DIAGNOSIS OF HIV INFECTION WITHIN ONE YEAR OF ACQUISITION: PROBABILITY AND TRENDS, 2010-2015, U.S.

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Background

- Diagnosis of HIV infection soon after acquisition is important for preventing transmission and improving clinical outcomes.
- Data on time from HIV infection to diagnosis can be used as an indicator of success of testing programs.

Methods

- All states and 6 U.S. dependent areas report cases of HIV infection and associated patient demographic and clinical information to the National HIV Surveillance System (NHSS).
- This study analyzed data reported to CDC through June 2018 for individuals aged ≥ 13 years with diagnosed HIV infection in the 50 U.S. states and District of Columbia during 2010 to 2015.
- The estimation of the probability of diagnosis of HIV within one year of acquiring the infection was done in three steps.
  - In the first step, using a CD4 depletion model[1], we estimated the number of persons with recent infection (<=12months) in each year from 2010-2015, among all HIV diagnoses reported to NHSS for those years.
  - In the second step, we estimated the HIV incidence in each of the six years from 2010 to 2015, using the same model.
  - In the third step, we estimated the probability of receiving a diagnosis within 12 months of HIV infection by expressing the number of diagnoses within one year as a percentage of estimated HIV incidence in each year.
- We assessed trends using estimated annual percentage change (EAPC), in the probability of receiving a diagnosis within 12 months of infection over a six-year (2010-2015) period. EAPCs and their 95% confidence intervals (CI) were calculated using a generalized log linear model.
  - Trends were assessed overall and by sex at birth, age at HIV diagnosis, race/ethnicity, transmission category, and region of residence at diagnosis.

Results

Table. Estimated number of persons with a recent HIV infection diagnosis (duration of infection <= 1 year), estimated HIV incidence, and the probability of diagnoses within one year of HIV infection, by selected characteristics, 2010–2015, National HIV Surveillance System, United States

	2010			2015			2010-2015	
	Estimated recent HIV diagnosis	Estimated HIV Incidence	Diagnosis within 1 year of HIV infection	Estimated recent HIV diagnosis	Estimated HIV Incidence	Diagnosis within 1 year of HIV infection	EAPC in diagnoses within 1 year of HIV infection	
	No. (95% CI)	No. (95% CI)	Pct. (95% CI)	No. (95% CI)	No. (95% CI)	Pct. (95% CI)	Pct. (95% CI)	P Value
Sex at birth								
Male	11,200 (10,900–11,500)	32,600 (31,700–33,400)	34.3 (33.8–35.3)	10,700 (10,400–11,000)	32,000 (30,200–33,800)	33.3 (31.4–35.2)	-0.6 (-1.8, 0.6)	0.329
Female	3,500 (3,300–3,700)	8,500 (8,100–9,000)	41.1 (38.8–43.3)	2,800 (2,700–3,000)	7,000 (6,300–7,700)	40.6 (36.2–44.9)	-0.3 (-2.6, 2.1)	0.825
Age at diagnosis								
13–24	3,300 (3,200–3,400)	12,100 (11,600–12,700)	27.4 (26.1–28.7)	3,000 (2,900–3,100)	9,200 (8,200–10,100)	33.0 (29.6–36.5)	3.9 (1.7, 6.1)	0.000
25–34	4,400 (4,300–4,500)	11,500 (11,000–12,000)	38.5 (36.7–40.2)	4,900 (4,800–5,000)	14,200 (13,100–15,400)	34.4 (31.5–37.2)	-2.2 (-3.9, -0.4)	0.016
35–44	3,200 (3,100–3,300)	8,100 (7,700–8,600)	39.7 (37.6–41.9)	2,600 (2,500–2,700)	7,300 (6,500–8,100)	35.4 (31.3–39.5)	-2.5 (-4.7, -0.2)	0.031
45–54	2,600 (2,500–2,700)	6,600 (6,200–7,000)	39.0 (36.6–41.3)	1,900 (1,800–2,000)	5,200 (4,500–5,900)	35.9 (31.0–40.8)	-2.0 (-4.6, 0.6)	0.126
≥55	1,100 (1,100–1,200)	2,700 (2,500–3,000)	41.2 (37.3–45.1)	1,100 (1,000–1,200)	3,100 (2,500–3,600)	36.4 (29.9–42.9)	-2.5 (-6.0, 1.2)	0.188
Race/ethnicity								
Black/African American	6,500 (6,200–6,700)	18,400 (17,800–19,100)	35.1 (33.7–36.5	5,600 (5,300–5,800)	16,500 (15,200–17,700)	33.7 (31.0–36.4)	-1.0 (-2.7, 0.7)	0.228
Hispanic/Latino[a]	2,900 (2,800–3,100)	9,200 (8,700–9,600)	32.0 (30.1–33.9)	3,200 (3,000–3,300)	10,200 (9,100–11,200)	31.1 (27.8–34.5)	-0.3 (-2.6, 2.1)	0.809
White	4,400 (4,200–4,600)	10,900 (10,400–11,400)	40.3 (38.4–42.2)	4,000 (3,900–4,200)	10,100 (9,2000–11,000)	39.8 (36.3–43.4)	-0.3 (-2.2, 0.7)	0.797
Other[b]	890 (810–970)	2,600 (2,400–2,900)	33.8 (29.9–37.5)	760 (690–840)	2,300 (1,800–2,700)	33.7 (26.2–41.1)	-0.1 (-4.4, 4.5)	0.981
Transmission category[c]								
Male-to-male sexual contact	8,900 (8,600–9,200)	25,900 (25,200–26,700)	34.3 (33.2–35.5)	8,800 (78,500–9,100)	26,500 (24,900–28,200)	33.2 (31.1–35.3)	-0.7 (-2.0, 0.7)	0.312
Injection drug use	1,000 (930–1,100)	2,700 (2,500–3,000)	37.5 (33.9–41.2)	810 (730–890)	2,200 (1,800–2,700)	36.2 (29.1–43.2)	-1.0 (-5.4, 3.5)	0.644
Male	550 (490–620)	1,600 (1,400–1,800)	35.4 (30.5–40.4)	440 (380–500)	1,300 (960–1,600)	33.9 (24.7–43.1)	-1.3 (-7.2, 5.0)	0.688
Female	470 (400–540)	1,200 (1,000–1,300)	40.4 (34.8–46.0)	370 (310–420)	930 (690–1,200)	39.4 (28.9–50.0)	-0.8 (-6.9, 5.8)	0.817
Male-to-male sexual contact and Injection drug use	630 (550–700)	1,500 (1,300–1,700)	42.0 (36.8–47.2)	540 (470–600)	1,200 (940–1,500)	43.2 (32.8–53.6)	0.5 (-4.8, 6.1)	0.853
Heterosexual contact[d]	4,100 (3,900–4,300)	10,900 (10,400–11,400)	37.7 (35.7–39.7)	3,300 (3,200–3,500)	8,900 (8,000–9,900)	37.3 (33.4–41.3)	-0.3 (-2.5, 2.0)	0.824
Male	1,100 (990–1,200)	3,600 (3,200–3,900)	30.4 (27.0–33.8)	880 (800–970)	2,900 (2,300–3,500)	30.3 (23.6–36.9)	-0.4 (-4.9, 4.2)	0.850
Female	3,000 (2,900–3,200)	7,300 (6,900–7,800)	41.2 (38.7–43.7)	2,500 (2,300–2,600)	6,000 (5,300–6,7000)	40.8 (36.0–45.5)	-0.2 (-2.7, 2.4)	0.871
Region of residence at HIV diagnosis								
Northeast	2,800 (2,700–2,800)	7,700 (7,200–8,100)	36.7 (34.5–38.9)	2,200 (2,000–2,300)	6,300 (5,500–7,100)	34.5 (30.1–39.0)	-1.2 (-3.7, 1.5)	0.378
Midwest	1,800 (1,700–1,800)	5,100 (4,800–5,400)	35.6 (33.0–38.2)	1,800 (1,700–1,900)	5,100 (4,400–5,700)	35.8 (30.9–40.8)	0.0 (-3.0, 3.1)	0.998
South	7,300 (7,100–7,600)	20,500 (19,800–21,200)	35.7 (34.4–37.1)	6,800 (6,600–7,000)	19,800 (18,400–21,200)	34.3 (31.9–36.8)	-0.9 (-2.4, 0.7)	0.265
West	2,700 (2,600–2,900)	7,400 (7,300–8,300)	34.8 (32.7–36.8)	2,700 (2,600–2,900)	7,900 (7,000–8,700)	34.6 (30.6–38.5)	0.0 (-2.5, 2.5)	0.972
Total[e]	14,300 (14,300–15,000)	41,100 (40,100–42,100)	35.7 (34.8–36.6)	13,500 (13,200–13,800)	39,000 (37,100–40,900)	34.6 (32.8–36.4)	-0.7 (-1.8, 0.4)	0.229

Note: Estimates rounded to the nearest 100 for estimates >1,000 and to the nearest 10 for estimates ≤1,000, therefore reported totals may not equal sum of columns

[a] Hispanics/Latinos can be of any race. [b] Includes American Indians/Alaska natives, Asians, Native Hawaiians/Other Pacific Islanders and persons of multiple races. [c] Data for transmission category have been statistically adjusted to account for missing risk factor information. [d] Heterosexual contact with a person known to have, or to be at high risk for HIV infection. [e] Includes persons with HIV infection attributed hemophilia or blood transfusion, or whose risk factor was not reported or identified

Summary of Results

- During 2010-2015, the probability of HIV diagnosis within one year of acquiring infection
  - Decreased for persons aged 25-34 years (EAPC = -2.2 [-3.9, -0.4]) and 35-44 years (EAPC = -2.5 [-4.7, -0.2]).
  - Increased for persons aged 13-24 years (EAPC = 3.9 [1.7, 6.1]).
  - Remained stable overall and for all other groups.
- In 2015, the probability of HIV diagnosis within one year of acquiring infection was
  - Lower for males than females (33.3% vs. 40.6%).
  - Lower for blacks/African Americans (33.7%) and Hispanic/Latinos (31.1%) than whites (39.8%).

Conclusions

- The absence of an increase over time in the probability of HIV diagnosis within one year of acquiring infection suggests limitations in the success of current testing programs.
- A lower probability of diagnosis in the first year of HIV infection can lead to more persons with undiagnosed infection, increasing the opportunity for HIV transmission and reducing benefits of early HIV care.
- To promote early HIV diagnosis and treatment, HIV testing efforts should be intensified for those at risk.

References

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