

Late Stage HIV Infection Detection Rate in New York City, 2004-2008



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Introduction

Evaluation of HIV testing in a jurisdiction ideally would involve a direct measure of the detection rate that represents the number of new diagnoses divided by the sum of new diagnoses and the number of undiagnosed HIV infections (Equation 1).

$$R = \frac{m}{m+n} \text{ (Equation 1)}$$

R : detection rate;

m : number of new diagnoses;

n : number of undiagnosed HIV infections.

Unfortunately, the number of undiagnosed HIV infections is usually unknown. Because diagnosis and reporting of AIDS in New York City (NYC) is virtually complete, we developed the late stage HIV infection detection rate as a new indicator to measure the efficacy of HIV testing in the city.

Methods

Late stage HIV infection was defined as AIDS within 365 days of an HIV diagnosis. HIV infections diagnosed in the year were counted as detected infections and those diagnosed with both HIV and AIDS in the next year were counted as missed infections. Table 1 shows cases #1 and #2 as detected cases, and case #3 as a missed case in Year 1. Case #3 will be counted as a detected case in Year 2.

Table 1. Detection status of late stage HIV infections by year of HIV/AIDS diagnosis

Case #	Year 1	Year 2	Status in Year 1
#1	HIV → AIDS		Detected
#2	HIV → AIDS		Detected
#3	HIV → AIDS		Missed

Some late stage HIV infections are detected when patients present with symptomatic AIDS rather than being detected by "active" HIV testing. An adjusted late stage HIV infection detection rate was calculated by removing cases diagnosed concurrently (AIDS within 31 days of initial diagnosis of HIV) (Equation 2).

$$adjR_{late} = \frac{m_{late} - m_{31}}{m_{late} + n_{late} - m_{31}} \text{ (Equation 2)}$$

$adjR_{late}$: adjusted late stage HIV infection detection rate;

m_{late} : number of detected late stage HIV infections;

n_{late} : number of missed late stage HIV infections;

m_{31} : number of concurrent HIV/AIDS diagnoses (AIDS with 31 days of initial diagnosis of HIV).

The Cochran-Armitage trend test was used to explore temporal trends in the detection rate, and the Chi-square test was used to determine differences between subgroups. The analysis was conducted with the statistical software SAS 9.2 (Cary, NC).

Results

Table 2 summarizes the total (N), detected (m_{late}) and missed (n_{late}) late stage HIV infections and concurrent HIV/AIDS diagnoses (m_{31}) in NYC. The number of late stage HIV infections declined steadily from 2004 to 2008. Among those detected, the majority of them were concurrent HIV/AIDS cases.

Table 2. Number of detected and missed late stage HIV infections in New York City, 2004-2008

	N	Detected (m_{late})		Missed (n_{late})
		m_{31}	$m_{late} - m_{31}$	
2004	2,687	1,053	400	1,234
2005	2,579	1,036	391	1,152
2006	2,470	997	343	1,130
2007	2,398	952	332	1,114
2008	2,245	949	303	993

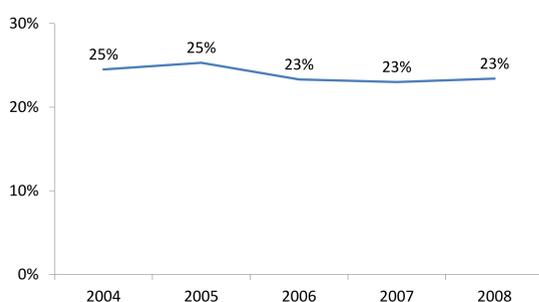


Figure 1. Late stage HIV infection detection rate in New York City, 2004-2008

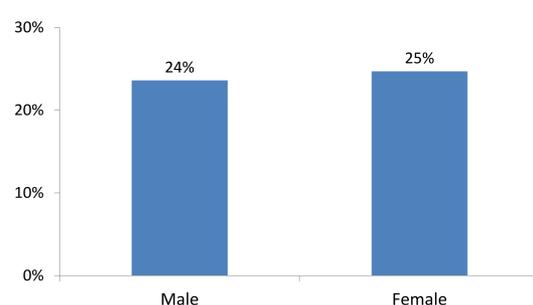


Figure 2. Late stage HIV infection detection rate in New York City, 2004-2008, by sex

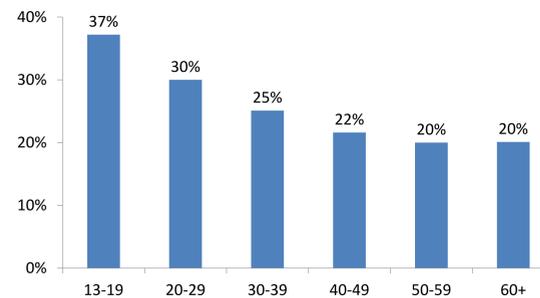


Figure 3. Late stage HIV infection detection rate in New York City, 2004-2008, by age

Late stage HIV infections were more likely to be detected among young people than among older individuals ($p < 0.0001$). (Fig 3).

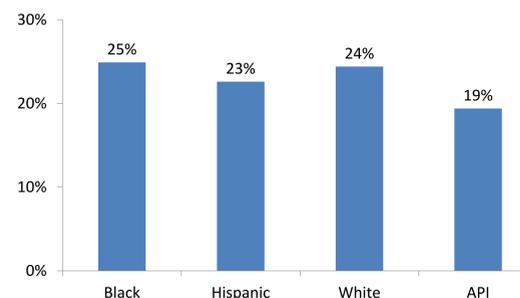


Figure 4. Late stage HIV infection detection rate in New York City, 2004-2008, by race/ethnicity

Blacks were most likely to be detected with marginal statistical significance ($p = 0.08$). (Fig 4).

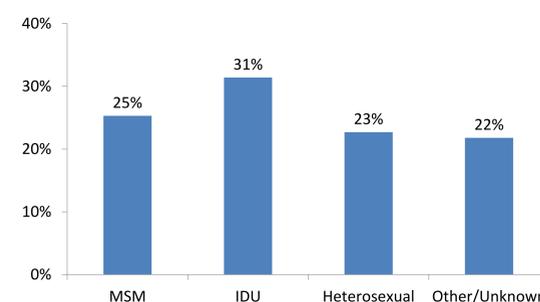


Figure 5. Late stage HIV infection detection rate in New York City, 2004-2008, by transmission risk

Injection drug users (IDUs) had the highest detection rate among all risk groups ($p = 0.02$). (Fig 5).

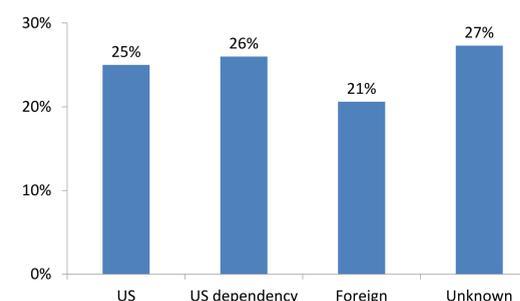


Figure 6. Late stage HIV infection detection rate in New York City, 2004-2008, by country of origin

Late stage HIV infections born outside of the US were less likely to be detected than those born in the US or US dependencies ($p = 0.005$). (Fig 6).

Limitations

First, because late stage HIV infection was defined based on the timing of HIV and AIDS diagnosis and not on duration of HIV infection, late stage HIV infections may be undercounted when some patients take antiretroviral treatment and delay onset of AIDS or if progression to AIDS is otherwise slower than expected. Second, some rapid progressors may be misclassified as late stage HIV infections.

Because undercounting and misclassification affect both detected and missed cases, and they are very likely to be constant during the 5-year period, estimates of the late stage HIV infection detection rate remain valid.

Conclusions

We developed a new indicator, the late stage HIV infection detection rate, to evaluate HIV testing. The indicator is the first that directly measures the percentage of HIV infections detected among those who are unaware of their HIV-positive status.

The late stage HIV infection detection rate in NYC was stable from 2004 to 2008. As our efforts towards universal voluntary HIV testing expand and diagnosis of both early and late infections improves, a stable trend in the late stage detection rate may reflect a stable trend in detection of early infections as well. A stable trend was also observed at the national level, where the number of undiagnosed HIV infections in the United States has remained almost unchanged in the last 10 years.

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