NATIONAL CENTER FOR HIV, VIRAL HEPATITIS, STD, AND TB PREVENTION

HIV molecular clusters attributed to sexual transmission in the United States, 2015–2023

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BACKGROUND

- Effectively identifying and responding to HIV molecular clusters, which indicate rapid HIV transmission, is an essential part of Ending the HIV Epidemic in the United States.
- We described the composition and growth of such HIV molecular clusters attributed to sexual transmission.
- Our aim was to identify characteristics of clusters with continued rapid growth to help communities prioritize those which may require the most robust and rapid response.

METHODS

- Using National HIV Surveillance System (NHSS) data reported through December 2023, we characterized molecular clusters first detected during December 2015–December 2022.
- We detected clusters quarterly, using transmission network analysis of HIV-1 *pol* sequences for all diagnoses in the past 3 years, using a pairwise threshold of 0.005 substitutions/site.
- Clusters of rapid transmission had ≥ 5 diagnoses during the past 12 months. Sexual transmission clusters are those with >50% of cluster members with transmission category of heterosexual or male-to-male sexual contact (MMSC).
- We compared characteristics of people in clusters with little/no growth to those in clusters with continued rapid growth (average annual growth <3 vs ≥3 diagnoses/year) as of December 2023.

RESULTS

- Of 432 HIV molecular clusters, 386 (89%) were attributed to sexual transmission.
- Of 3,515 people in these 386 clusters, most were men (92%), aged 20–29 years (54%), and resided in the South (53%). Transmission categories included MMSC (81%), other or no identified risk (7%), heterosexual transmission (6%), MMSC and injection drug use (IDU) (5%), and IDU (1%).
- Clusters varied in size at detection (median = 8; interquartile range [IQR]: 6–11), annual growth (median = 2; IQR: 1–5), and total growth (median = 8; IQR: 3–18; range: 0–102).
- Clusters with continued rapid growth (n=159; 41%) had similar size at detection (median = 9; IQR: 7–12) as clusters with little/no growth (n = 227; median=8; IQR: 6–11) yet had higher annual growth (median = 5; IQR: 4–8 vs. median = 1; IQR: 1–2) and grew to include 10–110 persons.
- Age, transmission category, region, urbanicity, and early infection were similar in clusters with and without rapid growth (Table).

Sexual transmission clusters are common and vary in growth after detection.
Over one third had continued rapid growth.

Although our analysis did not identify differences between clusters stratified by growth rate, exploration of other factors might reveal important differences to further guide prioritization and response.

Table. Characteristics of people in HIV molecular clusters attributed to sexual transmission at time of detection in the United States, 2015–2022

		People in all clusters (N=3,515) N (col %)	People in clusters with little/no growth (N=1,975) N (col %)	People in clusters with continued rapid growth (N=1,540) N (col %)
Age group at HIV diagnosis, years	13–19	410 (12)	238 (12)	172 (11)
	20–29	1,915 (54)	1,071 (54)	844 (55)
	30–39	750 (21)	410 (21)	340 (22)
	40–49	250 (7)	149 (8)	101 (7)
	50–59	154 (4)	88 (4)	66 (4)
	≥60	33 (1)	16 (1)	17 (1)
Transmission category	MMSC	2,851 (81)	1,600 (81)	1,251 (81)
	Other/no identified risk	230 (7)	119 (6)	111 (7)
	Heterosexual contact	203 (6)	123 (6)	80 (5)
	MMSC and IDU	176 (5)	103 (5)	73 (5)
	IDU	52 (1)	27 (1)	25 (2)
US Census Bureau region	Northeast	478 (14)	331 (17)	147 (10)
	Midwest	319 (9)	194 (10)	125 (8)
	South	1,852 (53)	999 (51)	853 (55)
	West	860 (24)	449 (23)	411 (27)
Urbanicity	Large central metro	1704 (48)	906 (46)	798 (52)
	Large fringe metro	678 (19)	384 (19)	294 (19)
	Medium metro	730 (21)	432 (22)	298 (19)
	Small metro	201 (6)	118 (6)	83 (5)
	Micropolitan (nonmetro)	96 (3)	57 (3)	39 (3)
	Noncore (nonmetro)	58 (2)	39 (2)	19 (1)
Acute or early HIV at diagnosis	Yes	460 (13)	247 (13)	213 (14)

Abbreviations: MMSC=male to male sexual contact; IDU=injection drug use.

CONCLUSIONS

- Sexual transmission clusters are common and vary in growth after detection; over one third had continued rapid growth.
- Our analysis did not identify differences between clusters stratified by growth rate.
- Exploration of other factors (e.g., the level of response, HIV testing and its impact on cluster growth, and other factors not included in NHSS) might reveal important differences to further guide prioritization and response.

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