HIV-1 transmission and phylogenetic dynamics among people who inject drugs on the US/Mexico border

01014

Britt Skaathun[1], Steffanie A. Strathdee[1], Cho-Hee Shrader[2], Carrie L. Nacht, Annick Borquez[1], Irina Artamanova, Alicia Harvey-Vera, Gudelia Rangel[3], Caroline Ignacio[1], Brendon Woodworth[1], Antoine Chaillon[1], Tetyana Vasylyeva[1]

[1]University of California San Diego, La Jolla, CA, USA, [2]ICAP at Columbia University, [3]U.S.-Mexico Border Health Commission, Mexican Section

BACKGROUND

Cross Border Drug Use (CBDU) among people who inject drugs (PWID) in San Diego (SD), U.S. and Tijuana (TJ), Mexico

- Sex and CBDU drive bidirectional cross-border mobility and are linked to increased HIV risk[2] (paid sex/syringe sharing)

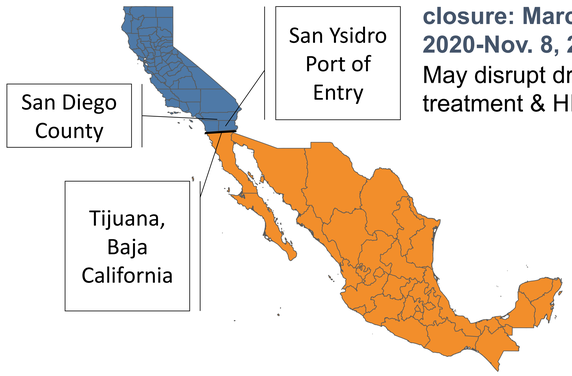
HIV among PWID in TJ

HIV prevalence: 5%

- Engagement in HIV testing and care are low
  - Ever tested: 37%
  - HIV diagnosed on ART[4]: 3.7%
- Pre-COVID19 pandemic, HIV incidence <2 /100 person years (PY)

OBJECTIVE: To assess HIV prevalence, incidence, and patterns of phylogenetic clustering and cluster growth in networks during the COVID-19 pandemic

Figure 1: Study site



US-Mexico border closure: March 21, 2020-Nov. 8, 2021: May disrupt drug treatment & HIV services

METHODS

- Participants from *La Frontera*, a longitudinal study of PWID aged ≥18 from 3 groups:
  - PWID living in SD who engaged in CBDU in the past 24 months
  - PWID living in SD who did not engage in CBDU
  - PWID living in TJ who did not engage in CBDU
- Baseline data collection November 2020-October 2021
- 18-month visit: May 13, 2022 - April 17, 2023

Biannual Measurements

- Behavioral
- HIV test, HIV sequencing

Statistical Analyses

HIV prevalence, bivariate incidence-density rates (IR), incident rate-ratios (IRR), incidence rate difference (IDD) and exact 95% confidence intervals (CI)

Phylodynamic analysis.

Bayesian phylogenetic analysis was used to identify local transmission clusters, estimate their age, and effective reproductive number (Re) over time.

HIV-1 transmission persisted during COVID-19 pandemic border closure

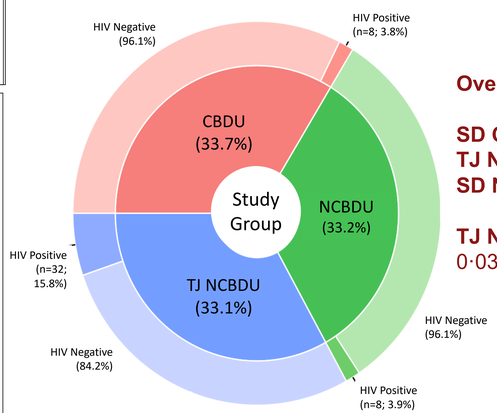
Growing HIV clusters consisted of PWID in San Diego & Tijuana

Efforts to end the HIV epidemic in the US should consider cross-border HIV-1 transmission.

Table 1: Baseline characteristics , La Frontera cohort, San Diego US & Tijuana, MX (N=611)

Characteristic	SD CBDU (n=206)	SD NCBDU (n=203)	TJ NCBDU (n=202)	Total (n=611)
Age, Median(IQR)	41 (35, 51)	40 (31, 53)	44 (38, 53)	43 (35, 52)
Cisgender woman, n(%)	44 (21%)	57 (28%)	55 (27%)	156 (26%)
Hispanic/Latinx, n(%)	156 (76%)	89 (44%)	195 (97%)	440 (72%)
Age 1st inj, Median(IQR)	20 (17, 25)	20 (17, 27)	20 (17, 26)	20 (17, 26)

Figure 2: Distribution of HIV Prevalence by Study Group



Overall IR: 1.37 (0.47, 2.24 95% CI)

SD CBDU IR: 0.76 (0, 1.81 95% CI)
TJ NCBDU: 2.88 (0.75, 5.02 95% CI)
SD NCBDU: 0

TJ NCBDU vs. SD NCBDU IDD: 0·03 (95% CI 0·00, 0·06)

Although not significant, incidence was notably higher among:

- Those who receptively shared syringes/works in past 6 mo
- Non-male participants
- Non-heterosexual participants.

45/49 samples sequenced
40 clustered

16 clusters with ≥ 1 cohort sequence
(size range 2-17)

Large Cluster 1 (n=15):

- 4 SD CBDU
- 11 TJ NCBDU
- 87% male
- 47% reported sex work (6 males & 1 female).
- 1 SD CBDU who seroconverted.

Large Cluster 2 (n=17):

- 7 sequences from the US (41%) and 10 from Mexico (59%).
- 3 cohort sequences: all female TJ NCBDU who reported sex work

Figure 3: Bayesian phylogenetic analysis

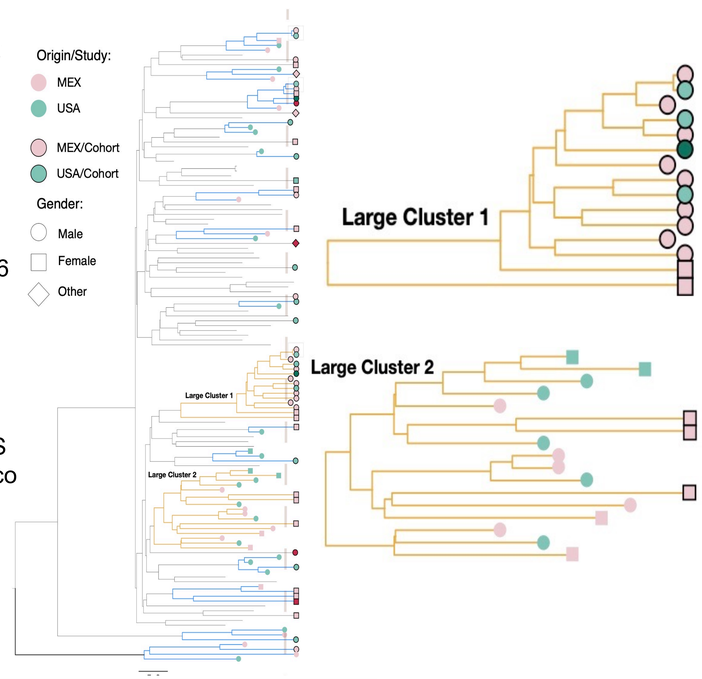
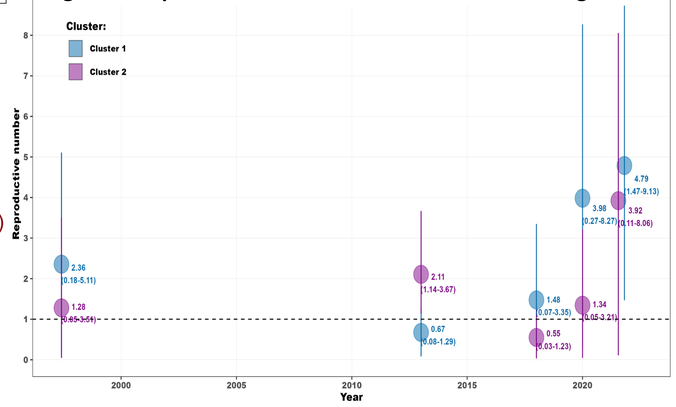


Figure 4: Reproductive number of clusters 1 & 2 through time



Cluster Growth

Large cluster 1:
Re >1 during US-Mexico border closure

Re 4·8 (95% HPD 1·5 – 9·1)

Large cluster 2:
Re >1 prior to 2013
Re 2·1 (95% HPD 1·1 – 3·7)

*HPD= Highest Posterior Density

CONCLUSIONS

- Amidst the COVID-19 pandemic and the border closure, cross-border HIV clusters grew.
- EHE efforts in the US should consider cross-border HIV-1 transmission.
- Mobile harm reduction services and coordination with municipal HIV programs to initiate ART and pre-exposure prophylaxis are needed to reduce transmission.

REFERENCES

1. Rachlis B, Brouwer KC, Mills EJ, Hayes M, Kerr T, Hogg RS. Migration and transmission of blood-borne infections among injection drug users: understanding the epidemiologic bridge. Drug and alcohol dependence. 2007;90(2-3):107-19.
2. Jain JP, Abramovitz D, Strathdee SA, et al. Sex Work as a Mediator Between Female Gender and Incident HIV Infection Among People Who Inject Drugs in Tijuana, Mexico. AIDS Behav 2020.
3. White EF, Garfein RS, Brouwer KC, Lozada R, Ramos R, Firestone Cruz M, Strathdee SA. Prevalence of hepatitis C virus and HIV infection among injection drug users in two Mexican cities bordering the U.S. Salud Publica de Mexico. 2007;49(3):165–172.
4. Smith LR, Patterson TL, Magis-Rodriguez C, et al. Engagement in the HIV Care Continuum among Key Populations in Tijuana, Mexico. AIDS Behav 2016;20:1017-25.
5. Mehta SR, Wertheim JO, Brouwer KC, et al. HIV Transmission Networks in the San Diego-Tijuana Border Region. EBioMedicine 2015;2:1456-63.

Contact Information
Britt Skaathun, MPH, PhD
bskaathun@health.ucsd.edu

FUNDING:
P30 AI036214 CFAR Supplement
La Frontera (PI: Strathdee): R01DA049644

ACKNOWLEDGEMENTS: La Frontera participants; Study Team: Carlos Nobles, Daniela Abramovitz, interviewers