Measuring Late HIV Diagnosis Among Men Who Have Sex with Men: AIDS Diagnosis vs. Testing Frequency

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Abstract

BACKGROUND: HIV surveillance in the U.S. monitors the occurrence of AIDS within one year of HIV diagnosis as a surrogate measure for late HIV diagnosis. The validity of this approach, particularly in populations with high levels of testing, is uncertain.

METHODS: We examined the relationship between AIDS diagnosis within 1 year of HIV diagnosis and time from last negative to first positive HIV test (intertest interval, ITI) using HIV surveillance and partner services data. Public health staff routinely assessed dates of last negative tests through partner services interviews or medical record review.

We categorized ITIs as ≤12, 13-24, 25-36, 37-48, 49-60, >60 months, or never tested, then calculated the proportion of AIDS ≤1 year from HIV diagnosis within each ITI category (ITI AIDS risk). We modeled hypothetical changes in population-level testing frequency by sequentially moving 50% of persons in each ITI category into the next higher or lower category. For each new distribution of ITIs, we estimated the proportion of persons with AIDS ≤1 year from HIV diagnosis by applying our ITI AIDS risk data. When calculating median ITIs, men who never tested negative were assigned the maximum observed ITI.

RESULTS: From 1/1/2010-8/30/2012, 583 cases of HIV were diagnosed among MSM in King County, WA. Among 547 (94%) MSM with testing history data, the median ITI was 16 months (IQR: 6-48), and 326 (60%) and 430 (79%) had tested within 2 and 5 years of diagnosis, respectively. 138 (25%) were diagnosed with AIDS within 1 year of HIV diagnosis, of whom 40 (29%) and 81 (59%) had tested within 2 and 5 years of HIV diagnosis, respectively.

The figure "Estimated proportion of persons with AIDS diagnosis ≤1 year of HIV diagnosis based on different ITI distributions" shows estimates of the proportion of MSM diagnosed with AIDS within 1 year of HIV diagnosis at varying population testing frequencies. Decreasing the median ITI from 16 to 9 months - which involves 58% of newly diagnosed MSM testing negative ≤1 year prior to diagnosis - decreased the proportion of AIDS ≤1 year after HIV diagnosis from 25 to 19%. Increasing the median ITI to 31 months increased this proportion to 31%.

CONCLUSIONS: Population estimates and individual-level classification of late HIV diagnosis differed based on how late diagnosis was defined. Even large changes in HIV testing frequency among MSM may have limited impact on the proportion of persons with AIDS within 1 year of HIV diagnosis, suggesting that the measure may have limited utility in monitoring the success of HIV case-finding efforts. Efforts to monitor trends in late diagnosis should include the ITI.

Background

- Late diagnosis of HIV infection represents missed opportunities to prevent:
  - Disease progression among HIV-infected persons
  - Ongoing transmission
- In the U.S., HIV surveillance monitors AIDS within one year of HIV diagnosis as a surrogate for late diagnosis
  - Validity of this measure is uncertain
- Intertest interval (ITI) = time from last negative HIV test to first positive
  - May provide additional/more accurate measure of late diagnosis

Objective

Using HIV surveillance and partner services data, compare AIDS diagnosis within 1 year of HIV diagnosis versus the intertest interval as surrogate measures of late HIV diagnosis

Methods

Testing history data from King County, WA

Source	Date of last negative test
Partner Services	Self-reported by patient in interview (most complete)
Core Surveillance	Most recent confirmed in medical record
Incidence Surveillance	Patient report or medical record

- Last negative test for ITI = date from partner services interview if available; otherwise, most recent date from surveillance

Definitions of late HIV diagnosis

AIDS Diagnosis

- AIDS diagnosis within 1 year of HIV diagnosis

Testing Frequency (ITI)

- No negative HIV test within 2 or 5 years prior to HIV diagnosis (includes having never tested negative)

Modeling AIDS diagnosis within 1 year of HIV diagnosis at varying population-level testing frequencies

Categorize ITIs for King County MSM
≤12, 13-24, 25-36, 37-48, 49-60, >60 months, never tested

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Define ITI AIDS Risk
Calculate % of AIDS ≤1 year of HIV diagnosis within each ITI category

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Model changes in population testing frequency
Sequentially move 50% of persons in each ITI category into next higher or lower category

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Estimate AIDS ≤1 year of HIV diagnosis for varying testing distributions
Apply ITI AIDS risk data to hypothetical distributions from prior step

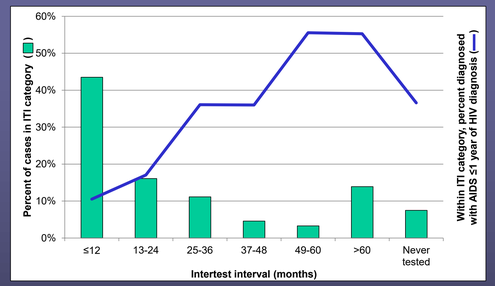
Results

Characteristics of 547* MSM newly diagnosed with HIV infection from Jan 1, 2010-Aug 30, 2012 in King County

Characteristic	Median or Number	IQR or %
Age (years)	33	27 to 43
Race/Ethnicity		
White	375	69%
Black	44	8%
Hispanic/Latino	83	15%
Asian/Pacific Islander	25	5%
Native American/Alaska Native	2	0.4%
Multiple race	18	3%
Injection drug use		
Late diagnosis		
AIDS diagnosis ≤1 year of HIV diagnosis	138	25%
Last negative HIV test >2 years prior to first positive^	221	40%
Last negative HIV test >5 years prior to first positive^	117	21%

* 547 (94%) of 583 cases with testing history data.
^ Includes men who never tested negative prior to HIV diagnosis.

Time from last negative HIV test to first positive test (ITI) and risk of AIDS within 1 year of HIV diagnosis



- Longer ITIs were associated with an increased risk of AIDS diagnosis within 1 year of HIV diagnosis
- Even among persons who reported a negative test in the last 1-12 or 13-24 months, 11% and 17% were diagnosed with AIDS within 1 year of HIV diagnosis, respectively

Results (cont.)

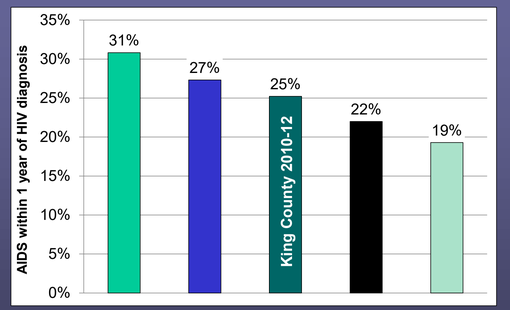
Comparing definitions of late diagnosis: AIDS diagnosis vs. testing frequency

K=.34		Last negative test >2 years prior to HIV dx	
		Yes	No
AIDS diagnosis within 1 year	Yes	98 (71%)	40 (29%)
	No	123 (30%)	286 (70%)

K=.28		Last negative test >5 years prior to HIV dx	
		Yes	No
AIDS diagnosis within 1 year	Yes	57 (41%)	81 (59%)
	No	60 (15%)	349 (85%)

- Agreement between these surrogates of late HIV diagnosis is poor
- Among cases diagnosed with AIDS ≤1 year of HIV diagnosis, 29% and 59% had tested within 2 and 5 years of HIV diagnosis, respectively

Estimated proportion of persons with AIDS diagnosis ≤1 year of HIV diagnosis based on different ITI distributions



ITI#: Median (IQR) in months	31 (19-60)	23 (13-51)	16 (6-48)	11 (5-43)	9 (4-36)
Tested in 2 years prior to HIV diagnosis	37%	52%	60%	65%	69%
Tested in 5 years prior to HIV diagnosis	75%	77%	79%	86%	89%

Men who never tested negative were assigned the maximum observed ITI.

Limitations

- Testing history data relies primarily on self-report
- ITIs do not directly measure time of HIV infection
  - May be conservative estimate if tests occur in the context of risk
- AIDS diagnosis within one year of HIV diagnosis as a surrogate for late diagnosis is sensitive to variations in rate of disease progression
- ITIs may not be an effective surrogate for late HIV diagnosis in populations that do not test frequently

Summary

- Despite 79% of MSM in King County reporting testing for HIV within 5 years prior to their HIV diagnosis, 25% are diagnosed with AIDS within 1 year of HIV diagnosis
- Longer ITIs were associated with an increased risk of AIDS diagnosis within 1 year of HIV diagnosis
- Agreement between definitions of late HIV diagnosis based on time from HIV diagnosis to AIDS diagnosis versus time from last negative HIV test to HIV diagnosis was poor
- Modeling the impact of changes in a population's testing frequency suggests that even large changes in testing frequency may have limited impact on the proportion of persons diagnosed with AIDS within 1 year of HIV diagnosis

Conclusions

- Measuring AIDS within 1 year of HIV diagnosis may have limited utility in monitoring the success of HIV case-finding efforts and frequency of late HIV diagnoses
- Efforts to monitor trends in late HIV diagnosis should include ITI
- Additional research to validate the ITI is needed

Acknowledgments

We would like to thank Michelle Perry, Edith Allen, Allison Moore, and Rachel Patrick of Public Health – Seattle & King County.

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