Factors associated with persistent high viremia in HIV-infected New Yorkers, 2006-2007

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Background

Surveillance data can be used to monitor the HIV epidemic and inform community-wide HIV prevention efforts. All HIV viral load (VL) and CD4 results have been reportable by New York State law since 2005. High serum HIV RNA concentrations are associated with clinical progression to AIDS and death. Virologic suppression restores immune status, dramatically improves survival, and reduces risk of HIV transmission to partners. Minimizing the number of HIV-infected persons with persistent high VL is a public health goal. Persistent high VL, a longitudinal measure of VL burden, is hypothesized to be more common among groups with insufficient access to and utilization of HIV-related medical care.

Objectives

1. **To assess control of VL in New York City (NYC), 2006-2007**
2. **To identify factors associated with persistent high VL**

Methods

Population-based analysis of persistent high VL using lab data reported to the NYC HIV Surveillance Registry

Eligibility:

- PLWHA alive and ≥12 years old by 12/31/2005
- NYC residents
- At least 2 VL tests drawn ≥2 weeks apart during 2006-2007

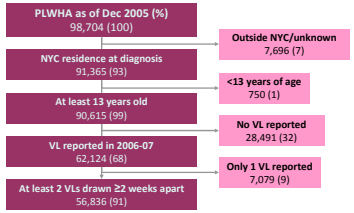
Key VL outcomes (copies/mL):

- Peak: Undetectable (0-400); Other (401-99K); High (≥100K)
- Persistent high: N pairs of consecutive VLs ≥100K / N total pairs

Data analysis:

- Descriptive comparisons by sociodemographic characteristics
- Logistic regression models, using generalized estimating equations accounting for HIV transmission risk, race, age, sex, borough of residence, years since HIV diagnosis and concurrent HIV/AIDS (AIDS diagnosis within 31 days of HIV diagnosis)

Figure 1. Eligibility chart on HIV-infected New Yorkers, 2006-2007.



Results

Figure 2. HIV-infected New Yorkers by VL trend, 2006-2007.

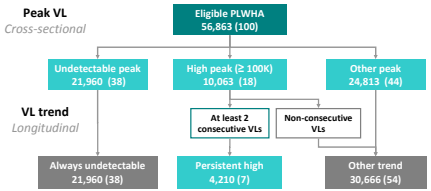


Table 1. Comparison of PLWHA with persistent high VL & undetectable VL to all reported PLWHA in New York City, 2006-2007.

	Persistent high VL (N=4,210) N (%)	Always undetectable (N=21,960) N (%)	All NYC PLWHA as of 12/2005 (N=98,704) N (%)
Risk			
MSM	1,058 (25)	7,592 (35)	29,559 (30)
IDU	1,113 (26)	4,104 (19)	22,703 (23)
Other/Unknown	1,144 (27)	5,981 (27)	28,422 (29)
Heterosexual	895 (21)	4,283 (20)	17,887 (18)
Age (years)			
Mean (Median)	41.4 (42)	46.6 (46)	44.0 (44)
Sex			
Female	1,502 (36)	6,562 (30)	29,920 (30)
Male	2,708 (64)	15,398 (70)	68,651 (70)
Race/ethnicity			
Black, non-Hispanic	2,141 (50)	8,998 (40)	44,310 (45)
Hispanic	1,473 (35)	7,321 (33)	802 (<1)
Other	11 (<2)	149 (2)	20,543 (21)
White, non-Hispanic	585 (14)	5,492 (25)	31,812 (33)
Borough of residence[1]			
Bronx	1,202 (29)	4,667 (21)	21,409 (22)
Brooklyn	1,196 (28)	5,517 (25)	24,376 (25)
Queens	488 (11)	3,402 (16)	13,596 (14)
Staten Island	77 (2)	393 (2)	1,780 (<2)
Manhattan	1,247 (30)	7,981 (36)	29,807 (30)
Concurrent HIV/AIDS			
Yes	6,260 (29)	1,021 (24)	25,246 (26)
No	15,700 (71)	3,189 (76)	73,458 (74)
Time since HIV diagnosis (years)			
Mean (Median)	9 (8)	9 (8)	8 (7)
AIDS as of 2005	3,123 (74)	14,236 (65)	59,486 (60)
Time since AIDS (years)	6.2 (6)	7.0 (7)	6.8 (7)
Number of VL tests, 2006-2007			
Mean (Median)	7 (7)	6 (6)	5 (5)

NOTE. VL=viral load; NYC=New York City; PLWHA=Persons living with HIV/AIDS; MSM=Men who have sex with men; IDU=intravenous drug users. [1]Borough of residence refers to the residence at HIV diagnosis for persons living with HIV (non-AIDS) or residence at AIDS diagnosis for PLWHA. Outside of NYC and unknown residence for all PLWHA as of December 31, 2005 are not shown. Data as reported to the NYC DOHMH by December 31, 2009.

A total of 56,836 PLWHA were included in analysis. Demographic characteristics of this group were similar to those of all PLWHA reported by end of 2005.

Compared to PLWHA with 'always undetectable' VL, PLWHA with persistent high VL were more likely to:

- Report IDU transmission risk
- Belong to a younger age group
- Report Black race or Hispanic ethnicity
- Reside in the Bronx
- Have concurrent HIV/AIDS at diagnosis
- Die by end of 2007 (11% vs. 3%), at a younger age (Median age at death 45 vs. 54 years)

Table 2. Factors associated with persistent high VL in New York City, 2006-2007 (N=56,836).

	PLWHA N (%)	OR[1] (95% CI)	adjusted OR[1,2] (95% CI)
Risk			
MSM	17,076 (30)	0.74 (0.66, 0.82)	0.80 (0.70, 0.91)
IDU	12,624 (22)	**1.16 (1.04, 1.29)**	**1.34 (1.19, 1.50)**
Other/Unknown	15,520 (27)	1.02 (0.92, 1.13)	1.00 (0.90, 1.12)
Heterosexual (Ref)	11,616 (20)	–	–
Age (years)			
13-19	1,038 (<2)	**3.56 (2.85, 4.46)**	**3.42 (2.72, 4.32)**
20-29	3,438 (6)	**2.48 (2.12, 2.89)**	**3.09 (2.63, 3.63)**
30-39	12,175 (21)	**2.48 (2.22, 2.77)**	**2.86 (2.56, 3.19)**
40-49	23,240 (41)	**1.92 (1.74, 2.12)**	**2.02 (1.83, 2.24)**
≥50 (Ref)	16,945 (30)	–	–
Sex			
Female	18,661 (33)	**1.20 (1.12, 1.30)**	0.95 (0.87, 1.04)
Male (Ref)	38,175 (67)	–	–
Race/ethnicity			
Black, non-Hispanic	26,214 (46)	**1.78 (1.60, 2.00)**	**1.46 (1.30, 1.65)**
Hispanic	19,177 (34)	**1.67 (1.48, 1.88)**	**1.29 (1.14, 1.46)**
Other	324 (<1)	0.7 (0.36, 1.36)	0.71 (0.37, 1.37)
White, non-Hispanic (Ref)	11,121 (20)	–	–
Borough of residence[3]			
Bronx	14,105 (25)	**1.41 (1.28, 1.55)**	**1.13 (1.02, 1.25)**
Brooklyn	15,291 (27)	**1.24 (1.13, 1.36)**	1.04 (0.94, 1.14)
Queens	7,752 (14)	0.98 (0.86, 1.11)	0.87 (0.76, 0.98)
Staten Island	1,050 (2)	1.21 (0.92, 1.59)	1.15 (0.88, 1.50)
Manhattan (Ref)	18,638 (33)	–	–
Concurrent HIV/AIDS			
Yes	13,359 (24)	1.05 (0.96, 1.14)	**1.11 (1.02, 1.21)**
No (Ref)	43,477 (76)	–	–
Years since HIV diagnosis			
0-4	17,225 (30)	1.04 (0.96, 1.12)	0.93 (0.85, 1.01)
≥5 (Ref)	39,661 (70)	–	–

NOTE. VL=viral load; MSM=Men who have sex with men; IDU=intravenous drug users. Numbers in bold denote significance at the 0.05 level. Data as reported to the NYC DOHMH by December 31, 2009. [1]Adjusted for number of VL pairs observed, 2006-2007. [2]Adjusted for age, race/ethnicity, borough, sex, history of AIDS, concurrent status at diagnosis, and number of pairs. [3]Borough of residence refers to the residence at HIV diagnosis for persons living with HIV (non-AIDS) or residence at AIDS diagnosis for PLWHA.

Conclusion

Almost half of PLWHA in this analysis were virally suppressed for two years in 2006-2007, which suggests a high level of care & treatment success. While only 7% had persistent high VL, this group is at high risk for morbidity and secondary transmission.

Findings suggest targeting care and treatment efforts to IDUs & young adults. Results on IDUs are consistent with literature, showing increased risk for delayed initiation of care and inconsistent utilization for IDUs. Perinatally infected youth represent over 80% of PLWHA aged 13-19 years in this analysis, and their experience with a range of therapies may partially explain their increased risk for persistent VL.

MSM were not at increased risk for persistent VL even though they represent almost half of all new HIV diagnoses reported annually in NYC. Factors other than high VL, particularly related to sexual behavior and sexual networks, likely explain high HIV incidence among MSM.

Findings of an increased risk for Bronx residents support the selection of the Bronx for expanded testing and linkage-to-care efforts initiated in 2008.

Strengths. Analysis is population-based and longitudinal and showcases a novel use of surveillance data. Given its longitudinal design and use of individual VL measures over time, persistent high VL is be a useful complement to existing CVL measures.

Limitations. Analysis excludes individuals with only one VL test, who are unaware of HIV status, not yet reported to the Registry, and out-of-care. Treatment history was not available for inclusion in analysis.

Discussion. VL data reported for 2006-2007 serve as 'baseline' profile for further analyses. Longitudinal measures of VL can be used for population monitoring of antiretroviral therapy coverage and effectiveness.

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