Geographic Estimate of Sexual HIV Transmission Burden in the Era of U=U: Data from the DC Cohort

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BACKGROUND

- The Undetectable = Untransmittable (U=U) campaign promotes durable viral suppression of HIV to reduce sexual transmission and end the epidemic.
- Washington, DC, has the highest prevalence of HIV in the US (1.9%), with one new diagnosis per day. Sexual transmission is the most common mode of infection and STI incidence is rising nationally and in DC.
- The DC Cohort is a city-wide longitudinal cohort of people with HIV (PWH) who receive care at 15 sites.

AIMS

- To assess the HIV transmission burden by zip code of residence among DC Cohort participants.

METHODS

- Analysis of DC Cohort participants aged ≥13 who received care from 4/2016 to 3/2018.
- DC Cohort data were linked to DC Department of Health databases to capture additional HIV viral loads and STIs.
- HIV transmission burden was defined as the number of participants with incident STI with HIV VL >200 copies/mL from 9 months prior to 3 months after STI diagnosis (to capture VL in the U=U period).
- Zip code-level STI prevalence and detectable VL data was mapped using ArcMap 9.4 GIS software.
- Demographic characteristics reported as frequency (%) for categorical data and median (IQR) for continuous data, using Fisher chi-square and Wilcoxon, respectively.

CASE DEFINITIONS

A. Gonorrhea
- a) Positive NAAT or culture on urogenital or extra-genital (oropharyngeal, rectal) specimen
- b) If previously positive, a new positive test done ≥3 weeks later

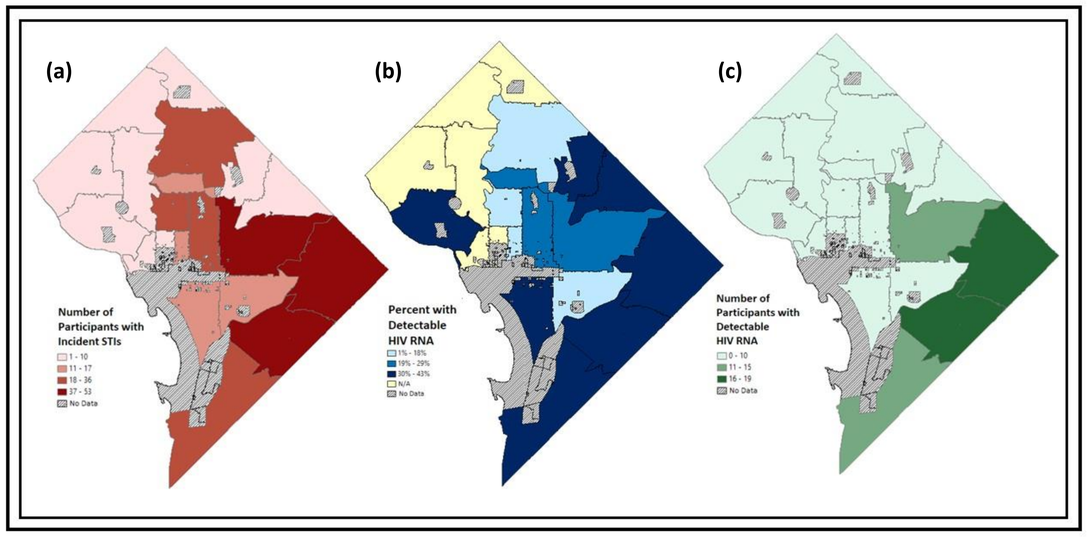
B. Chlamydia
- a) Positive NAAT on urogenital or extra-genital specimen
- b) If previously positive, a new positive test done ≥3 weeks later

C. Syphilis
- a) Positive non-treponemal test (NTr) titer ≥ 1:8 with a previous non-reactive NTr, or:
- b) Four-fold increase in the NTr titer from the previous test, or:
- c) Positive treponemal test (Tr) if NTr was ≥ 1:8 and previous Tr test was negative.

Incident STI cases were counted starting 30 days after enrollment in the DC Cohort. Any combination of STI diagnosed on the same date in the same participant was considered as a single STI episode.

RESULTS

Figure. Maps of DC by zip code, with (a) number of DC Cohort participants with incident STI; (b) percent of participants with HIV RNA >200 copies/mL among those with an incident STI, and (c) number of participants with HIV RNA >200 copies/mL among those with incident STI. Of 15 residential zip codes, 11 had high numbers of participants with STIs [(a) red and orange], and 5 accounted for the highest HIV transmission burden [(c) medium and dark green]. Zip codes with <5 participants with an STI were excluded from (b).



Characteristics	Total PWH	No STI	STI	
	N (%)	N (%)	N (%)	P-Value
No of Participants	3467	3100	367	
Age, mean, years	53.4	54.2	42.4	<.0001
Age Category				<.0001
13 to 17	9 (0.3)	9 (0.3)	0 (0.0)	
18 to 34	362 (10.4)	257 (8.3)	105 (28.6)	
35 to 54	1590 (45.9)	1393 (44.9)	197 (53.7)	
55+	1506 (43.4)	1441 (46.6)	65 (17.7)	
Race/ethnicity				<.0001
NH Black	2839 (81.9)	2587 (83.5)	252 (68.7)	
NH White	337 (9.7)	262 (8.5)	75 (20.4)	
Hispanic	180 (5.2)	149 (4.8)	31 (8.5)	
Other	46 (1.3)	44 (1.4)	2 (0.5)	
Gender (current)				<.0001
Male	2309 (66.6)	1989 (64.2)	320 (87.2)	
Transmission risk				<.0001
MSM	1234 (35.6)	968 (31.2)	266 (72.5)	
IDU	234 (6.8)	226 (7.3)	8 (2.2)	
Heterosexual	1220 (35.2)	1175 (37.9)	45 (12.3)	
Other/Unknown	779 (22.5)	731 (23.6)	48 (13.1)	

KEY FINDINGS

- Of 3,467 participants, 367 or 10.6% had at least one incident STI.
- Ten or more DC Cohort participants lived in 20 Washington DC zip codes. Of the 367 with incident STI, 89.4% lived in 11 zip codes.
- Of the 367 with incident STI, at least one HIV VL was available in "U=U window" for 348 (94.8%).
- Overall, 97 (26.4%) with incident STI had at least one HIV VL >200 copies/ml.
- Of these 97, 66 (68.0%) resided in 5 of the 20 Washington DC zip codes.

DISCUSSION

- Despite evidence for U=U and treatment-as-prevention, STI occurring during periods of viremia represent events that carry a high risk of HIV transmission.
- To achieve the 90/90/90/50 Plan to End the HIV Epidemic in the DC, geographically specific information regarding STIs and HIV transmission burden allow for resources on treatment and prevention of HIV – including adherence support for PWH in care, outreach for PrEP for their partners, and STI prevention campaigns – to be directed towards groups with the highest risk for HIV transmission.

LIMITATIONS: These data provide an estimation of transmission burden; actual frequency and type of condomless sex acts among persons with VL >200 and without PrEP was not known.

STRENGTHS: This analysis combines city-wide data on STI incidence and longitudinal HIV care, capturing sexual transmission risk by geographic areas.

CONCLUSIONS

- In Washington DC, 5 residential zip codes accounted for 68.0% of the estimated HIV transmission burden among participants in the DC Cohort.
- Estimates of HIV transmission burden by zip code allow for focused, neighborhood-level interventions that may strengthen efforts to end the HIV epidemic.

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