHAS included the reported date of the first positive HIV test. Participants in SHAS were asked, "When did you first find out you had tested positive for HIV (the virus that causes AIDS)?" The month and year were then recorded. Additional information obtained from SHAS included the following: the reason and place of testing, who had recommended the testing, and whether the test was anonymous or confidential (type of test). Information on the type of test was only available for participants interviewed since May 2000.

Our objective was to determine the agreement between the year of diagnosis recorded in HARS and the year of diagnosis reported by respondents to the survey. We did not focus on agreement of more exact dates of diagnosis (month and year, or the difference in months between dates). Surveillance data are usually reported by year of diagnosis, and we attempted to quantify how much misclassification may occur and needs consideration in interpreting surveillance reports.

## Analytic methods

For cases that had both month and year available for the date of the first positive test from both SHAS and HARS ( $n=13,675$  of a total of 16,394 cases available for analysis), we calculated the difference in months between the two dates to assess the distribution of these differences. For all cases ( $n=16,394$ ), we determined the percentage of agreement in the year of diagnosis between the two data sources, as well as the percentage of self-reported dates with a diagnosis year earlier or later than the diagnosis year recorded in HARS. We assessed percentage of agreement by demographic characteristics (reporting state, sex, age, race/ethnicity), mode of exposure, test characteristics (anonymous/confidential, test reason, test place), and the time

interval (in months) between the date of diagnosis recorded in HARS to the date of interview. We also calculated kappa statistics, weighted to account for differences in agreement, for agreement on the year of diagnosis overall and for subgroups, excluding 38 cases from the analyses that had diagnosis dates reported earlier than 1982.<sup>6,7</sup> Kappa statistics and  $p$ -values were calculated using the Cicchetti-Allison weight type in the SAS software.<sup>7</sup> We defined excellent agreement as a kappa statistic ( $k$ ) greater than 0.75, fair to good agreement as 0.40 to 0.75, and poor agreement as less than 0.40.<sup>6</sup>

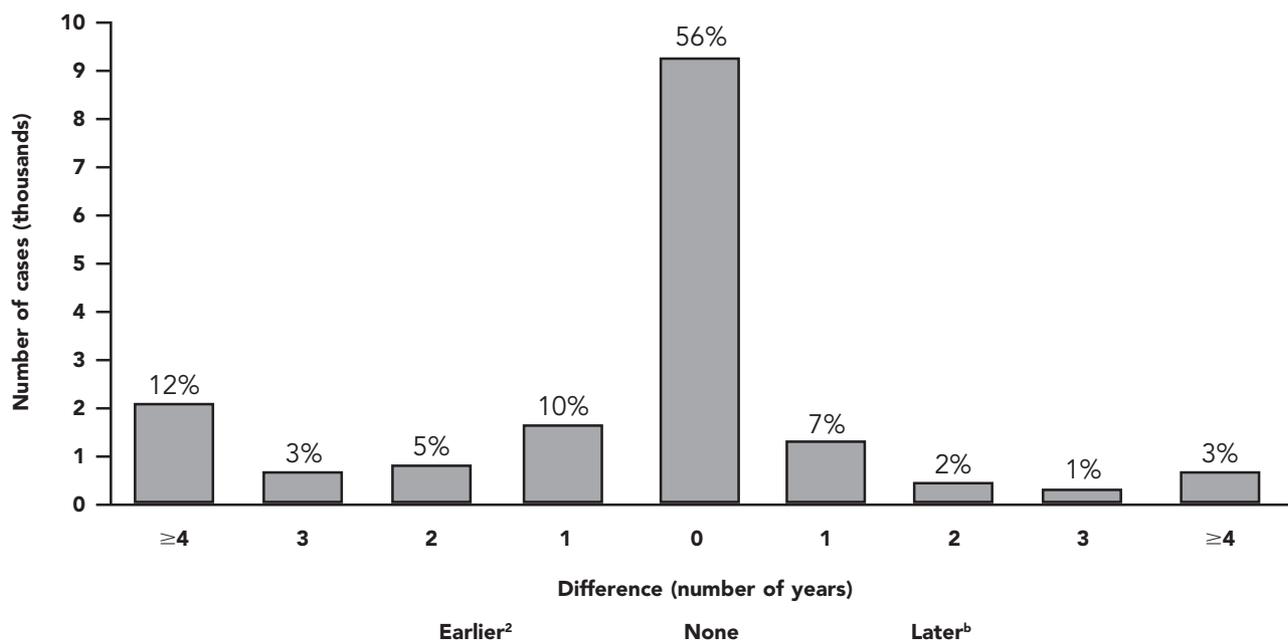
## RESULTS

Of 13,675 HARS-SHAS date pairs that had both month and year of HIV diagnosis available (of a total of 16,394 cases available for analysis), 10,561 (77.2%) had dates within 12 months of each other. Not all of these 10,561 cases, however, matched calendar year of diagnosis; 9,206 (87.2%) had the same calendar year of diagnosis, 585 (6.3%) had a later year self-reported than was recorded in HARS, and 770 (8.4%) had an earlier year self-reported than was recorded in HARS. Overall, 9,206 (56.2%) of all 16,394 HARS-SHAS date pairs had the same year of diagnosis; 2,299 (14.0%) of the SHAS respondents reported a later year than HARS, and 4,889 (29.8%) reported an earlier year than HARS (Figure).

The percentage of HARS-SHAS date pairs that agreed on the same calendar year of diagnosis varied by the year cases were reported to HARS, with 54.7% in agreement in 1995 and 66.0% in agreement in 2002. The proportion of respondents who reported an earlier year of diagnosis than was recorded in HARS was 30.5% in 1995 and 27.0% in 2002. Agreement varied among states and ranged from 37.4% to 80.5%; for cases reported from states with name-based HIV reporting, agreement ranged from 51.8% to 80.5%, and for cases reported from states that did not have name-based HIV reporting, agreement ranged from 28.6% to 59.9% (the latter states report only AIDS cases to CDC). For states that implemented name-based HIV reporting during the observation period, agreement was 49.1% for cases reported before implementation and 62.9% for cases reported after implementation.

Agreement on the year of diagnosis differed by age group (the highest observed agreement [63.8%] was found among those aged 55 to 64, the lowest [54.4%] among those aged 35 to 44) and exposure routes (the highest observed agreement [62.7%] was found among those exposed through heterosexual contact, the lowest [47.2%] among those exposed through injection drug use) (Table 2). Agreement varied by the length of time between the date of diagnosis recorded in HARS and the date of the interview (highest agreement [74.3%] was found in participants interviewed within 12 months, the lowest agreement [42.8%] among those interviewed three years or more later). Agreement was the highest for AIDS cases reported from states with name-based HIV reporting (68.6%), followed by HIV cases reported from states with name-based HIV reporting (59.6%), followed by AIDS cases reported from states that did not have name-based HIV reporting (51.0%). Among the 8,165 reported cases of AIDS from states without name-based HIV reporting, the same date (month and year, or year only

**Figure. Date of first positive HIV test: difference in years between self-reported year from SHAS and year reported to CDC's HIV/AIDS Reporting System, 1995–2002**



<sup>a</sup>Diagnosis year reported in SHAS earlier than year recorded in HARS.

<sup>b</sup>Diagnosis year reported in SHAS later than year recorded in HARS.

SHAS = Supplement to HIV and AIDS Surveillance Project

HARS = HIV/AIDS Reporting System

*n*=16,394

when month was missing) was reported for HIV and AIDS diagnosis for 3,044 cases (37.3%); date of HIV diagnosis was earlier than the date of AIDS diagnosis for 4,623 cases (56.6%), and the date of AIDS diagnosis was earlier than the reported date of HIV diagnosis or the date of HIV diagnosis was missing for 498 cases (6.1%). Among cases with the same dates for HIV and AIDS diagnosis reported in HARS, agreement with SHAS was 58.1%; for those with a date of HIV diagnosis, agreement was 48.4%; and for those with a date of AIDS diagnosis, agreement was 31.7%.

HARS and SHAS agreement on the year of diagnosis also differed by self-reported factors, including reasons and recommendations for testing and type and place of testing. The most frequent reason for testing was illness (6,485 of 16,385 [40%] for whom this information was available). Among those who said they were tested because of illness, the calendar year of diagnosis agreed between HARS and SHAS for 64.7% (Table 2). Among those interviewed for SHAS after May 2000, most received their first positive HIV test results from a confidential test (3,492 of 4,303 [81.2%] for whom this information was available), and agreement was 59.1% among this group (Table 2). In contrast, agreement was 44.3% among those tested anonymously. Agreement was 62.5% when someone else recommended testing and 52.2%

when participants sought testing on their own. Finally, the highest agreement by place of testing was observed for those who were tested in an emergency room (78.2%), and the lowest among those who were tested in a correctional facility (47.4%). The discrepancy between the number of participants reporting blood donation as the reason for testing (*n*=351) and the number reporting blood banks as the place of testing may be due to the identification of other clinics as the place of testing when donating blood.

The kappa statistic revealed overall good agreement between self-reported years of diagnosis and years of diagnosis reported to HARS (*k*=0.69; 95% CI 0.68, 0.70). The test for equal kappa coefficients showed significant differences in agreement between states (*p*<0.0001, data not shown) and subgroups for the factors shown in Table 2.

According to self-reports, about 30% of HIV diagnoses may have occurred in an earlier year than recorded in HARS, but this varied among states from 7% to 42%. Just as agreement on the same year of diagnosis varied among subgroups, reporting of an earlier year of diagnosis also varied (Table 2). Participants who were interviewed sooner rather than later after their date of HIV diagnosis recorded in HARS less commonly reported an earlier year of diagnosis. Earlier years of diagnosis were most commonly reported by those who

**Table 2. Date of first positive HIV test: comparison of self-reported year of diagnosis from SHAS to that reported to HARS, 1995–2002**

	Same year reported by each					Earlier year reported in SHAS
	n <sup>a</sup>	Percent <sup>b</sup>	k <sup>c</sup>	95% CI <sup>c</sup>	p <sup>d</sup>	Percent <sup>e</sup>
Total	16,394	56.2	.69	.68, .70		29.8
Sex					<.01	
Male	12,202	55.3	.68	.67, .69		30.8
Female	4,192	58.7	.72	.70, .73		26.9
Age (years)					<.01	
18–24	1,329	62.5	.80	.78, .82		20.6
25–34	6,026	54.8	.69	.67, .70		30.1
35–44	6,232	54.4	.66	.65, .67		32.3
45–54	2,191	59.2	.70	.67, .72		28.8
55–64	528	63.8	.68	.63, .73		25.8
≤65	86	55.8	.69	.59, .80		24.4
Unknown	2					
Race					<.01	
White	4,797	55.7	.68	.66, .69		32.5
Black	8,438	54.8	.68	.67, .69		29.7
Hispanic	2,970	60.3	.71	.69, .73		26.4
Asian/Pacific Islander	72	59.7	.70	.57, .83		27.8
American Indian/Alaska Native	108	61.1	.80	.73, .87		18.5
Other/unknown	9	55.6	.62	.25, 1.0		33.3
Mode of exposure					<.01	
Men who have sex with men	6,491	56.8	.69	.67, .70		30.6
Injection drug use	3,765	47.2	.60	.58, .62		34.4
Men who have sex with men and inject drugs	1,259	48.7	.63	.59, .66		36.3
Heterosexual contact	3,420	62.7	.73	.71, .74		24.6
Other/unknown	1,459	67.4	.75	.73, .78		21.3
Case first reported to CDC as HIV					<.01	
AIDS, states with name-based HIV reporting	6,712	59.6	.71	.70, .73		26.0
AIDS, states without name-based HIV reporting	1,517	68.6	.58	.55, .62		27.6
AIDS, states without name-based HIV reporting	8,165	51.0	.64	.63, .66		33.4
Time between date of diagnosis recorded in HARS and date of interview					<.01	
0–12 months	5,732	74.3	.62	.61, .63		22.8
13–24 months	2,260	57.4	.49	.45, .52		32.4
25–36 months	1,451	46.8	.51	.47, .55		38.8
>36 months	5,169	42.8	.54	.52, .57		34.8
Unknown	1,782					

*continued on p. 94*

had been tested anonymously (42.6%), who had been tested in a correctional facility (41.2%) or military facility (40.5%), or who had indicated the reason for testing was being at risk (39.8%) or donating blood (39.0%).

## DISCUSSION

Overall, agreement on the year of diagnosis was good according to self-reports and information recorded in HARS.

According to our analysis, however, as many as 30% of the HIV diagnoses may in fact have been made in an earlier year than that recorded in HARS. Even among SHAS participants who were interviewed within 12 months of the diagnosis date recorded in HARS, 23% reported an earlier year than was recorded in HARS. The literature contains no other studies to which we can compare our results. One study that assessed the concordance for the date of AIDS diagnosis found that 24% (49 of 206 cases for whom this

**Table 2 (continued). Date of first positive HIV test: comparison of self-reported year of diagnosis from SHAS to that reported to HARS, 1995–2002**

	Same year reported by each				Earlier year reported in SHAS
	n <sup>a</sup>	Percent <sup>b</sup>	k <sup>c</sup>	95% CI <sup>c</sup>	Percent <sup>e</sup>
Reason for testing					<.01
Required	1,492	49.2	.66	.64, .69	36.5
Illness	6,485	64.7	.74	.73, .75	20.5
At risk	2,081	45.9	.60	.57, .62	39.8
Pre-operative screening	517	49.5	.63	.58, .68	36.4
Sex partner is injection drug user or man who has sex with men	1,495	54.7	.64	.61, .67	33.0
Blood donor	351	48.7	.58	.52, .64	39.0
Physician recommended	858	54.7	.63	.59, .67	31.9
Offered at clinic	730	50.8	.60	.55, .64	36.7
Curious	541	49.0	.61	.56, .66	37.3
Other/unknown	1,835	52.6	.66	.63, .69	34.0
Type of test <sup>f</sup>					<.01
Anonymous	540	44.3	.57	.52, .62	42.6
Confidential	3,492	59.1	.66	.64, .68	27.4
Unknown	271	61.6	.68	.60, .75	24.0
Recommendation of testing <sup>g</sup>					<.01
Someone else	2,169	62.5	.67	.65, .70	23.7
Self	1,673	52.2	.62	.59, .65	34.8
Required	461	52.1	.67	.61, .72	34.1
Place of testing <sup>h</sup>					.03
HIV/STD clinics	794	54.3	.65	.61, .69	30.1
Other clinics	1,373	53.5	.62	.59, .65	32.9
Physician/HMO	709	59.2	.67	.62, .71	28.5
Hospital (inpatient)	822	67.2	.69	.65, .73	18.5
Emergency room	124	78.2	.77	.66, .88	11.3
Correctional	245	47.4	.61	.53, .68	41.2
Blood bank	114	50.0	.55	.43, .67	39.5
Military facility	37	54.1	.58	.39, .77	40.5
Other/unknown	87	50.6	.62	.50, .74	37.9

<sup>a</sup>Number of SHAS-HARS date pairs

<sup>b</sup>Percentage of SHAS-HARS date pairs that agree on year of diagnosis

<sup>c</sup>Weighted kappa coefficient and 95% confidence interval (CI)

<sup>d</sup>Test for equal kappa coefficients

<sup>e</sup>Percentage of SHAS-HARS date pairs where SHAS year of diagnosis was earlier than HARS year of diagnosis

<sup>f</sup>This information was available only for cases interviewed during 2000–2002; for place of testing additional options were added during that time.

SHAS = Supplement to HIV and AIDS Surveillance (SHAS) Project

HARS = HIV/AIDS Reporting System

CDC = Centers for Disease Control and Prevention

information was available) had received their AIDS diagnosis earlier than that recorded in the state surveillance system.<sup>1</sup>

Agreement varied by demographic and behavioral characteristics as well as by the circumstances of testing, such as the reason or place of testing. These factors may indicate problems with reporting of positive HIV test results from particular sources. State and local health departments may assess whether improvements are needed to obtain testing information from these sources; however, just as agreement

varied by states, reporting of positive HIV test results from a particular reporting source may vary by state.

Our results are subject to several limitations. Participants may not remember test dates correctly. For example, 14.0% of the SHAS respondents reported receiving their HIV diagnosis later than that recorded in HARS, and these discrepancies varied by the length of time between diagnosis and interview. Further, many eligible subjects could not be interviewed because they were deceased, not located, too sick, or

refused to be interviewed. The effect that anonymous testing had on this analysis is unknown; lower agreement among those who indicated they had ever had an anonymous test suggests that anonymous testing may account for some of the self-reports of receiving a diagnosis earlier than reported in HARS. About 13% of the SHAS participants indicated that the HIV test they had had was anonymous (question added June 2000), and therefore this test could not have been reported to HARS. A small proportion of HIV cases recorded in HARS (about 5%) met the case definition on the basis of physician report without evidence of a laboratory test, and cases diagnosed by anonymous testing may be reflected in that group. There is also the possibility that states used data collected through SHAS to update the information in HARS, which would result in a falsely increased rate of agreement. Finally, individuals with HIV/AIDS who were interviewed sooner after receiving a new diagnosis of HIV may remember their diagnosis date more accurately than those interviewed after a longer interval; we found better agreement for those with a shorter time interval between the HARS recorded diagnosis date and the interview date.

Variations in implementation of HIV reporting and reporting practices may affect the information collected. Some states initially collected information for new HIV diagnoses only and did not capture prevalent HIV diagnoses. Although prevalent HIV diagnoses are captured once they progress to AIDS, information on earlier HIV test results may be more difficult to obtain. The practice of laboratory reporting, including electronic reporting, may increase the level of agreement. We had inadequate data to evaluate the effect of laboratory reporting on our results. It is unknown whether additional information on HIV tests is universally used to update records of AIDS cases or, where applicable, previously reported HIV cases. Further, migration of individuals with HIV between reporting areas may hinder accurate data collection. For example, a later date of diagnosis may be recorded in HARS if information from the state where the first diagnosis occurred is not available to the new state. The Council of State and Territorial Epidemiologists (CSTE) recommends the state-to-state reciprocal notification process for HIV and AIDS case reports—similar to that used for other reportable diseases—to resolve duplicate reports and facilitate reporting of required case data.<sup>8</sup> The use of reciprocal notification to facilitate communication between HIV surveillance programs will ensure more accurate diagnosis dates for national and local monitoring of the HIV epidemic.

The minimum performance standards of the CDC Guidelines for National Human Immunodeficiency Virus Case Surveillance include a standard on data quality: "All HIV/AIDS surveillance systems should collect the recommended standard data in a reliable and valid manner."<sup>9</sup> The performance standard, however, does not specify a maximum error rate for individual data elements or records. Misclassification of the year of diagnosis can lead to inaccurate annual case counts and trends in diagnosis rates, as well as inaccurately

calculated follow-up times between HIV diagnosis and AIDS or death.

In summary, HARS appears to correctly capture the majority of dates of first positive HIV tests. Future studies should assess the potential for errors in reporting by survey participants and ask for the specific location where the first positive HIV test was conducted to review records and verify self-reports. Additional studies may also assess the validity of diagnosis dates by comparing the date of diagnosis from HARS with test dates in laboratory databases. Increased use of electronic laboratory reporting of HIV tests to surveillance programs may improve HARS's information collected on dates of the first positive tests. CSTE has encouraged states to adopt laboratory reporting of HIV nucleic acid (DNA and RNA) detection test results and CD4 counts and suggested that electronic laboratory reporting procedures could help assist management of reportable laboratory results.<sup>10</sup> Efforts to improve efficiency and standardization of laboratory reporting, such as implementation of electronic laboratory reporting, together with ongoing evaluations of system performance by state and local health departments, will ensure that HIV surveillance data are of sufficient quality for effective planning and allocation of resources for HIV prevention and care. Because reliable case counts are essential for resource allocation for HIV treatment and prevention efforts, additional studies are needed to examine the validity of HIV diagnosis dates and the reasons why HARS has failed to accurately capture some initial diagnosis dates.

## REFERENCES

1. Gallagher KM, Jara M, Demaria A Jr, Seage GR, Heeren T. The reliability of passively collected AIDS surveillance data in Massachusetts. *Ann Epidemiol* 2003;13:100-4.
2. Klevens RM, Fleming PL, Li J, Gaines, CG, Gallagher K, Schwarcz S, et al. The completeness, validity, and timeliness of AIDS surveillance data. *Ann Epidemiol* 2001;11:443-9.
3. Lee LM, Lehman JS, Bindman B, Fleming PL. Validation of race/ethnicity and transmission mode in the U.S. HIV/AIDS reporting system. *Am J Public Health* 2003;93:914-7.
4. Buehler JW, Diaz T, Hersh BS, Chu SY. The supplement to HIV/AIDS surveillance project: an approach for monitoring HIV risk behaviors. *Public Health Rep* 1996;111(Suppl 1):133-7.
5. Centers for Disease Control and Prevention. HIV/AIDS Surveillance Report; 2001; 13(No. 2).
6. Fleiss JL. *Statistical methods for rates and proportions*. 2nd ed. New York: Wiley; 1981.
7. SAS Institute. *SAS/STAT User's Guide*. Version 8. Cary, NC: SAS Institute; 1999. p. 1309-11.
8. Council of State and Territorial Epidemiologists. Reciprocal (inter-state) notification of HIV cases [CSTE position statement 01-ID-04] [cited 2003 May 20]. Available from: URL: <http://www.cste.org/ps/2001/2001-id-04.htm>
9. Centers for Disease Control and Prevention (US). Guidelines for national human immunodeficiency virus case surveillance, including monitoring of human immunodeficiency virus infection and acquired immunodeficiency syndrome. *MMWR Recomm Rep* 1999; 48(RR-13):11-7.
10. Council of State and Territorial Epidemiologists. Improved laboratory surveillance for HIV [CSTE position statement 01-ID-03] [cited 2003 May 20]. Available from: URL: <http://www.cste.org/ps/2001/2001-id-03.htm>