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Demographic Profiles of Newly Acquired HIV Infections Among Adolescents and Young Adults in the U.S

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Abstract

Understanding the demographic and risk profiles of youth with recent HIV infection offers insight for imputing the dynamics of the epidemic and targeting prevention efforts. 342 HIV-positive youth were tested using a Sensitive/Less Sensitive strategy; 33% were classified as recently infected; with the majority (51%) occurring within African Americans.

Introduction

The Centers for Disease Control and Prevention (CDC) recently reported that approximately 56,300 people were newly infected with HIV in the United States in 2006 [1], 35% of which are occurring in persons less than 30 years of age. Identifying trends of recent HIV infections, particularly in adolescents and young adults (youth), is important for increasing linkage to treatment and care, for behavioral counseling, for enrolling individuals into acute and early intervention programs, and for estimating HIV incidence. However, the latter requires rigorous and expensive surveillance strategies [2] that can be circumvented by using a strategy that employs a Sensitive/Less Sensitive (S/LS) test that is based on detecting low levels of antibody during early infection [3–5]. The aims of this study were to describe the rates of recent HIV infection in youth engaging in care, and their associated virologic, immunologic, and demographic characteristics.

Methods

Single serum specimens were collected from 342 persons who consented, HIV-positive youth engaging in care at 15 Adolescent Trials Network (ATN) sites between 2003 and 2005, and were tested by an S/LS serologic strategy to discriminate recent from chronically HIV-infected persons. Demographic, risk, immunologic, therapeutic, and virologic characteristics were compared within and between groups of recent and established infections.

Demographic and CDC risk category data were obtained by direct subject interaction; CD4 cell (CD4) counts, HIV-1 RNA viral load (VL) results, and use of anti-retroviral therapy (ART) closest to the study visit date were abstracted from the clinical records. Sera were tested by an

S/LS assay (Dilutional Vironostika [DV], bioMerieux, France) [6]; samples producing negative results on the LS portion of the S/LS test were considered to be from persons with recent HIV infection (< 170 days from seroconversion) [5].

Exploratory univariate and bivariate analyses were used to explore therapeutic, clinical, demographic, and risk-taking profiles of recently and chronically infected adolescents. Multinomial logistic regression analysis was used to assess potential associations of having a negative (recent) S/LS result.

Results

Demographic and biomedical data for the 342 enrolled subjects are presented in Table 1 by S/LS testing outcome. The proportions of persons classified as being recently infected across all sites were approximately equal (mean = 33.6%, 95% CI = 28.6 – 38.6); multinomial logistic regression confirmed that the occurrences of recent infections were independent of site, gender, and age of the participant. The mean age was 19.5 years for females and 20.9 for males ($p < 0.001$); the majority (72%) of males and females were age 18–24 years.

Of all recent infections occurring among participants, the majority (58%) was male, 51% were black, and 26% were Hispanic (Table 1). Further grouping revealed that within blacks, 28.4% were recently infected as compared with 53.1% within Caucasians and 31.5% within Hispanics. Among recently infected male youth, 84% of all blacks, 88% of all whites, and 94% of Hispanics engaged in MSM behaviors. Among MSM adolescents, age 13–29, the rate of recent infection in blacks was identical to that found in the CDC report (48.2%). In slight contrast to the CDC findings in MSM youth aged 13–29, where 30.5% of white MSM youth and 21.2% of Hispanic MSM youth were newly infected, our group exhibited rates of 25% and 28.6%, respectively. Of the 112 recent infection cases 92 (82.1%) reported engaging in MSM or sex with multiple partners behaviors. Of those with recent infection, 29% were on antiretroviral (ARV) therapy at study entry while just 20% of those with established infection were on therapy ($p = 0.043$).

The sensitivity of the DV S/LS in correctly classifying recent infections has been reported to range from 79% to 89% in ARV-naïve samples of known times from seroconversion [4]. However, serum-antibody levels may decrease in the presence of ARV therapy, and thus, the performance of the DV S/LS may yield false-recent infection classifications [7]. In our study, this could account for the 3% difference in rates of recent infection between treated and untreated subjects, which are consistent with previously reported rates of misclassification [7].

The more prominent risk categories were MSM behaviors among young men (84%) and reports of sex with multiple partners (68%) among males and females. Further, non-African American participants reported risk behaviors in a greater number of categories (mean = 2.5, SD = 1.5) than African Americans (mean = 2.0, SD = 1.1, $p = 0.001$). Recently infected persons had significantly higher CD4 cells/mm³ than those with established infection ($p < 0.001$).

Discussion

We report a high rate of recent HIV-1 infection in a cohort of youth in the US using an S/LS laboratory method. The rates reported here are consistent with the CDC estimates for 2006.

Overall, other studies have reported a range of 6 – 24% of recent infection among HIV seropositive adults and adolescents in the U.S. and abroad [8,9–11]. In comparison, we report a high rate of 33% (95% CI = 29% – 39%) of recent infections at 15 ATN sites. Although not quantified, ATN sites reported few refusals for this study and these data are thus felt to be

representative of youth engaging in care in large urban centers in the US during the enrollment period.

Although this study was subject to biases due to our inability to conduct a full epidemiologic assessment to determine HIV incidence at ATN sites, the high rate of newly infected youth in this cohort indicate a higher proportion of youth are identified early, enter care early, or undergo HIV testing more frequently. However, the available data would not allow such a determination.

The S/LS strategy is a cost-effective tool that can be used to estimate rates of new infections within cohorts and therefore, can identify “hot-spots” of the epidemic to permit targeted access to education, diagnostic services and care.

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Table 1

Demographic, Immunologic, and Virologic Profiles of Recently HIV Infected Youth as Classified by the DV S/LS Assay.

		Recent N=112	Established N=230	p-value
		% of Recent Infections	% of Established Infections	
Gender	Male N=213	58.0	64.3	.285
	Female N=129	42.0	35.7	
Ethnicity/Race	Black Non-Hispanic N=201	50.9	63.2	.005
	Hispanic N=92	25.9	27.6	
	White Non-Hispanic N=32	15.2	6.6	
	Other/Mixed Race N=15	8.0	2.6	
Grouped Race	African American and Hispanic N=293	76.8	90.8	.001
	Caucasian and Other/Mixed Race N=47	23.2	9.2	
Age Groups	< 18 years N=66	19.6	19.1	.992
	18– 24 years N= 247	72.3	72.6	
	> 24 years N= 28	8.0	8.3	
On ARV Therapy	No N=265	71.4	80.4	.043
	Yes N=77	28.6	19.6	
CDC Risk Categories (more than one allowable)	Injection Drug User N=14	2.7	4.8	.562
	MSM N= 179	50.00	53.9	.566
	Sex with multiple partners N=225	67.9	64.8	.682
	Sex while under the influence of non-injection drugs and/or EtOH N=78	24.1	22.2	.683
	Exchange sex for drugs/ money or given drugs/ money for sex N=28	8.9	7.8	.834
	Victim of sexual assault N=52	13.4	16.1	.631
	Perinatally infected N=6	0.9	2.2	.668
	Recipient of blood transfusion, blood components, or tissue N=7	1.8	2.2	1.00
	STD Diagnosis N=111	36.6	30.4	.269
	Other exposure N=4	0	1.7	.307
Viral Load (Patients not on ARV Therapy only (N= 222))	< 400 copies/ml	8.8	5.8	.555
	401 –10,000 copies/ml	25.0	28.6	
	10,001 – 100,000 copies/ml	38.2	44.2	
	> 100,001 copies/ml	27.9	21.4	
		Mean (SD, N)	Mean (SD, N)	

		Recent N=112	Established N=230	p-value
		% of Recent Infections	% of Established Infections	
	N of Risk Factors	2.27 (1.4, N=112)	2.17 (1.3, N=229)	.525
	Most recent Log ₁₀ VL	4.07 (1.3, N=99)	4.08 (1.1, N=196)	.940
	CD4 cells/mm ³	542.40 (272.8, N=100)	437.12 (226.8, N=201)	< .001
	Age	20.23 (2.3, N=112)	20.44 (2.7, N=230)	.498
Rates of Recent Infection in MSMs by Race		2003 – 2005 Current Study	2006 CDC Report	
	Black MSM Youth	48.2%	48.2%	
	White MSM Youth	25.0%	30.5%	
	Hispanic MSM Youth	28.6%	21.2%	