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Evaluating care outcomes for acute HIV infection in Philadelphia, 2014-2016

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ABSTRACT

Background: Detection and treatment of acute HIV infection (AHI) improves both individual-level health by preserving immune function and community-level health by reducing infectiousness and HIV transmission. This analysis aims to evaluate characteristics and care outcomes associated with AHI among individuals newly diagnosed with HIV in Philadelphia.

Methods: Data were extracted from the Enhanced HIV/AIDS Reporting System (eHARS) for individuals aged 13+ and newly diagnosed with HIV between 2014 and 2016. Chi-square tests were used to assess significant differences in continuum measures including: linkage to care at 14 and 30 days following diagnosis, retention in care at 1 year following diagnosis (2 CD4/VL > 90 days apart), and viral suppression (VS; VL <200 copies/ml) at 180 and 365 days following diagnosis between AHI and established infections. Bivariate and multivariable regression models assessed significant predictors of AHI and primary outcomes along the continuum of care. Multivariable models were adjusted for potential demographic and clinical confounders.

Results: 1,838 Philadelphia residents were eligible for inclusion in analysis, of which 86 (4.7%) were categorized as AHI and 1,752 (95.3%) as established infection. Cases of AHI were significantly more likely to be male, aged 13-24, HIV-non AIDS cases, and report MSM as their transmission risk. Care continuum data for each outcome is presented in Figure 1. Results of adjusted regression analysis indicated that AHI were three times more likely to be linked to care within 30 days of diagnosis compared to those diagnosed with established infection (AOR,3.3; 95%CI:1.6-7.0). AHI were twice as likely to be retained in care in the year following diagnosis (AOR,2.1; 95%CI:1.1-3.7) and achieve VS within 180 days of diagnosis (AOR,2.1; 95%CI:1.3-3.5) when compared to those with established infections.

Conclusions: Our data show that individuals diagnosed with AHI have better engagement in care and VS outcomes in the year following diagnosis than those with established infection. Further increasing early detection of HIV may be impactful in improving engagement in care among newly diagnosed individuals and reducing HIV transmission overall.

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INTRODUCTION

- Detection and treatment of acute HIV infection (AHI) improves both individual-level health by preserving immune function and community-level health by reducing infectiousness and HIV transmission.
- The implementation of 4th generation HIV testing has resulted in an increase in the proportion of individuals identified as AHI in Philadelphia from 3.2% in 2014 to 6.3% in 2016, however this represents less than 5% of new diagnoses during that time.

Objective:

- To evaluate characteristics and care outcomes associated with AHI among individuals newly diagnosed with HIV in Philadelphia from 2014 to 2016.

METHODS

Definitions :

- **AHI:** Acute HIV infection based on the approved HIV Testing Algorithm
- **Linkage to Care (LTC):** Evidence of a quantitative VL/CD4 test measured at 14 and 30 days following diagnosis
- **Retention:** 2 VL/CD4 tests at least 90 days apart in the 12 months following diagnosis
- **Viral Suppression (VS):** Evidence of a VL <200 copies/mL measured at 180 and 365 days following diagnosis

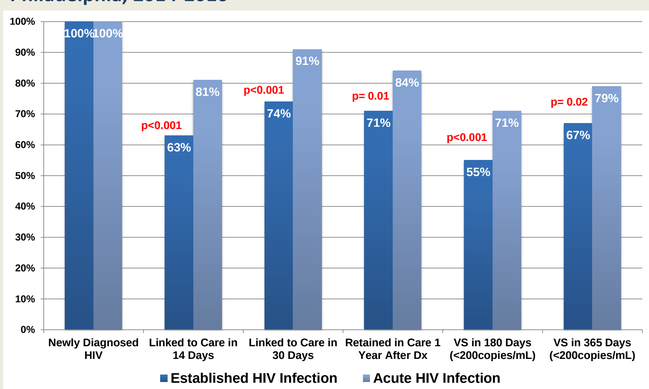
Inclusion Criteria:

- Data were extracted from the Enhanced HIV/AIDS Reporting System (eHARS) and included newly diagnosed HIV cases aged 13+ in Philadelphia from 2014-2016.

Analysis:

- Chi-square analysis to determine characteristics significantly associated with AHI.
- Bivariate and stepwise multivariable logistic regression to assess predictors of AHI and to evaluate AHI as a significant predictor of care continuum outcomes.
- Covariates of interest included: Dx year, birth sex, race/ethnicity, age at Dx, transmission risk, type of facility at Dx, insurance status, and initial CD4 count.
- All analyses completed using SAS version 9.3.

Figure 1. HIV Care Continuum, Established vs. Acute HIV Infection, Philadelphia, 2014-2016



RESULTS

- Of the 1,838 individuals diagnosed between 2014-2016, 86 (4.7%) were classified as AHI and 1,752 (95.3%) as established infection.
- Cases of AHI were significantly more likely to be male, aged 13-24, diagnosed at an outpatient medical facility, and report MSM as a transmission risk (Table 1) and showed significant differences along care continuum measures compared to established infection (Figure 1).
- In adjusted regression analyses:
  - Individuals aged 13-24 were nearly 4 times as likely to be diagnosed with AHI compared to those aged 45 and older (Table 2).
  - Individuals diagnosed in an inpatient or outpatient medical facility were over 3 times as likely to be diagnosed with AHI compared to those individuals diagnosed at a Testing and Linkage to Care (TALC) or Correctional facility (Table 2).
  - Cases of AHI were 2.5 times as likely as established infections to link to care in 14 days and 3 times as likely to link in 30 days (Table 3).
  - Cases of AHI were 2 times as likely to be retained in care 1 year after diagnosis (Table 3).
  - Cases of AHI were 2 times as likely to be virally suppressed at 180 days after diagnosis, but not at 1 year (Table 3).

Table 1. Demographic characteristics of sample population

Selected Variables	Acute Infection	Established Infection	Total
Total, n (%)	86 (4.7)	1752 (95.3)	1838 (100.0)
Dx Year, n (%)*			
2014	21 (24.4)	637 (36.4)	658 (35.8)
2015	29 (33.7)	583 (33.3)	612 (33.3)
2016	36 (41.9)	532 (30.4)	568 (30.9)
Birth Sex, n (%)*			
Male	75 (87.2)	1361 (77.7)	1436 (78.1)
Female	11 (12.8)	391 (22.3)	402 (21.9)
Race/Ethnicity, n (%)			
Black	59 (68.6)	1150 (65.6)	1209 (65.8)
Hispanic	12 (13.9)	281 (16.0)	293 (15.9)
White	14 (16.3)	250 (14.3)	264 (14.4)
Other/Unk	1 (1.2)	71 (4.0)	72 (3.9)
Age at Dx, n (%)*			
13-24	45 (52.3)	411 (23.5)	457 (24.9)
25-34	21 (24.4)	560 (32.0)	581 (31.6)
35-44	5 (5.8)	322 (18.4)	327 (17.7)
45+	15 (17.4)	459 (25.2)	474 (25.8)
Transmission Risk, n (%)*			
MSM	58 (67.4)	974 (55.6)	1032 (56.1)
PWID	4 (4.6)	105 (6.0)	109 (5.9)
Heterosexual	20 (23.3)	632 (36.1)	652 (35.5)
Other/Unk	4 (4.6)	41 (2.3)	45 (2.5)
Dx Facility, n (%) *			
Inpatient	8 (9.3)	151 (8.6)	159 (8.7)
Outpatient	66 (76.7)	1042 (59.5)	1108 (60.3)
TALC/Correctional	8 (9.3)	426 (24.3)	434 (23.6)
Other/Unk	4 (4.7)	133 (7.6)	137 (7.4)
Initial CD4 Count, n (%)			
<200	11 (13.2)	362 (22.8)	373 (22.3)
200-349	15 (18.1)	294 (18.5)	309 (18.5)
350-499	24 (28.9)	350 (22.0)	374 (22.4)
≥500	33 (39.8)	582 (36.7)	615 (36.8)
Insurance Status			
Yes	58 (67.4)	1022 (58.3)	1080 (58.8)
No	14 (16.3)	375 (21.4)	389 (21.2)
Unknown	14 (16.3)	355 (20.3)	369 (20.0)

*Significant difference (p<0.05) between AHI and established infection

Table 2. Significant Predictors of Acute HIV Infection

	OR (95% CI)	AOR (95% CI)
Dx Year		
2014	REF††	NS
2015	1.51 (0.85-2.67)	NS
2016	2.05 (1.18-3.56)	NS
Birth Sex		
Male	1.96 (1.03-3.72)	NS
Female	REF††	NS
Race/Ethnicity		
Black	REF	REF
Hispanic	0.83 (0.44-1.57)	0.99 (0.52-1.90)
White	0.27 (0.04-2.01)	1.64 (0.89-3.13)
Age		
13-24	3.35 (1.84-6.10)	3.87 (2.09-7.15)
25-34	1.15 (0.58-2.25)	1.28 (0.65-2.54)
35-44	0.47 (0.17-1.32)	0.51 (0.18-1.42)
45+	REF*	REF*
Transmission Risk		
MSM	1.88 (1.21-3.16)	NS
PWID	1.2 (0.4-3.59)	NS
Heterosexual	REF††	NS
Other/Unk	3.08 (1.00-9.44)	NS
Dx Facility		
Inpatient	2.82 (1.04-7.65)	3.80 (1.37-10.55)
Outpatient	3.37 (1.60-7.09)	3.54 (1.67-7.56)
TALC/Correctional	REF††	REF††
Other/Unk	1.6 (0.47-5.40)	1.92 (0.56-6.59)

*p<0.0001 **p<0.001 †p<0.005 ††p<0.05 NS = Not Significant
Race and insurance status were adjusted for in the multivariable model as *a priori* hypothesized predictors.

Table 3. AHI as a significant predictor of LTC, Retention, and VS

	LTC in 14 Days	LTC in 30 Days	Retention at 1 year	VS at 180 days	VS at 1 year
	AOR (95% CI)				
Acute Infection	2.54 (1.45-4.44)	3.34 (1.59-7.02)	2.04 (1.12-3.74)	2.13 (1.30-3.51)	1.25 (0.64-2.39)
Established Infection	REF**	REF**	REF*	REF**	REF

*p<0.05 **p<0.005 All variables in Table 2 were adjusted for in multivariable analysis.

CONCLUSIONS

Summary:

- Results indicate that AHI is being identified most frequently within groups at highest risk of HIV in Philadelphia including youth and MSM.
- Additionally, the identification of AHI can significantly impact outcomes along the continuum of care and help individuals to reach viral suppression more quickly.

Limitations: No data on which Dx facilities utilized 4th generation testing

Next Steps:

- Identifying AHI should be a priority for health departments as it:
  - Provides valuable insight into transmission dynamics and informs local testing and prevention strategies.
  - Not only improves individual-level treatment outcomes but also community-level outcomes by disrupting HIV transmission early after infection.
- Increasing the use of 4th generation testing at non-medical sites may help to further increase identification of AHI.