HIV Testing and Referral to Care in U.S. Hospitals Prior to 2006: Results from a National Survey

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SYNOPSIS

Objectives. We sought to provide a benchmark for human immunodeficiency virus (HIV) testing availability and practices in U.S. hospitals prior to the Centers for Disease Control and Prevention's (CDC's) 2006 revised recommendations.

Methods. We conducted a survey of nonfederal general hospitals in the U.S. in 2004. Chi-square tests detected significant associations with hospital characteristics. Questionnaires were completed electronically via a secure Internet site or on paper. Nonresponse analysis was conducted and data were weighted to adjust for nonresponse.

Results. HIV testing (on the basis of clinical symptoms or behavioral risk factors) was available in more than half of hospital inpatient units (62%), employee health departments (58%), and emergency departments (57%). Twenty-three percent offered routine screening (testing for people in a defined population regardless of clinical symptoms or behavioral risk), most commonly in labor and delivery. Teaching status, region, size, and type of metropolitan area were associated with the availability of HIV testing and routine screening ($p < 0.01$). Hospitals used a variety of methods to link patients to care: referral to a hospital-based clinic (36%); on-site, same-day evaluation (35%); and referral to an unaffiliated HIV or community clinic (42%).

Conclusions. Hospitals offered HIV testing on the basis of clinical suspicion or risk, but were far from meeting CDC's current recommendation to routinely test all patients aged 13 to 64. Hospital size, teaching status, and geographic location were associated with HIV testing availability and testing practices. Our understanding of current practice identifies opportunities for public health action at the practitioner, organization, and systems levels.

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According to the 2006 National Health Interview Survey, 18% of adults aged 18 to 64 years received a human immunodeficiency virus (HIV) test in a hospital setting.¹ The Centers for Disease Control and Prevention (CDC) has recommended voluntary, routine HIV testing for hospital patients at high risk for HIV infection for more than a decade.²⁻⁴ In September 2006, CDC revised and strengthened this recommendation, proposing voluntary HIV testing for all patients in health-care settings, aged 13 to 64 years, regardless of risk.⁵ While hospitals are second only to physicians' offices in terms of where people report receiving an HIV test,¹ very little is known about the prevalence and practice of HIV testing and referral in U.S. hospitals. To monitor the uptake of CDC's recommendations and proactively address barriers and limitations to their uptake, researchers, administrators, and policy makers must know hospitals' current practice with respect to HIV testing. This article provides a benchmark with which to do so.

To date, studies of HIV testing in hospitals have examined specific departments or units in hospitals (e.g., labor and delivery [L&D] and emergency departments [EDs]) and in most cases have focused on interventions in a single institution. Several studies have described HIV testing in urban EDs.⁶⁻¹⁷ Fewer have focused on HIV testing of inpatient¹⁸⁻²⁰ or urgent care patients.^{14,21} While these studies provide valuable insight into the feasibility of routine HIV testing in specific hospital settings and outcomes achieved in targeted interventions, their single case study designs limit their generalizability.²² Furthermore, studies confined to one or even a few facilities provide no gauge with which to measure the prevalence of HIV testing across U.S. hospitals or how widespread various practices are. Two studies have assessed HIV testing in EDs across institutions.^{23,24}

This study provides the first national snapshot of hospital HIV testing practices. The specific aims are threefold: (1) assess the availability of two types of HIV testing in hospital settings—testing on the basis of clinical presentation or risk and screening defined populations of patients—prior to CDC's release of revised recommendations for HIV testing in health-care settings; (2) when HIV testing was available, explore how it was implemented and how patients were linked to care; and (3) describe how HIV testing availability and practice vary across hospitals.

METHODS

Survey instrument and administration

In 2004, we surveyed all nonfederal, general medical and surgical hospitals within the U.S. listed in the 2002

American Hospital Association (AHA) Annual Survey Database,²⁵ which contains data on the universe of U.S. hospitals; 2002 was the most current edition at the time of this survey. The survey instrument consisted of 48 questions in the following domains: (1) assessment of current practices and policies for HIV testing; (2) screening, services, and referral to care; (3) external agreements with other providers; (4) use of rapid HIV tests; and (5) facilitators and barriers to screening.

Questionnaires were mailed to each hospital's chief executive, who was instructed to identify the person "most knowledgeable about HIV testing policies and practices" to respond on behalf of the hospital. Respondents had the option of completing a paper questionnaire and returning it via prepaid business reply mail or completing the questionnaire online via a password-protected website.

Definitions

In this study, HIV testing is defined as performing an HIV test because of clinical symptoms or behavioral risk factors. This definition encompasses CDC's 2006 definitions of "diagnostic" testing—performing an HIV test for people with clinical signs or symptoms consistent with HIV infection—and "targeted" testing—performing an HIV test for subpopulations of people at higher risk. The definition of HIV screening is performing an HIV test for all people in a defined population, regardless of clinical symptoms or behavioral risk factors, and is the same one used in CDC's 2006 recommendations.⁵ "Opt-out screening"—performing HIV screening after notifying the patient that (1) the test will be performed and (2) the patient may elect to decline or defer testing—was not assessed in this survey, as it predated the release of the 2006 recommendations.

Analysis

Sample weights were calculated and applied to all analyses. Because the full universe of eligible hospitals was surveyed, the basic weight for each hospital was one. Next, to assess potential bias due to nonresponse, the distribution of respondents was compared to that of nonrespondents for various hospital characteristics. Chi-square tests were used to detect significant differences. To control for nonresponse, sample weights were post-stratified using a raking method to match the marginal distributions of the weights to variables for which there was a significantly different distribution as well as total number of beds in 2002. The final weights represent the universe of hospitals satisfying our eligibility criteria (4,497 general medical and surgical hospitals in 2002).

Due to the finite size of the universe studied, a finite population correction was applied to the variance

estimates.²⁶ Ignoring the population's finite nature would have resulted in overestimated variances and standard errors of estimates. The margin of error for a full sample estimate (1,230 observations) was $\pm 1.2\%$.

Bivariate analyses were conducted to determine whether HIV testing availability and practice varied by hospital characteristics: hospital ownership (government, nonprofit, or for profit); hospital size (small: <50 beds, medium: 50–99 beds, or large: >100 beds); teaching status (membership in the Council of Teaching Hospitals and Health Systems of the Association of American Medical Colleges or residency training approval by the Accreditation Council for Graduate Medical Education); census region (Northeast, Midwest, South, or West); and metropolitan statistical area (MSA) type (<250,000 population, 250,000–1 million, >1 million, or non-MSA areas [defined as rural or frontier]). These variables were obtained from the 2002 AHA Annual Survey Database. Statistically significant differences were determined through Chi-square tests. Results were considered significant at $p < 0.05$. When

the sample size in any response cell was small ($n < 30$), subgroup analysis was not performed.

Percentages relating to HIV testing in EDs, L&D units, trauma centers, urgent care centers, and outpatient centers were based only on those hospitals with said department according to the 2002 AHA Annual Survey Database. It was assumed that all hospitals had inpatient services.

RESULTS

Sample characteristics

A total of 1,230 hospitals participated in this survey, which represented about 27% of all nonfederal general hospitals in the U.S. at that time ($n = 4,497$). The majority of respondents were professionals in infection control (43%) or the laboratory (25%). Characteristics of this sample generally reflected the population of U.S. hospitals; however, the distribution of respondent hospitals differed significantly from nonrespondent hospitals relative to three variables: ownership, MSA type, and census region (Table 1). Sixty-six percent of

Table 1. Selected characteristics of U.S. hospitals by total population, HIV testing survey respondents, and nonrespondents^a

Characteristic	All hospitals (n=4,497)	Respondents (n=1,230)	Nonrespondents (n=3,267)	P-value ^b
	Percent	Percent	Percent	
Hospital ownership				
Government	24.5	25.8	24.0	<0.001
Nonprofit	62.0	65.6	60.6	
For profit	13.5	8.6	15.4	
Hospital size				
Small	24.7	25.0	24.6	0.950
Medium	20.7	20.8	20.7	
Large	54.6	54.2	54.7	
Teaching status				
Teaching	16.6	16.7	16.5	0.430
Non-teaching	83.4	83.3	83.5	
Type of metropolitan area				
Large	28.8	27.9	32.0	0.040
Medium	19.7	18.0	15.7	
Small	8.9	8.8	8.4	
Non-metropolitan/rural	42.6	45.3	43.9	
Census region				
Northeast	13.7	18.6	11.8	<0.001
Midwest	29.7	34.1	28.1	
South	37.7	32.4	39.7	
West	18.9	15.0	20.4	

^aPercentages are unweighted.

^bBased on Chi-square test of comparison between respondents and nonrespondents

HIV = human immunodeficiency virus

respondent hospitals were nonprofit, 26% were government, and 9% were for profit. The distribution among nonrespondents was 61% nonprofit, 24% government, and 15% for profit. Among respondent hospitals, 28% were in large metropolitan areas, 18% in medium areas, 9% in small areas, and 45% in non-metropolitan areas. These figures compare with 32% of nonrespondents in large metropolitan areas, 16% in medium areas, 8% in small areas, and 44% in non-metropolitan areas. Finally, 19% of respondent hospitals were in the Northeast census region, 34% in the Midwest, 32% in the South, and 15% in the West, while 12% of nonrespondent hospitals were in the Northeast, 28% in the Midwest, 40% in the South, and 20% in the West.

Most sample hospitals had EDs (88%), outpatient centers (70%), and L&D units (69%). One-third had trauma centers and one-quarter had urgent care centers.

Availability of HIV testing in hospitals

Ninety-one percent of responding hospitals offered HIV testing (on the basis of clinical symptoms or risk factors). A majority had HIV testing available in at least one of the following settings: inpatient (62%), employee health (58%), and ED (57%). HIV testing

was also available in L&D (49%) and outpatient settings (43%). HIV testing was not commonly available in urgent care centers (27%) or trauma centers (16%).

Table 2 depicts the prevalence of HIV testing by hospital characteristics and location. HIV testing was available in 100% of teaching hospitals, 97% of hospitals in the Northeast, 96% of hospitals in large MSAs, and 97% of large hospitals. Hospitals' teaching status ($p<0.001$), regional location ($p=0.004$), size ($p<0.001$), and type of metropolitan area ($p<0.001$) were associated with the availability of HIV testing. Hospital ownership (public, nonprofit, or for profit) was not associated with HIV testing ($p=0.320$).

Results related to rapid-test use are not included, as they have been reported elsewhere.²⁷⁻³⁰

Availability of HIV screening in hospitals

While HIV testing was available in most responding hospitals, less than one-quarter (23%) reported screening patients for HIV regardless of location within the hospital. L&D was the most common, with 18% of hospitals reporting they screen patients there. Screening of inpatient, outpatient, or ED patients was rare; none of these occurred in more than 2% of hospitals.

Table 2 also depicts the prevalence of HIV screening

Table 2. Prevalence of HIV testing and screening in U.S. hospitals by selected hospital characteristics and location

Characteristic	N	Offer HIV testing		Screen for HIV	
		Percent	P-value	Percent	P-value
Total	1,217	90.7		23.4	
Hospital ownership					
Government	314	89.1	0.320	19.6	0.070
Nonprofit	797	91.0		23.6	
For profit	106	92.0		29.2	
Hospital size					
Small	305	80.2	<0.001	15.6	<0.001
Medium	249	86.9		21.3	
Large	663	96.8		27.6	
Teaching status					
Teaching	204	99.7	<0.001	34.3	<0.001
Non-teaching	1,013	88.9		21.3	
Type of metropolitan area					
Large	340	95.9	<0.001	29.4	0.008
Medium	221	91.2		22.4	
Small	108	89.6		21.9	
Non-metropolitan/rural	548	87.0		20.0	
Census region					
Northeast	228	97.0	0.004	35.3	<0.001
Midwest	411	89.2		20.4	
South	397	90.5		25.2	
West	181	88.7		15.5	

HIV = human immunodeficiency virus

by hospital characteristics and location. The patterns are similar to what was observed for HIV testing, but at much lower levels. HIV screening was offered in 34% of teaching facilities, 28% of large hospitals, 29% of large MSAs, and 35% of Northeastern hospitals. Teaching status ($p<0.001$), size ($p<0.001$), census region ($p<0.001$), and type of metropolitan area ($p=0.008$) were associated with HIV screening in hospitals; hospital ownership was not ($p=0.070$).

Common reasons for HIV testing in hospitals

The most common indications considered for HIV testing included health-care workers after an occupational exposure (92%), clinicians' concern because of acquired immunodeficiency syndrome (AIDS) symptoms (84%) or risk factors (80%), or patients who requested an HIV test (71%). Treatment of rape victims was an indication in two-thirds of hospitals (68%); HIV tests were indicated for pregnant women in more than half of the hospitals (59%). The least commonly considered indication was when patients were being evaluated for sexually transmitted diseases (STDs) (39%).

Personnel for HIV testing

In hospitals that offered HIV testing, mainly physicians ordered tests (94%), administered pretest procedures such as counseling and consent (70%), and delivered test results to patients (80% when the test was negative, 85% when the test was positive). Nurses also figured prominently, primarily in administering pretest procedures (62%). In some hospitals, they ordered tests (39%), drew specimens (35%), and delivered test results (40% when negative, 28% when positive). In some hospitals, physicians' assistants ordered tests (30%). In others, trained counselors administered pretest procedures (14%) and delivered results (11% when negative, 9% when positive). Social workers and

members of the HIV clinical team were rarely involved in any aspect of HIV testing in hospitals.

Written consent policy in hospitals

Eighty-eight percent of hospitals that offered HIV tests required patients to sign written consents. Ninety-one percent of those that obtained written consent reported it was hospital policy to do so (Table 3). Two-thirds, with regional variation ($p<0.001$), indicated that obtaining written consent was state law. For example, more Northeastern hospitals cited state law requirements than any other region; the South was the least likely to cite state law. Few hospitals reported that consent was required by local law (6%) or at clinician discretion (2%).

Medical evaluation for patients who test positive

Table 4 shows where hospitals refer patients for medical evaluation and follow-up after a positive HIV test. Forty-two percent referred patients to a community-based clinic that was not affiliated with the hospital for medical evaluation. Thirty-six percent referred patients to a hospital-based clinic/outpatient center, and 35% provided an on-site medical evaluation the same day the positive result was disclosed. Referrals to hospital-based clinics were more common among hospitals in the Northeast (45%) and Midwest (41%). Hospitals in the South were more likely to refer patients to community-based clinics (50%). The least common practice was setting an appointment for an on-site medical evaluation at a later date (15%).

Availability of other HIV services

Table 5 shows the availability of HIV services in addition to testing. At least 80% of hospitals that offered HIV tests directly provided or had arrangements with other facilities to deliver primary HIV care services, social services, and HIV counseling services to HIV-positive patients. These services tended to be provided

Table 3. Consent policies for HIV testing in U.S. hospitals by total and census region^{a,b}

	Total (n=931)	Northeast (n=209)	Midwest (n=297)	South (n=289)	West (n=136)	
Consent policy	Percent	Percent	Percent	Percent	Percent	P-value
Obtaining consent is:						
Hospital policy	91.2	92.1	90.7	92.0	89.8	0.810
Local law	6.4	9.1	4.7	5.7	7.9	0.140
State law	65.6	88.6	60.4	55.5	72.5	<0.001
At provider discretion	2.4	0.47	1.6	4.1	2.1	0.040

^an = hospitals that require patients to sign informed consent for HIV testing

^bPercents are weighted; counts are unweighted.

HIV = human immunodeficiency virus

Table 4. Where patients who test positive for HIV in the hospital receive medical evaluation, by total and census region^{a,b}

	Total (n=1,005)	Northeast (n=202)	Midwest (n=337)	South (n=331)	West (n=135)	
Site of medical evaluation	Percent	Percent	Percent	Percent	Percent	P-value
Referral for evaluation at HIV or community clinic (not part of hospital)	41.6	37.7	37.4	49.9	33.4	<0.001
Referral for evaluation at hospital-based clinic or outpatient center	35.9	44.6	40.6	31.9	29.5	0.001
Medical evaluation on-site, same day	34.5	38.1	29.9	37.2	33.0	0.080
Appointment for on-site evaluation, later date	14.5	20.9	16.0	10.0	17.2	0.004

^an = hospitals that offer HIV testing in any setting (all answering)

^bPercents are weighted; counts are unweighted.

HIV = human immunodeficiency virus

by the hospitals themselves rather than through referral arrangements with other facilities, such as community-based, public health, and other provider organizations.

Approximately three-quarters of hospitals provided case management and drug and alcohol treatment. Two-thirds provided partner notification and referral services and infectious diseases specialists. These services were mostly provided through referral arrangements. Case management was equally likely to be available on-site or through referral.

DISCUSSION

In 2006, CDC recommended that all patients in health-care settings be screened for HIV, regardless of clinical or behavioral risk. This was a significant departure from its previous recommendation that health-care provid-

ers offer HIV tests based on an assessment of risk or location in a community with high HIV prevalence.² Findings from this survey suggest that while HIV testing was widely available in hospitals prior to 2006, it was available primarily in cases of occupational exposure or at the provider's discretion; HIV screening was not common. These findings are consistent with those of Wilson et al. who found that HIV testing occurred in about half of academic EDs, but only in special circumstances such as after occupational exposures, cases of rape, and suspicion of HIV infection by clinical manifestations other than suspected HIV.²³

According to this survey, HIV testing was not routine for any patient population, even those for which screening has been recommended historically and consistently—patients in L&D units and patients being evaluated for STDs. Routine prenatal screening has been recommended by CDC since 1995³¹ and the

Table 5. Availability of other HIV services in U.S. hospitals^{a,b}

		Available on-site	Referral arrangement	Neither
HIV services	N	Percent	Percent	Percent
Primary care services	1,097	62.5	39.4	13.8
Social services	1,103	60.0	40.0	16.6
HIV counseling	1,123	61.0	48.6	14.8
Case management	1,085	42.5	42.0	27.2
Drug/alcohol treatment	1,089	23.0	62.4	25.0
Partner notification and referral	1,079	16.6	59.7	33.1
Infectious diseases specialist	1,125	12.9	57.8	35.3

^an = hospitals that offer HIV testing in any setting (all answering)

^bPercents are weighted; counts are unweighted.

HIV = human immunodeficiency virus

American College of Obstetricians and Gynecologists and American Academy of Pediatrics since 1999.³² Similarly, since 1996, the U.S. Preventive Services Task Force has recommended HIV testing for people at increased risk for HIV, including people being treated for STDs.³³ Like this survey, others that have focused on providers in EDs have found low levels of HIV testing for patients with STDs.^{16,23,24}

Treating physicians and nurses handled most aspects of HIV testing, while social workers and HIV care teams had minimal, if any, role in the testing process. The lack of involvement of staff that specialize in counseling, case management, and infectious diseases treatment presents a potential gap in patients' linkages to care. While hospitals tended to refer patients who tested positive to internal resources for medical evaluation and follow-up, one-quarter to one-third of hospitals provided no linkage to infectious diseases specialists, partner services, case management, or drug and alcohol treatment. For hospitals that don't have the resources available on-site to provide these services, CDC recommends referring patients to an external clinical provider, local health department, or community-based organization.⁵

HIV testing and referral practices varied according to hospital characteristics. Teaching hospitals, large hospitals, hospitals in large metropolitan areas, and hospitals in the Northeast were more likely to offer testing and screening. Region was also associated with many of the practical aspects of HIV testing, such as written consent requirements and the ways in which ancillary services were provided, either through internal resources or through referral arrangements with community-based providers. These differences by hospital characteristics may provide direction for future studies as to what effects these factors have on the nature, scope, and implementation of HIV testing in hospital settings. Possible hypotheses include: (1) these institutions have more resources for HIV testing, such as personnel, funding, and services available internally or through referral arrangements with local providers; (2) the prevalence of HIV infection is higher among patients in these types of institutions; and (3) conventional wisdom and practice standards for HIV testing vary by practitioners in these types of institutions.

In this survey, it is unclear to what extent written consent requirements are a barrier to more widespread HIV testing in hospitals, as stated in the 2006 recommendations.⁵ Northeastern hospitals had the highest rates of screening and Western hospitals had the lowest, yet both were more likely than Midwestern and Southern hospitals to report there were state and hospital requirements for written consent.

Limitations

The potential for selection bias existed in this study. Any hospital that met the eligibility criteria could participate in the survey; 27% did so. While the distributions of respondents and nonrespondents were statistically significantly different on three variables (ownership, census region, and MSA type), the magnitude of the difference was greatest for for-profit hospitals (8.6% respondent vs. 15.4% nonrespondent) and census region, with percentage point differences ranging from five to seven. These differences are similar to response patterns in the AHA Annual Survey of Hospitals²⁵ and, thus, do not raise suspicion that they are due to differences in HIV testing practices. In addition, weighting the data helped to minimize possible effects of nonresponse.

These data are based on the responses of the person deemed by the hospital CEO to be most knowledgeable about HIV testing practices in the hospital, typically a professional in infection control or the laboratory. It is conceivable that this respondent may not have been fully knowledgeable about issues such as state laws regarding consent for HIV testing and individual providers' practices. While this study was not designed to triangulate respondents' answers with secondary data sources or studies of individual practitioners' fidelity to HIV testing practices as stated in the survey, this is a critical subject for future research.

Finally, because the survey was conducted prior to the release of the 2006 recommendations, the survey instrument was not designed to gauge recommended practices such as "opt-out screening." A related issue is that because the survey was conducted in 2004, the findings may not reflect HIV testing practices in hospitals today. However, to the best of our knowledge, no other study of hospital-based HIV testing practices compares in scope to this one. Therefore, this study provides public health researchers and practitioners with insight into current practice and serves as a benchmark against which to monitor the uptake of routine HIV testing in hospitals that would otherwise be unavailable.

CONCLUSIONS

This study provides the first national assessment of HIV testing practices in hospitals and a critical baseline prior to CDC's 2006 recommendations from which to measure the uptake of routine HIV testing in hospital settings. While this survey did not assess individual physicians' practices, these findings suggest that in 2004, HIV testing for patients in hospitals was conducted at the providers' discretion, with screening occurring in

a low percentage of L&D units and not at all in other hospital settings.

Opportunities for clinicians, administrators, and policy makers to facilitate increased testing in hospital settings include: (1) educating clinicians about the need for and benefit of expanded HIV testing, particularly for patients with STDs who are at high risk for HIV infection; (2) streamlining administrative requirements for HIV testing to reduce burdens on clinicians; (3) utilizing other staff in the testing process, particularly trained counselors, social workers, and case managers, to deliver results and facilitate patients' linkages to care; and (4) ensuring that linkages are in place for critical services for patients who test positive for HIV, particularly for case management, drug and alcohol treatment, partner notification and referral services, and infectious diseases specialists, where hospitals may not have internal capacity or referral arrangements in place.

On this last point, there may be a role for public health departments to facilitate patients' linkages to services provided by other hospital- and community-based providers to ensure that patients with HIV infection are connected to a full complement of care. Further study is required to detect any changes in practice, as CDC released its revised recommendations, and to measure the relative effects of hospital and environmental characteristics on HIV testing and screening.

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