Published in final edited form as:
Sex Transm Dis. 2008 July ; 35(7): 686–688. doi:10.1097/OLQ.0b013e31816b1f9b.

HIV Testing in Adolescents and Young Adults Receiving STI Testing in an Urban Primary Care Setting

RENATA ARRINGTON-SANDERS, MD, MPH, **JONATHAN ELLEN, MD**, and **MARIA TRENT, MD, MPH**
Division of General Pediatrics and Adolescent Medicine, Johns Hopkins School of Medicine, Baltimore, Maryland

IN THE UNITED STATES, an estimated 1 million people are infected with the human immunodeficiency virus (HIV) and one-quarter are unaware of their infection.[1] Rates of new infections have increased among young persons with nearly half of all new HIV infections in the US occurring in black adolescents and young adults aged 13 to 24.[1-4]

Despite evidence that early diagnosis may have potential advantages in promoting prevention,[5-8] improving immune restoration, and linking HIV-infected persons with care[9] HIV testing has been a controversial and difficult area to define and produce relevant guidelines. In 2001, the Centers for Disease Control and Prevention[10] (CDC) recommended universal HIV testing for all persons who (a) live in communities with an HIV prevalence >1%; (b) have known risk factors for HIV infection; and (c) request HIV testing. In September 2006, the guidelines for health care settings were modified to recommend that all persons aged 13 to 64 years be tested for HIV.[11]

Understanding risk-based care delivery patterns of providers who care for vulnerable populations is salient to understanding the acceptance of the current guidelines. The purpose of this study was to determine if care-seeking adolescents and young adults who were receiving sexually transmitted infection (STI) testing and living in a high-HIV–prevalent community were being tested for HIV according to CDC guidelines.

To select adolescents who fall in the special CDC risk categories, medical records of adolescents and young adults aged 11 to 24 years who were evaluated for an STI in a large academic ambulatory care facility in Baltimore, MD, between July 2003 and June 2004 were reviewed. This time frame was used to include time points in all seasons. This multidisciplinary practice provides general pediatric care, adolescent medicine primary and subspecialty care, and HIV primary and specialty care as a 3-team structure. Most of the patients served by this clinic are from the Baltimore metropolitan area. Baltimore is a large city on the east coast of the United States that is 64% black, has 23% of the population living below poverty level,[12] and an estimated community HIV incidence of 166.8 per 100,000 persons.[13] The clinic is primarily staffed by resident, fellow, and nurse practitioner providers supervised by attending physicians. Counselors are also available on-site to provide pre/posttest HIV counseling and general STI/HIV risk reduction counseling to adolescents.

Quality assurance (QA) laboratory logs were used to randomly identify patients who had STI and/or HIV testing during the study period. Inclusion criteria for chart review included (a) age between 11 and 24 years and (b) evidence of STI screening or testing at the visit during the

Correspondence: Renata Arrington-Sanders, Division of General Pediatrics and Adolescent Medicine, Johns Hopkins School of Medicine, 200 North Wolfe Street, Office # 2083, Baltimore, MD 21287. E-mail: rarring3@jhmi.edu..

study time frame. Patients were excluded in the analysis if they had a known diagnosis of HIV at the time of the visit. Electronic patient records (EPR) were used to confirm test results and prevent misclassification based on the secondary QA log reports. In order for a person to be classified as having been screened or tested for an STI, patients were required to have documented endocervical (females) or urine-based (males) diagnostic testing for either *Chlamydia trachomatis*,or *Neisseria gonorrhea* by EPR. Urine-based testing was unavailable for females. A person was classified as having an STI if one of the following tests were positive by laboratory standards: *C. trachomatis* (Roche AMPLICOR PCR), *N. gonorrhea* (Roche AMPLICOR PCR), herpes simplex viral culture (Micro Test M4 Transport Media), or syphilis by positive Rapid Plasma Reagin Becton Dickinson Macro Vue or Zeus Fluorescent Treponemal Antibody Absorption.

A single reviewer extracted data from the EPR record using a standardized data extraction form developed by the research team. Extracted data included age, race/ethnicity, gender, insurance status, provider, history of an STI before the visit, history of HIV, diagnosis of STI at the visit, presenting complaint, condom use, number of partners (lifetime/current), sexual orientation, and documentation of risk reduction counseling. The main outcome was laboratory evidence of HIV testing. The only HIV screening testing available during the study period was HIV antibody (ELISA) test by venous collection.

This project was approved by the Johns Hopkins Institutional Review Board as a quality improvement study.

Data were first analyzed using descriptive and bivariate analyses. Factors that have been shown to predict HIV testing[10,14-20] were assessed in bivariate analysis with χ^2 statistic to account for the unadjusted association between independent variables with HIV testing. Factors that were significant at $P < 0.05$ were entered in the final model. Stepwise multivariate logistic regression analyses were performed to identify the adjusted odds of HIV testing with regard to different predictors of HIV testing after adjusting for age, gender and insurance status. Odds ratios (OR) and 95% confidence intervals (95% CI) were also calculated. Statistical significance was set at 5%. All analyses were performed with SPSS (version 13.0, SPSS, Inc., Chicago, IL) software package.[21]

One hundred sixty charts of adolescents and young adults who had received care between July 2003 and June 2004 were abstracted from the STI QA log (Table 1). Ten charts (6.3%) were excluded because the adolescent or young adult had a previous diagnosis of HIV. The remaining adolescents were 11 to 21 years old, with a mean age of 17 years (SD 2.0), predominantly female (77%), black (93%), insured (79%), and evaluated by a resident physician (58%). There were no significant differences between males and females for age, race, and insurance status.

Sixty-nine (46%) adolescents had an STI at the index visit and 60 (40%) had a history of an STI. There was no significant difference between males and females for STI at the visit (χ^2= 1.9, $P = 0.18$). Females were 3.6 times more likely than males to have had a history of an STI ($\chi^2 = 8.2$, $P < 0.01$).

Eighty-two (55%) adolescents were tested for HIV at the time of the index visit. One adolescent tested for HIV had a positive result. Most of the adolescents tested for HIV received prevention counseling at the visit (83%). Most adolescents who received counseling received it only from a nurse practitioner or physician provider (67%). In bivariate analysis (Table 2), HIV testing was associated with positive laboratory test for an STI diagnosis, having multiple current partners, receiving risk reduction counseling at the visit and provider level (resident vs. specialty nurse or fellow provider).

In multivariate logistic regression, the final model (Table 2) included STI at the visit, multiple partners, risk reduction counseling, and provider level. The adjusted odds of HIV testing was 2.4 times higher for adolescents with an STI at the visit than adolescents without an STI (AOR 2.4, 95% CI 1.0−5.5) and 5.8 times higher for adolescents with multiple current partners than adolescents with one or fewer current partners (AOR 5.8, 95% CI 1.4−25). Furthermore, the adjusted odds of HIV testing was 2.8 times higher for adolescents seen by an adolescent fellow or subspecialty nurse than adolescents seen by a resident provider (AOR 2.8, 95% CI 1.2−6.7).

The findings of this study are consistent with other studies documenting HIV testing based on risk and significant variability for testing among providers[22,23] Racial disparities in HIV among black adolescents[4] combined with a risk-based approach represents a missed opportunity for HIV testing that puts patients who may be infected for HIV at risk for nontesting because of provider misclassification based on this behavior. Although adolescents diagnosed with an STI or with multiple current partners were more likely tested for HIV, all adolescents with multiple partners and an STI were not tested for HIV, and adolescents seen by a subspecialty nurse or an adolescent fellow were more likely to be tested than those evaluated by a resident physician. One hypothesis for why adolescent patients seen by resident trainees were not routinely tested for HIV is that trainee providers may not view HIV testing as part of routine care, but part of risk-based STD testing. Furthermore, other barriers such as time, comfort, and limited dissemination of HIV testing guidelines may limit routine testing in the academic setting.

These findings must be considered in the context of several limitations. This study used QA logs and EPR data that are limited by provider documentation. Thus, refusal of HIV testing may not have been well documented and HIV testing performed offsite may not have been known or documented by providers. This analysis represents data from a single institution and may not be generalizable to other adolescent and young adult care practices or populations. However, given the prevalence of STIs and HIV in this community, our work adds to the literature.

Based on the variations of care provided by specialty versus resident providers, there is an opportunity for quality improvement efforts to impact trainee behavior around routine HIV testing. Exploration of trainee comfort and the relationship between the quality of counseling and acceptance of HIV testing may strengthen future quality improvement efforts designed to improve care delivery in ambulatory settings. An additional focus on repeat testers, on how the implementation of opt-out testing will influence care-seeking behavior of adolescents and those who refuse testing may also assist in identifying individual level factors influencing testing behavior in the context of clinical care. Ultimately, destigmatization and acceptance of routine testing in pediatric settings providing care to adolescents may potentially identify more youth at-risk for HIV in order to provide successful interventions before infection, early intervention for those already infected, and reduce the growing number of young people affected by the current HIV epidemic.

Acknowledgements

Supported by the Faculty Development in Primary Care training grant from the Health Resources and Services Administration (D55HP00118).

References

1. Centers for Disease Control and Prevention. Epidemiology of HIV/ AIDS-United States, 1981−2005. MMWR Morb Mortal Wkly Rep 2006;55:589–592. [PubMed: 16741494]
2. Centers for Disease Control and Prevention (CDC). HIV/AIDS Surveillance Report. 17. Centers for Disease Control; Atlanta, GA: 2006.

3. Gallant JE. HIV counseling, testing and referral. Am Fam Physician 2004;70:295–302. [PubMed: 15291088]
4. Morris M, Handcock M, Miller WC, et al. Prevalence of HIV infection among young adults in the United States: Results from the Add Health Study. Am J Public Health 2006;96:1091–1097. [PubMed: 16670236]
5. Cleary PD, van Devanter N, Rogers TF, et al. Behavior changes after notification of HIV infection. Am J Public Health 1991;81:1586–1590. [PubMed: 1746654]
6. Fox R, Odaka NJ, Brookmeyer R, et al. Effect of HIV antibody disclosure on subsequent sexual activity in homosexual men. AIDS 1987;1:241–246. [PubMed: 3126772]
7. van Griensven GJ, de Vroome EM, Tielman RA, et al. Effect of human immunodeficiency virus (HIV) antibody knowledge on high-risk sexual behavior with steady and non-steady sexual partners among homosexual men. Am J Epidemiol 1989;129:596–603. [PubMed: 2916553]
8. Quinn TC, Wawer MJ, Sewankambo N, et al. Viral load and heterosexual transmission of human immunodeficiency virus type 1. Rakai Project Study Group. N Engl J Med 2000;342:921–929. [PubMed: 10738050]
9. Kaufmann GR, Zaunders JJ, Cunningham P, et al. Rapid restoration of CD4 T cell subsets in subjects receiving antiretroviral therapy during primary HIV-1 infection. AIDS 2000;14:2643–2651. [PubMed: 11125882]
10. Centers for Disease Control and Prevention. Advancing HIV prevention: New strategies for a changing epidemic—United States 2003. MMWR Morb Mortal Wkly Rep 2003;52:329–332. [PubMed: 12733863]
11. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents and pregnant women in health-care settings. MMWR Morb Mortal Wkly Rep 2006;55:1–17. [PubMed: 16410759]
12. [May 21, 2007]. http://quickfacts.census.gov/qfd/states.
13. The Maryland 2005 HIV/AIDS Annual Report.. Maryland Department of Health and Mental Hygiene. 2006.
14. Goodman E, Berecochea A. Predictors of HIV testing among runaway and homeless adolescents. J Adolesc Health 1994;15:566–572. [PubMed: 7857955]
15. Samet JH, Winter MR, Grant L, et al. Factors associated with HIV testing among sexually active adolescents: A Massachusetts survey. Pediatrics 1997;100:371–377. [PubMed: 9282708]
16. Main DS, Iverson DC, McGloin J. Comparison of HIV-risk behaviors and demographics of adolescents tested or not tested for HIV infection. Public Health Rep 1994;109:699–702. [PubMed: 7938393]
17. Povinelli M, Remafedi G, Tao G. Trends and predictors of human immunodeficiency virus antibody testing by homosexual and bisexual adolescent males. Arch Pediatr Adolesc Med 1996;150:33–38. [PubMed: 8542003]
18. Rotheram-Borus MJ, Gillis R, Reid HM, et al. HIV testing, behaviors, and knowledge among adolescents at high risk. J Adolesc Health 1997;20:216–225. [PubMed: 9069022]
19. Stein JA, Nyamathi A. Gender differences in behavioural and psychosocial predictors of HIV testing and return for test results in a high-risk population. AIDS Care 2000;12:343–356. [PubMed: 10928212]
20. Murphy DA, Mitchell R, Vermund SH, et al. Adolescent Medicine HIV/AIDS Research Network. Factors associated with HIV testing among HIV-positive and HIV-negative high-risk adolescents: The REACH Study. Reaching for excellence in adolescent care and health. Pediatrics 2002;110:e36. [PubMed: 12205286]
21. SPSS Inc.. , editor. SPSS User's Guide to Version 13.0 Statistical Package. Chicago, IL: 2006. Statistical Package for Social Scientists..
22. Simmons E, Roberts M, Ma M, et al. Routine testing for HIV in the United States: The intersection between recommendations and practice. AIDS Patient Care STDS 2006;20:79–83. [PubMed: 16475888]
23. Walter EB, Lampe MA, Livingston E, et al. How do North Carolina prenatal care providers counsel and test pregnant women for HIV? NC Med J 1998;59:105–109.

TABLE 1

Characteristics of 150 Adolescents Aged 11 to 21 yr Evaluated for a Sexually Transmitted Infection (STI) at an Academic Ambulatory Care Facility

Characteristics	Male, N (%)	Female, N (%)	χ^2
Overall	36 (23)	117 (77)	—
Age, mean (SD)	16.6 (2.2)	17.1 (2.1)	—
African American	32 (89)	109 (93)	1.1
Insured	28 (78)	91 (78)	0.0
STI at visit	13 (36)	57 (49)	1.9
H/O STI*	7 (19)	54 (46)	8.2†

*Sexually transmitted infection.

†Female greater than male; *P* value <0.01.

TABLE 2

Predictors of HIV Testing Among 150 Adolescents Aged 11 to 21 yr Evaluated For an STI At an Academic Ambulatory Care Facility, Baltimore, July 2003 to June 2004

Predictor Variable	HIV Tested, N (%)	OR	95% CI	AOR*	95% CI
STI					
STI at the visit	37 (54)	2.4	1.3–4.8	2.4†	1.0–5.5
None	26 (32)	1.0			
Number of partners					
Multiple	12 (80)	6.9	1.8–26.2	5.8†	1.4–25
One	38 (37)	1.0			
Risk reduction					
Counseling	68 (61)	2.8	1.0–4.9	1.7	0.6–4.9
No counseling	14 (36)	1.0			
Provider					
Specialty	32 (55)	2.1	1.1–4.2	2.8†	1.2–6.7
Resident	31 (36)	1.0			

*Adjusted for age, gender and insurance status.

†$P < 0.05$.