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Predictors of timely HIV genotypic testing among individuals newly diagnosed and linked to care in Philadelphia

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ABSTRACT

Background: Genotypic testing (GT) is recommended by Public Health Service treatment guidelines and used as part of routine HIV surveillance to assess trends in HIV drug resistance and transmission patterns. Despite increasing rates of linkage to care (LTC), GT ≤90 days of diagnosis remains stable around 50%. This analysis aims to identify and address barriers to timely GT among persons who have successfully LTC.

Methods: Data were extracted from Philadelphia's Enhanced HIV/AIDS Reporting System on individuals aged 13+ newly diagnosed with HIV from 2013-2015 and LTC ≤90 days of diagnosis. LTC was defined as having a viral load (VL) or CD4 ≤ 90 days after diagnosis. Multivariable logistic regression analysis predicted timely GT, defined as GT ≤ 90 days of diagnosis. Models were adjusted for race, sex at birth, age at diagnosis, exposure category, diagnosing site, linkage site, year of diagnosis, insurance status, concurrent HIV/AIDS diagnosis, LTC within 30 days, and viral suppression (VS, defined as a VL <200 copies/ml at the last measure in the year after diagnosis).

Results: 1,420 Philadelphia residents that LTC ≤ 90 days of diagnosis were included in the analysis. Of these, 57% received timely GT. New diagnoses aged 45+ were less likely to have evidence of timely GT compared to diagnoses aged 18-24 (AOR, 0.6; 95% CI:0.4-0.8). Those who LTC within correctional facilities (AOR,0.5 95% CI:0.3-0.8) were less likely to have timely GT compared to those who LTC at a medical care clinic. Individuals without insurance at diagnosis were 72% less likely to have timely GT compared to individuals with insurance (AOR, 0.7; 95%CI:0.5-0.9). Individuals who achieved VS within 1 year post diagnosis were 1.5 times as likely to have received timely GT as those who did not (AOR, 1.5; 95%CI:1.2-1.9).

Conclusions: Our data show poor adherence to recommendations for baseline GT in persons newly diagnosed with HIV. Timely GT is critical in improving long term care outcomes and in creating local transmission networks that provide entry points for intervention to reduce new HIV infections, both in keeping with National HIV/AIDS Strategy efforts. Race, age, insurance status, linkage facility, and VS are all factors that should be considered when focusing efforts to increase GT at the patient and provider level.

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INTRODUCTION

- Molecular HIV Surveillance (MHS) utilizes HIV genotypic sequence data to assess trends in HIV drug resistance and transmission patterns.
- Public Health Service treatment guidelines recommend genotypic testing (GT) within 90 days of HIV diagnosis as part of first line HIV care.
- GT within 90 days is critical to achieving National HIV/AIDS Strategy (NHAS) outcomes including reducing new HIV transmissions and increasing the rate of viral suppression after HIV diagnosis.
- Despite increasing rates of linkage to care (LTC) within 90 days of diagnosis, the rate of GT within 90 days remains around 50% across years.

- **Objective:**
  - **To identify and address barriers to timely GT among persons newly diagnosed with HIV in Philadelphia who have successfully LTC within 90 days.**

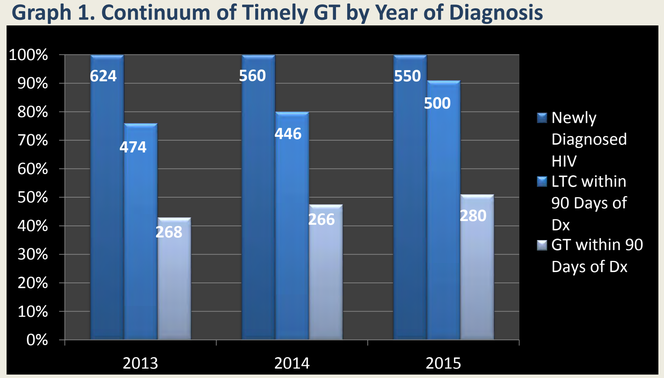
METHODS AND MATERIALS

Definitions:
- ***Timely Genotypic Testing (GT):*** Evidence of a genotypic test within 90 days of HIV diagnosis
- ***Linked to Care (LTC):*** Evidence of a a viral load or CD4 within 90 days of HIV diagnosis

Inclusion Criteria:
- Data were extracted from the Enhanced HIV/AIDS Reporting System (eHARS) and include newly diagnosed HIV cases in Philadelphia from 2013-2015, aged 13+, who LTC within 90 days of diagnosis.

Analysis:
- Chi-square analysis to compare demographic and clinical characteristics of those that received and did not receive timely GT.
- Univariate and stepwise multivariable logistic regression analyses were used to identify predictors of timely GT.
- Covariates of interest included **race**, **sex at birth**, **age at diagnosis**, **transmission category**, **type of diagnosing site**, **type of linkage site**, **year of diagnosis**, **insurance status**, **concurrent HIV/AIDS diagnosis**, **LTC within 30 days**, and **viral suppression** (VS, defined as a VL <200 copies/ml at the last measure in the year after diagnosis).
- All analysis completed using SAS version 9.3.

Graph 1. Continuum of Timely GT by Year of Diagnosis



RESULTS

- 1,420 individuals aged 13 and over were diagnosed from 2013-2015 in Philadelphia and LTC within 90 days.
  - 814 (57.3%) received timely GT and 606 (42.7%) did not.
- Race/ethnicity, age, transmission category, linkage site, and VS were all significantly associated with timely GT (Table 1).
- Hispanics were more likely to receive timely GT when compared to Blacks (Table 2).
- Those aged 45+ were less likely to have evidence of timely GT when compared to persons aged 18-24 (Table 2).
- Those with no insurance at HIV diagnosis were less likely to have timely GT when compared to those with insurance (Table 2).
- Persons who LTC within a correctional facility were 51% less likely to have timely GT compared to persons who LTC at a medical care clinic (AOR, 0.49; 95% CI: 0.31-0.79) (Table 2).
- Individuals who achieved VS within 1 year were 1.5 times as likely to have received timely GT compared to those who did not (AOR, 1.54; 95% CI: 1.24-1.92) (Table 2).

Table 1. Sample Demographics

	Timely GT N (%)	No Timely GT N (%)	Total N (%)
All	814 (57.3)	606 (42.7)	1,420 (100)
Sex at Birth			
Male	655 (80.5)	465 (76.7)	1,120 (78.9)
Female	159 (19.5)	141 (23.3)	300 (21.1)
Race/Ethnicity*			
Black	556 (68.3)	446 (73.6)	1,002 (70.6)
White	114 (14.0)	74 (12.2)	188 (13.2)
Hispanic	115 (14.1)	57 (9.4)	172 (12.1)
Age at Dx*			
13-17	21 (2.6)	11 (1.8)	32 (2.2)
18-24	214 (26.3)	132 (21.8)	346 (24.4)
25-34	250 (30.7)	167 (27.6)	417 (29.4)
35-44	138 (16.9)	100 (16.5)	238 (16.8)
45+	191 (23.5)	196 (32.3)	387 (27.2)
Transmission Category*			
Heterosexual	293 (36.0)	246 (40.6)	539 (38.0)
MSM	474 (58.2)	306 (50.5)	780 (54.9)
PWID	37 (4.6)	43 (7.1)	80 (5.6)
Dx Status			
HIV (Non-AIDS)	597 (73.3)	426 (70.3)	1,023 (72.0)
AIDS	217 (26.7)	180 (29.7)	397 (28.0)
Linkage Site*			
Medical Care Clinic	603 (74.1)	409 (67.5)	1,012 (71.3)
Inpatient	11 (1.4)	7 (1.2)	18 (1.3)
Correctional	47 (5.8)	53 (8.7)	100 (7.0)
Co-located HIV Testing and Care	114 (14.0)	87 (14.4)	201 (14.1)
Insurance Status			
Yes	489 (59.8)	329 (40.2)	818 (57.6)
No	157 (11.1)	135 (9.5)	292 (20.6)
VS Within 1 Year*			
Yes	529 (65.0)	323 (53.3)	852 (60.0)
No	285 (35.0)	283 (46.7)	568 (40.0)

*Significant difference (p<0.05) between timely GT and no timely GT
Note: Unknown/Missing subgroups removed from table; cells may not add up to 100%

Table 2. Logistic Regression Analysis for Timely GT

Variable	Univariate OR (95% CI)	Multivariable AOR (95% CI)
Race/Ethnicity		
Black	REF*	REF*
White	1.24(0.90-1.70)	1.32(0.95-1.83)
Hispanic	1.62(1.15-2.28)	1.64(1.16-2.32)
Other/Unknown	0.80(0.47-1.36)	0.82 (0.48-1.42)
Age at Dx		
13-17	1.18(0.55-2.52)	1.04(0.48-2.25)
18-24	REF**	REF**
25-34	0.92(0.69-1.24)	0.90(0.66-1.21)
35-44	0.85(0.61-1.19)	0.79(0.56-1.12)
45+	0.60(0.45-0.81)	0.56(0.41-0.76)
Transmission Category		
MSM	REF*	NS
Heterosexual	0.77(0.62-0.96)	NS
IDU	0.56(0.35-0.88)	NS
Other/Unknown	0.59(0.25-1.40)	NS
Insurance Status‡		
Yes	NS	REF*
No	NS	0.72(0.53-0.93)
Linkage Site		
Medical Care Clinic	REF*	REF*
Correctional	0.60(0.40-0.91)	0.49(0.31-0.79)
Inpatient	1.01(0.41-2.77)	0.65(0.18-2.31)
Co-located HIV Testing and Care	0.89(0.66-1.21)	0.88(0.52-1.50)
Other/Unknown	0.53(0.34-0.82)	0.45(0.25-0.82)
VS Within 1 Year		
Yes	1.63(1.31-2.02)	1.54(1.24-1.92)
No	REF***	REF***

*p<0.05 **p<0.005 ***p<0.001 NS = Not Significant
‡Insurance was included in the multivariable model as an *a priori* hypothesized predictor.

CONCLUSIONS/IMPLICATIONS

- Timely GT is critical to achieving NHAS goals including:
  - Reducing new HIV transmissions through transmission network analysis to identify potential points of intervention.
  - Increasing the number of individuals who achieve viral suppression.
- Results indicate poor adherence to recommendations for timely GT for new HIV diagnoses at entry into HIV care in Philadelphia.
- Race/ethnicity, age, insurance status, and type of linkage facility present potential barriers to receiving timely GT and should be considered when focusing intervention efforts.
- Receipt of timely GT significantly improves the likelihood of VS within 1 year of HIV diagnosis.

- Next steps:
  - Evaluate completeness of GT sequence reporting from laboratories to identify if/where improvements can be made.
  - Provide education to providers, specifically within correctional institutions, on the importance of timely GT.