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Missed Opportunities for HIV Screening among a Cohort of Adolescents with Recently Diagnosed HIV infection in a Large Pediatric Hospital Care Network

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Abstract

Purpose: Routine HIV screening reduces Human Immunodeficiency Virus (HIV) progression and transmission. Our aims were to determine prevalence and factors associated with prior HIV screening among a cohort of youth living with HIV (YLWH).

Methods: Retrospective chart review of YLWH aged 14–26 at an HIV clinic comparing characteristics between those with and without HIV screening within the year prior to diagnosis.

Results: Subjects (n=301) were male (85%), African-American (87%), and men who have sex with men (MSM) (84%). Subjects seen one year prior to diagnosis (n=58) contributed 179 visits for missed opportunities with 59% having a documented sexual history in the electronic health record (EHR) and 48% tested for HIV. Subjects with symptoms suggesting acute HIV infection (51%) were more likely to be tested (p=0.04). In the adjusted model, documentation of sexual history and demographic factors were not associated with prior testing.

Conclusion: We identified high rates of missed opportunities for HIV testing and sexual history documentation in the year prior to diagnosis, underscoring the need for routine HIV screening in adolescents.

Keywords

HIV testing; missed opportunities; primary care; HIV

The United States Centers for Disease Control and Prevention (CDC) estimates that adolescents and young adults (AYA) account for more than one in five new Human Immunodeficiency Virus (HIV) infections in the U.S. Yet, only 56% of HIV infected AYA

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are aware of their status¹. Early diagnosis of HIV can lead to improved health outcomes and has significant public health benefits². Despite routine testing recommendations, HIV testing prevalence among adolescents remains low³ and missed opportunities for HIV testing and late diagnosis of infection persist⁴.

There is a critical need for research to determine barriers to routine HIV testing in adolescents. We aimed to identify factors associated with non-receipt of routine HIV screening among a subset of recently diagnosed youth living with HIV (YLWH). Secondarily we aimed to determine the proportion of youth who were screened among those who presented with symptoms consistent with acute HIV in the year prior to diagnosis

Methods

Study Design

This retrospective cohort study included YLWH treated at an urban adolescent HIV clinic between January 2009-April 2015. This study was approved by the hospital's Institutional Review Board.

Setting and Subjects:

Subjects were identified by querying the clinic's electronic database for patients seen during the study period. Inclusion criteria were: age 14–26 and confirmed HIV positive serostatus. Data were abstracted from the electronic health record (EHR) and paper charts and entered into a REDCap database.

Measures:

Our primary outcome measure was receipt of HIV testing during the one year prior to diagnosis among those subjects previously seen within the care network. The adolescent HIV clinic is part of a large care network in the Philadelphia metropolitan area that includes primary and specialty care, a pediatric emergency department and a tertiary care hospital. At the time of the study, there were 31 primary care sites. All visits within the care network were included in the analysis. The date of diagnosis was defined as the date of initial HIV confirmatory test.

Exposure measures included demographics and clinical data including CD4+ cell counts, quantitative HIV RNA and presence of symptoms potentially consistent with acute HIV infection (defined as fever, pharyngitis, lymphadenopathy, or flu-like illness).

Documentation of sexual history was defined as any documentation in the EHR progress note that included mention of the patient having sex. A missed opportunity was defined as a prior healthcare encounter occurring within 12 months prior to HIV diagnosis in which HIV testing was not performed. The prior visits only included those from available data in the care network.

Although we only included a prior healthcare encounter occurring within 12 months in which HIV testing was not performed in our missed opportunity analysis, we also collected data on documentation of sexual history, HIV testing and visits in the network 36 months

prior to the diagnosis when available. These visits also represent missed opportunities for testing.

Statistical Analysis

Demographic and clinical variables were summarized using descriptive statistics. Categorical independent variables of interest were compared using the Fisher's exact test. Continuous variables were compared using the two sample t-test (if normally distributed) and Wilcoxon rank-sum testing (if non-normally distributed). All variables were entered into univariate logistic regression analyses and informed the exploratory analysis with exact logistic regression and multivariable logistic regression models (adjusted for insurance, race and gender) to identify factors associated with missed opportunities for HIV diagnosis. Relationships were considered significant at $p < 0.05$.

Results

Demographics

Of 301 subjects identified during the study period who met inclusion criteria, $n=58$ (19%) had at least one visit in the care network in the year prior to diagnosis and entry into the adolescent HIV clinic and were included in the analysis for missed diagnosis. The mean age was $16.95 (\pm 0.4)$, and the majority male (80%), African American (93%), and men who have sex with men (MSM) (81%). Of the patients diagnosed with HIV within the care network ($n=27$), the sites of HIV testing were Outpatient (60%), Emergency Department (26%), and Inpatient (15%).

There were no significant differences across demographic factors (age, gender, race, insurance status, mode of transmission) between those with ($n=58$) and without ($n=301$) prior visits in the health system on bivariate analysis.

Documentation of sexual history

Subjects ($n=58$) seen within the year prior to HIV diagnosis in the hospital network contributed 179 visits to the analysis. The distribution of visit sites was outpatient (56%), emergency department (40%), and inpatient (4%). The 58 subjects were seen on average 4.1 times in the year prior to diagnosis (1–16; SD 3.6) and 59% of visits had any documentation of sexual history. The overwhelming majority of those noting sexual activity included no other information, such as number of partners, gender of partners, or condom use.

Prior HIV testing

Based on patient report at their initial visit after HIV diagnosis, 183/301 (61%) had never had an HIV test prior to their first positive test. Of the total cohort, 26% ($n=79$) had been seen in the care network during the three years prior to HIV diagnosis with a total of 325 medical visits. HIV testing was completed for 31/79 (39%) patients who had medical visits during the three year period prior to diagnosis in the care network.

Of those subjects previously seen within the care network ($n=58$), and included in the missed opportunity analysis, HIV testing was performed in $n=28$ (48%) in the year prior to

diagnosis, indicating missed opportunities for HIV testing in more than half of the sample. Furthermore, 88% (n=51) of those seen in the care network had documented symptoms that could have been consistent with acute infection and of whom 51% were tested. In bivariate analysis (Table 1), subjects presenting with symptoms compatible with possible seroconversion were more likely to be tested for HIV in the year prior to diagnosis (p=0.04). In the multivariate logistic regression model examining factors associated with HIV screening in the year prior to diagnosis, after adjusting for insurance status, race and gender (Table 2), documentation of sexual history (aOR 0.3, 95% CI: 0.1–1.0) approached significance (p=0.06) with decreased odds of prior HIV screening in those without documented sexual history.

Discussion

Prior to HIV diagnoses, AYAs in this cohort had many primary and acute care encounters with the health care system, however many never received prior HIV testing. Our data support previous studies demonstrating that HIV testing rates remain low among adolescents in the year prior to diagnosis⁵ with less than half of the sample tested and only slightly more (59%) having any sexual history documented despite clear public health guidelines supporting sexual history taking at adolescent health care visits.⁶ Additionally, only 51% of those with symptoms that could suggest acute retroviral syndrome were tested. This indicates that testing rates were low in youth who subsequently contracted HIV, regardless of whether sexual history was documented or the presence of symptoms that could be consistent with acute HIV infection.

A recent study by Neilan et al concluded that a one-time routine HIV screen at age 25 is more efficient and cost-effective than routine HIV recommendations.⁷ However, the majority of patients in our study would have had a delayed diagnosis if following this recommendation, as risk factors were not routinely documented in the medical record.

Our findings support the most recent guidelines from the CDC, AAP, USPSTF recommending routine HIV screening for all adolescents, regardless of risk.^{8–10} Increases in routine HIV testing regardless of perceived risk, and rapid testing initiatives among adolescents¹¹ have increased linkage to care and diagnosis of HIV, thus decreasing community viral load and transmission risk.

Our study has limitations, as our data represent a single urban pediatric health system and thus generalizability may be limited. The chart review methodology may have resulted in misclassification bias wherein providers considered testing for HIV, but did not document the discussion and/or patient refusal of testing. Limited to patients only seen within the network, we may have been underpowered due to small sample size to detect differences in prior HIV testing based on key characteristics. Additionally, patients may have sought testing elsewhere but visits within the care network still represent potential missed opportunities for providers to offer and document screening.

Conclusion

Our data support the adoption and implementation of routine HIV testing guidelines by pediatric providers. Adolescents may not always disclose sexual activity during routine assessment, and provider level barriers⁵ limits the reach of risk-based testing algorithms. Future research is needed to develop interventions in the clinical setting to improve provider comprehensive sexual health and HIV screening practices among adolescents.

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References

- Centers for Disease Control and Prevention (CDC). <https://www.cdc.gov/hiv/pdf/library/slidesets/cdc-hiv-prevention-and-care-outcomes.pdf>
- Ryscavage PA, Anderson EJ, Sutton SH, Reddy S, Taiwo B. Clinical Outcomes of Adolescents and Young Adults in Adult HIV Care. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2011;58(2):193–197. doi:10.1097/qai.0b013e31822d7564. [PubMed: 21826014]
- Handel MV, Kann L, Olsen EO, Dietz P. HIV Testing Among US High School Students and Young Adults. *Pediatr*. 2016;137(2). DOI:10.1542/peds.2015-2700.
- Chin T, Hicks C, Samsa G, Mckellar M. Diagnosing HIV Infection in Primary Care Settings: Missed Opportunities. *AIDS Patient Care STDs*. 2013;27(7):392–397. doi:10.1089/apc.2013.0099 [PubMed: 23802143]
- Wejnert C, Prejean J, Hoots B, et al. Prevalence of Missed Opportunities for HIV Testing Among Persons Unaware of Their Infection. *JAMA*. 2018;319(24):2555–2557. doi:10.1001/jama.2018.7611. [PubMed: 29946714]
- Goyal MK, Witt R, Hayes KL, et al. Clinician Adherence to Recommendations for Screening of Adolescents for Sexual Activity and Sexually Transmitted Infection/Human Immunodeficiency Virus. *J Pediatr*. 2014;165(2):343–347. DOI:10.1016/j.jpeds.2014.04.009. [PubMed: 24840761]
- Neilan AM, et al. Optimal Age for Screening Adolescents and Young Adults Without Identified Risk Factors for HIV. *Journal of Adolescent Health*. 2018; 62(1): 22. doi: 10.1016/j.jadohealth.2017.08.028 [PubMed: 29273141]
- Branson Bernard M., et al. Revised Recommendations for HIV Testing of Adults, Adolescents, and Pregnant Women in Health-Care Settings. U.S. Dept. of Health & Human Services, Centers for Disease Control and Prevention, 2006.
- “Adolescents and HIV Infection: The Pediatrician’s Role in Promoting Routine Testing.” *Pediatrics*, vol. 128, no. 5, 2011, pp. 1023–1029., doi:10.1542/peds.2011-1761. [PubMed: 22042816]
- Final Recommendation Statement: Human Immunodeficiency Virus (HIV) Infection: Screening. U.S. Preventive Services Task Force. December 2016. <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/human-immunodeficiency-virus-hiv-infection-screening>
- Camacho-Gonzalez AF, Gillespie SE, Thomas-Seaton L, et al. The Metropolitan Atlanta community adolescent rapid testing initiative study. *Aids*. 2017;31. doi:10.1097/qad.0000000000001512.

Implications and Contribution

Routine HIV screening can reduce the risk of HIV progression and transmission in adolescents and young adults, a group at disproportionate risk of HIV. Sexual history was undocumented in the majority of visits and less than half were tested for HIV. These findings underscore the need for routine HIV testing.

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Table 1:

Characteristics of cohort seen one year prior to diagnosis (n=58) and bivariate analysis

Variable	Total sample (n=58)	HIV Testing within 1 year prior to diagnosis (n=28)	No HIV Testing within 1 year prior to diagnosis (n=30)	p-Value
Age at Diagnosis (Mean/SD)	16.95 ± 0.4	17.2 ± 1.7	16.7 ± 1.5	0.22 ^a
Gender				0.43b
Cisgender Male	47 (80%)	24 (86%)	23 (77%)	
Cisgender Female	8 (14%)	2 (7%)	6 (20%)	
Transgender (MtF)	3 (6%)	2 (7%)	1 (3%)	
Race/Ethnicity				0.59 ^c
Black	54 (93%)	27 (96%)	27 (90%)	
White	1 (2%)	0	1 (3%)	
Hispanic	2 (3%)	1 (4%)	1 (3%)	
Unknown	1 (2%)	0	1 (3%)	
Insurance				0.93 ^b
Private	14 (24%)	7 (25%)	7 (23%)	
Public	37 (64%)	17 (61%)	20 (67%)	
Uninsured	7 (12%)	4 (14%)	3 (10%)	
CD4+ cell count (median/IQR)	464 (295–590)	449 (295–529)	478 (356–590)	0.41 ^c
Quantitative HIV RNA (median/IQR)	40,777 (3,259–126,901)	42,277 (3,259–401,399)	39,276 (14,539–126,901)	0.94 ^c
Male-male sexual transmission				
yes	47 (81%)	24 (86%)	23 (77%)	0.51 ^b
Acute HIV symptoms at prior visits				
yes	51 (88%)	26 (93%)	25 (83%)	0.04 ^b
Documentation of sexual history				
yes	34 (59%)	20 (71%)	14 (47%)	0.07 ^b

^a two sample t-test (normal distribution)^b Fishers Exact test^c Wilcoxon rank-sum (Mann Whitney) (non-normal distribution)^d Significant at p-value < 0.05

Table 2:

Multiple logistic regression of factors associated with missed opportunities for HIV Testing (n=58)

Variable	No HIV Testing within 1 year prior to diagnosis (n= 30)	Adjusted Odds Ratio (95% CI)	p-Value
Age at Diagnosis	16.7 ± 1.5 (mean/SD)	0.7 (0.5–1.2)	0.29
Cisgender male	23 (77%)	1.6 (0.5–15.4)	0.28
Black race	27 (90%)	1.7 (0.1–21.8)	0.69
Public insurance	20 (67%)	1.3 (0.4–4.9)	0.67
Acute HIV symptoms at prior visits	25 (83%)	2.7 (0.04–1.5)	0.13
Documentation of sexual history	14 (47%)	0.3 (0.1–1.0)	0.06

Significant at p-value < 0.05

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