Ending the HIV epidemic among persons who inject drugs: a cost-effectiveness analysis in six U.S. cities

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Background
- In the United States, persons who inject drugs (PWID) continue to be disproportionately at risk of HIV infection.
- There is considerable evidence suggesting that implementation of prevention programs can be highly effective in reducing transmission of HIV among PWID, and that HIV incidence among PWID can be reduced substantially with focused, locally-orientated strategies in treating and preventing HIV.
- We aimed to determine the highest-valued combination implementation strategies to reduce the burden of HIV among PWID in US cities.

Methods
- We used a previously validated dynamic, compartmental HIV transmission model to project distinct HIV microepidemics for six US cities: Atlanta, Georgia; Baltimore, Maryland; Los Angeles, California; Miami, Florida; New York City, New York; and Seattle, Washington.
- In each city, the adult population aged 15-64 was partitioned by sex at birth, HIV risk group (men who have sex with men [MSM], PWID, MSM who inject drugs [MSMWD] and heterosexuals), race/ethnicity (black/African American, Hispanic/Latix and non-Hispanic white/others) and sexual risk behavior level (high vs. low-risk).
- For each city, we calibrated the model to match HIV prevalence, new diagnoses and deaths (2012-2015), and validated against external incidence estimates.
- We estimated averted HIV infections and incremental cost-effectiveness ratios (ICERs) (healthcare perspective, 3% annual discount rate, 2018US$), for each intervention and city compared to the status quo over a 20-year time horizon. Interventions were implemented at plausible scale for a 10-year horizon.

Results
- Selected strategies included between six (Atlanta and Seattle) and twelve (Miami) individual interventions (Figure 1). Care coordination to improve ART engagement and RAPID ART were not included in any city’s optimal strategy while expanded access to MOUD and rapid HIV testing integrated with MOUD were included in all.
- HIV incidence reductions of 8.1% [2.8%–13.2%] (Seattle) to 54.4% [37.6%–73.9%] (Miami) by 2030 (Figure 3), and with large reductions in Miami, Los Angeles and Atlanta (75.5%, 49.0% and 44.8% respectively) and Baltimore, New York City and Seattle reaching 16.1%, 17.7% and 19.2% reductions, respectively, when implemented at near-ideal levels (Figure 2).

Conclusion
- Distinct combinations of evidence-based interventions targeted to PWID were required to produce the greatest public health impact in each setting.
- Evidence-based interventions targeted to PWID can deliver considerable value, however ending the HIV epidemic among PWID will require innovative implementation strategies and supporting programs to reduce social and structural barriers to care.
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Evidence-based interventions targeted to PWID can deliver considerable value; however, ending the HIV epidemic among PWID will require innovative implementation and support to reduce social and structural barriers to care. Table 1. Description, effectiveness and care implementation scenarios for the evidence-based HIV prevention programs and care interventions included in our analysis.

Figure 1. City-level health production functions for evidence-based prevention and care interventions targeted to persons who inject drugs and men who have sex with men who inject drugs.

Figure 2. Projected reductions in HIV Incidence among persons who inject drugs and men who have sex with men who inject drugs.

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