Delayed HIV diagnosis in Philadelphia

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Introduction

Ending the HIV Epidemic (EHE) requires prompt diagnosis and treatment of HIV to reduce transmission. Delayed HIV diagnosis and late entry into care remain challenging. Strategic deployment of testing resources may leverage both targeted and universal testing to accomplish the timely diagnosis of HIV infection. Late entry into HIV care increases the risk for death despite antiretroviral therapy. Concurrent diagnoses of HIV/AIDS represent a missed opportunity for early HIV diagnosis.

Methods

We extracted data from the City of Philadelphia's Enhanced HIV/AIDS Reporting System (eHARS) for 3,856 individuals diagnosed with HIV infection in Philadelphia, PA from 2012-2018. We determined characteristics associated with delayed diagnosis, defined as CD4 cell count < 200 cells/mm^3 measured within 90 days of HIV, or date of AIDS diagnosis prior to HIV diagnosis. Death data from the Pennsylvania Bureau of Vital Statistics, Social Security Death Master Index, and the National Death Index were matched with eHARS data to identify deceased persons.

Independent variables included: calendar year of HIV diagnosis, age category, current gender, race/ethnicity, transmission risk, insurance status, receipt of care from Ryan White medical provider, and substance use history.

We used Chi-square and multivariate logistic regression to assess factors associated with delayed diagnosis. Analyses evaluated benchmarks across the HIV care continuum within 1 year after HIV diagnosis and measured the association of concurrent diagnosis of HIV/AIDS with linkage to care, retention in care, viral suppression, and death.

Variable	HIV (non-AIDS) Col %	HIV/AIDS (Concurrent)	Logistic Regression OR (95% CI)	Adjusted Logistic Regression aOR (95% CI)
Year of HIV Dx				
2016-2018	1121 (37.3)	265 (31.3)	1.0 (Ref)	1.00 (Ref)
2014-2015	880 (29.3)	231 (27.2)	1.1 (0.9 – 1.4)	0.9 (0.7 – 1.1)
2012-2013	1007 (33.5)	352 (41.5)	1.5 (1.2 – 1.8)	1.2 (0.9 – 1.4)
Age at HIV DX				
18-24	879 (29.2)	115 (13.6)	1.0 (Ref)	1.0 (Ref)
25-34	972 (32.3)	202 (23.8)	1.6 (1.2 – 2.0)	**1.6 (1.2 – 2.0)**
35-44	481 (16.0)	206 (24.3)	3.2 (2.5 – 4.2)	**3.2 (2.4 – 4.3)**
45-54	440 (14.6)	186 (21.9)	3.2 (2.5 – 4.2)	**3.1 (2.3 – 4.2)**
55-64	188 (6.3)	9 (11.0)	3.8 (2.8 – 5.2)	**4.0 (2.8 – 5.7)**
65+	48 (1.6)	46 (5.4)	7.3 (4.7 – 11.5)	**7.1 (4.3 – 11.9)**
Current Gender				
Female	669 (22.2)	184 (21.7)	1.0 (Ref)	1.0 (Ref)
Male	2243 (74.6)	645 (76.1)	1.0 (0.9 – 1.3)	**1.5 (1.1 – 1.9)**
Transgender	96 (3.2)	19 (2.2)	0.7 (0.4 – 1.2)	1.7 (0.9 – 3.0)
Race/Ethnicity				
Black	2051 (68.2)	589 (69.5)	1.0 (Ref)	1.0 (Ref)
White	400 (13.3)	104 (12.3)	0.9 (0.7 – 1.1)	1.0 (0.7 – 1.2)
Hispanic	469 (15.6)	113 (13.3)	0.8 (0.7 – 1.1)	0.9 (0.7 – 1.2)
Asian/American Indian/Alaska Native/Multi-race	88 (2.9)	42 (5.0)	1.7 (1.1 – 2.4)	**1.9 (1.2 – 2.9)**
Transmission Risk				
MSM	1604 (53.3)	361 (42.6)	1.0 (Ref)	1.0 (Ref)
PWID	245 (8.1)	55 (6.5)	1.0 (0.7 – 1.4)	1.7 (0.8 – 3.7)
MSM/PWID	67 (2.2)	11 (1.3)	0.7 (0.4 – 1.4)	1.4 (0.5 – 3.7)
Heterosexual	965 (32.1)	371 (43.9)	1.7 (1.4 – 2.0)	**1.4 (1.1 – 1.8)**
No Report Risk	127 (4.2)	50 (5.9)	1.7 (1.2 – 2.5)	1.1 (0.8 – 1.7)
Insurance Status				
Yes	1,800 (59.8)	264 (31.1)	1.0 (Ref)	1.0 (Ref)
No	629 (20.9)	88 (10.4)	1.0 (0.7 – 1.2)	1.0 (0.8 – 1.4)
Unknown	580 (19.3)	496 (58.5)	5.8 (4.9 – 7.0)	**5.9 (4.9 – 7.1)**
Ryan White Care				
No RW Care	870 (28.9)	246 (29.0)	1.0 (Ref)	1.0 (Ref)
Yes – At Diagnosis	1700 (56.5)	498 (58.7)	1.0 (0.9 – 1.2)	**1.5 (1.2 – 1.9)**
Yes – After Dx	438 (14.6)	104 (12.3)	0.8 (0.7 – 1.1)	1.0 (0.8 – 1.4)
Substance Hx				
No	2622 (87.3)	770 (90.8)	1.0 (Ref)	1.0 Ref
Yes	382 (12.7)	78 (9.2)	0.7 (0.5 – 0.9)	**0.4 (0.2 – 0.8)**

Results

Variable	Linkage to Care	Retention in Care	Viral Suppression	Death
HIV/AIDS Dx				
No	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Yes	**4.1 (3.2-5.2)**	**2.3 (1.8-2.8)**	**2.0(1.7-2.4)**	**3.8 (2.6-5.5)**

From 2012 to 2018, the number of HIV diagnoses declined from 731 to 422; those with delayed diagnosis declined from 28% to 18%. Age categories of 18-24 and 25-34 years at time of diagnosis comprised majority of diagnoses, N=2168 (56%). The majority were: born male (78%), current gender male (75%), black (69%), MSM (51%), insured (54%), and participated in Ryan White care (71%).

In multivariate regression, current gender male; race/ethnicity Asian, American Indian, Alaska Native, or Multi-race; heterosexual transmission; unknown insurance status; receipt of care from a Ryan White medical provider; and history of substance abuse were 1.5 (95%CI, 1.1-1.9), 1.9 (1.2-2.9), 1.4 (1.1-1.8), 5.9 (4.9-7.1), 1.5 (1.2-1.9), and 0.4 (0.2-0.8) times as likely to have delayed diagnosis, respectively, after adjustment for calendar year of diagnosis, age category, and current gender. Although concurrent HIV/AIDS diagnosis was positively associated with linkage to care (aOR, 4.1), retention in care (aOR, 2.3), and viral suppression (aOR, 2.0), HIV/AIDS was associated with increased risk of death (aOR, 3.8; 95%CI, 2.6-5.5).

Conclusions

EHE will only be successful by reaching all people living with HIV and creating opportunities for early diagnosis. Routine opt-out universal screening combined with repeated, targeted testing will allow for identification and early treatment of HIV infection. As a medical care safety net, Ryan White program provides care to a disproportionate number of people with delayed diagnosis of HIV. By diagnosing HIV as early as possible, we may eliminate delayed diagnosis and reduce the risk of AIDS-related events or death.