

**The impact of localized
implementation: determining the
cost-effectiveness of
HIV prevention and care
interventions
across six U.S. cities.**

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The impact of localized implementation: determining the cost-effectiveness of HIV prevention and care interventions across six U.S. cities.

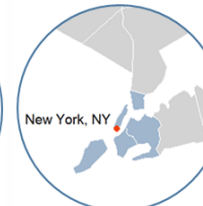
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Background

The HIV epidemic in the US is best characterized as a set of diverse microepidemics.



Total adult 15-64 Population (% projected change to 2040)

Total population (2016)	3,812,143 (37%)	1,874,601 (-1%)	6,964,983 (-2%)	1,821,311 (16%)	5,865,683 (3%)	1,503,497 (15%)
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Adult 15-64 Population by race/ethnicity (% projected change in proportion by 2040)

Black / African American	1,336,469 (-1%)	553,665 (5%)	568,815 (-1%)	296,354 (-2%)	1,304,687 (-1%)	95,550 (1%)
Hispanic / Latinx	391,265 (10%)	102,495 (3%)	3,385,948 (4%)	1,246,583 (7%)	1,703,286 (4%)	137,818 (7%)
Non-Hispanic White and others	2,084,409 (-9%)	1,218,441 (-8%)	3,010,220 (-3%)	278,374 (-5%)	2,857,710 (-3%)	1,270,129 (-8%)

People Living with HIV (rate/100,000)[†]

Prevalence	31,961 (670)	16,931 (718)	48,100 (564)	26,128 (1,120)	117,260 (959)	7,768 (312)
New diagnoses	1,618 (33)	441 (19)	1,720 (20)	1,150 (49)	2,608 (21)	248 (10)
National Rank ^Δ	2	25	27*	1	21*	75*



Background

- Dynamic HIV transmission models can provide a unified framework to quantify the health and economic value of different strategies to address the HIV epidemic while accounting for microepidemic context.
- A number of efficacious HIV interventions are available; however, there is a paucity of evidence on real-world implementation of many of these interventions.



Objective

- Our objective was to determine the cost-effectiveness of HIV treatment and prevention interventions among adults, offered at previously-documented levels of scale in six US cities with diverse HIV microepidemics.

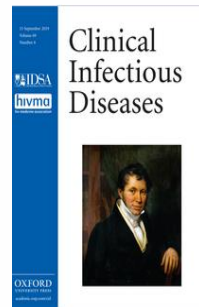
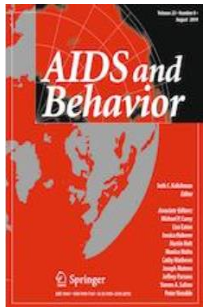
This research informed work presented during this conference:

1. *What will it take to 'End the HIV epidemic' in the US? An economic modeling study in 6 cities*

- *Looking Beyond 90-90-90 to Support, Measure, and Model City-Level Impact* session: September 10, 16:00–17:15 by Bohdan Nosyk.



Background Research



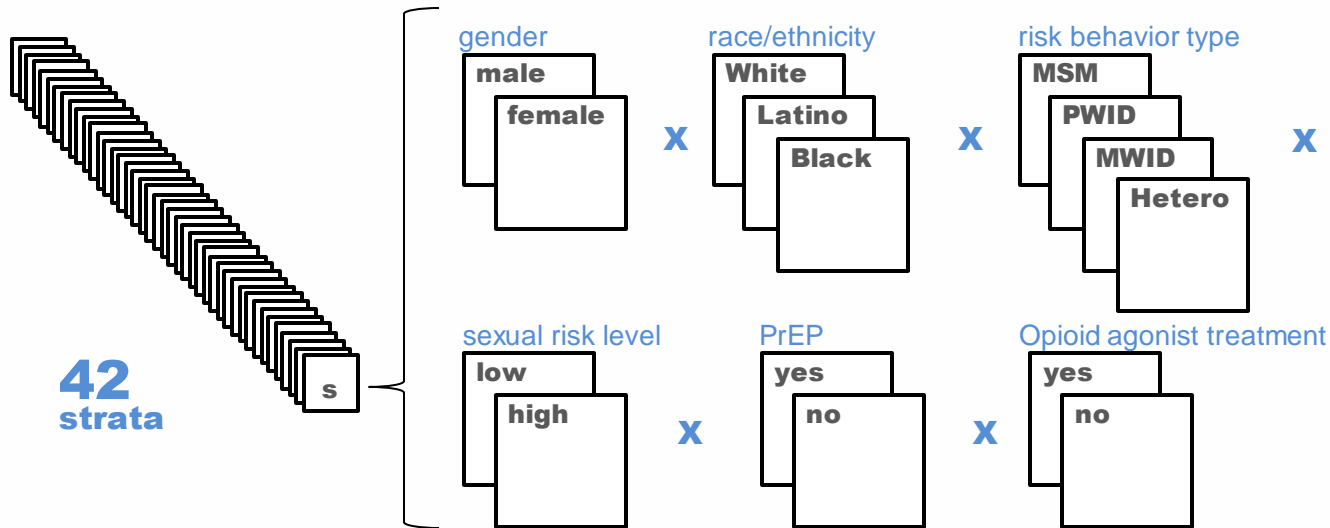
1. **Scientific Case** (Panagiotoglou et al, AIDS Behav. 2018;22(9):3071-3082)
2. **Evidence Synthesis** (Krebs et al, PLoS One. 2019;14(5):e0217559)
3. **Medical Care Costs** (Enns et al, AIDS. 2019;33(9):1491-1500)
4. **Disease progression, ART persistence** (Wang et al, Lancet HIV. 2019;6(8):e531-e539)
5. **Model Calibration** (Zang et al, 2nd review)
6. **Defining the 'status quo' comparator** (Nosyk et al, *in press*, Clin Infect Dis. 2019)
7. **Defining the evidence-based interventions** (Krebs et al, under review)



Methods

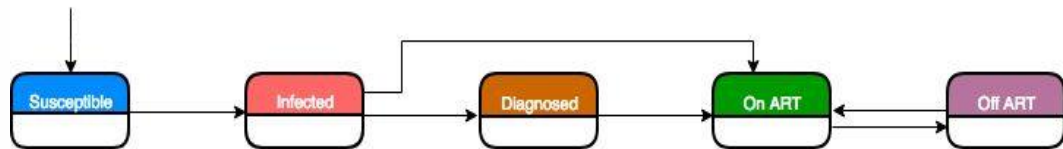
Our model, at a glance:

- For each city, the population aged 15-64 was stratified as →



- Disease progression accounted for acute infection and CD4 strata

19
states



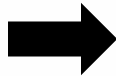


Methods

- We identified 16 evidence-based HIV interventions selected from the CDC's Compendium of Evidence-Based Interventions and Best Practices for HIV Prevention and the literature within four specific domains:

Protect

- Syringe services program (SSP)
- Medication for opioid use disorder (MOUD) with buprenorphine
- MOUD with methadone
- Targeted pre-exposure prophylaxis (PrEP) for high-risk MSM & MWID



Diagnose

- Opt-out testing in ER
- Opt-out testing in primary care (PC)
- EMR testing offer reminder
- Nurse-initiated rapid testing
- MOUD integrated rapid testing



Treat

- Case management for initiation
- Care coordination for retention
- Care coordination for retention, targeted
- EMR alert of suboptimal ART
- Same-day ART initiation
- Enhanced personal contact
- Re-linkage program



Methods

We used the *Reach Effectiveness Adoption Implementation Maintenance (RE-AIM)* framework to define for each intervention:

- **Effectiveness:** Drawn from RCTs, meta-analyses, and recently published literature.
- **Reach and Adoption determining the Scale of Delivery:** Drawn from evidence of real-world implementation.
 - *Estimating ranges on the scale of implementation for evidence-based HIV/AIDS interventions in the United States*, Data/Modeling session: September 10, 17:15–18:15 by Emanuel Krebs.
- **Costs of implementation, delivery and sustainment:** Adapted from published sources.
 - *Estimating costs of implementation, delivery and sustainment for evidence-based HIV/AIDS interventions in the United States*, Policy/Finance session: September 11, 14:30–15:30 by Xiao Zang.



Methods

We estimated averted HIV infections and incremental costs and quality-adjusted life-years (QALYs), and incremental cost-effectiveness ratios (ICERs):

- Payer perspective;
- 3% annual discount rate;
- 2018 USD;

for each intervention and city compared to the status quo.

- *A preamble to ending the HVI epidemic in the United States: Modeled status quo projections for new HIV diagnoses in six US cities*, Poster session: September 10, 17:15–18:15 by Xiao Zang.
- Interventions were implemented at previously-documented scale for a 10-year period.
- All outcomes were measured over a 20-year time horizon (2020-2040).
- We performed probabilistic sensitivity analysis (2,000 best-fitting parameter sets).

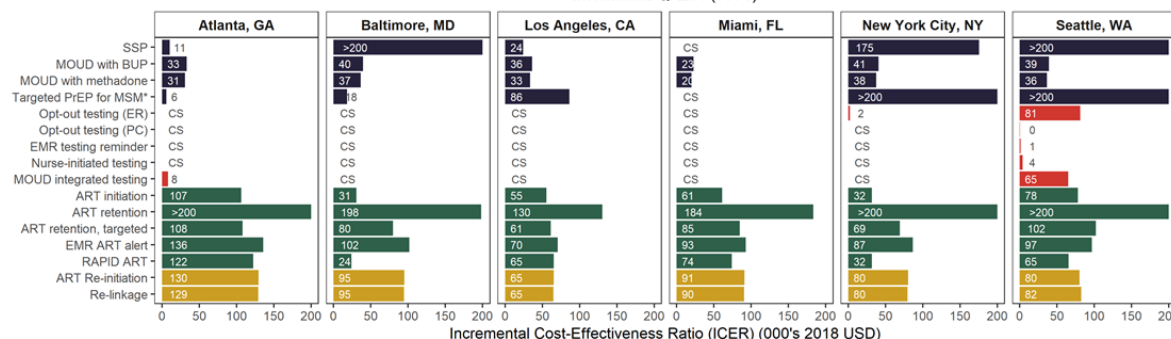
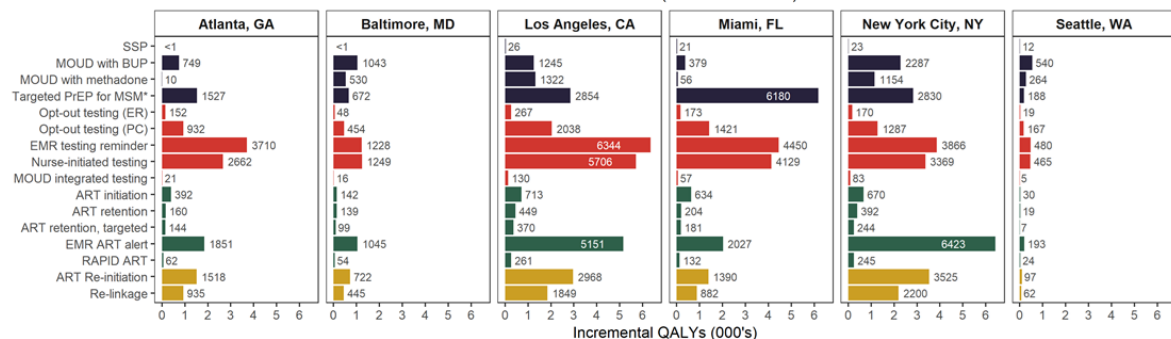
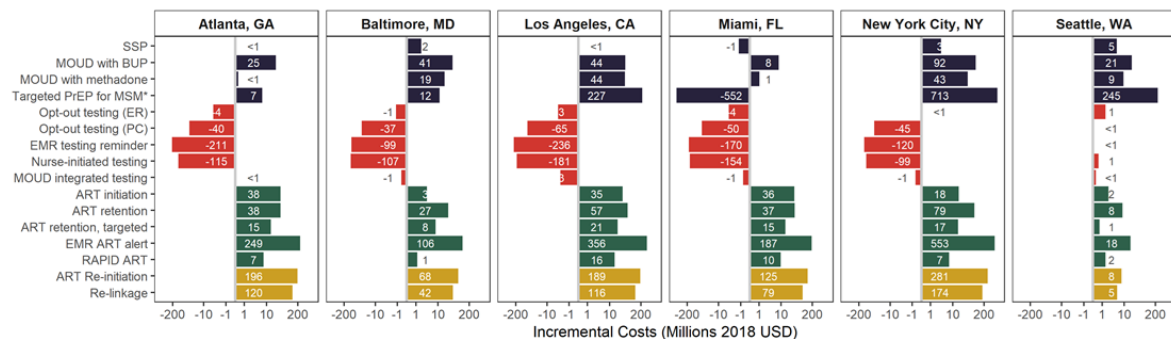
Results

Similarities across cities:

- Value of MOUD ;
- HIV testing cost-saving;
- ART initiation valuable.

Differences across cities:

- SSP scale-up;
- Expanded targeted PrEP.

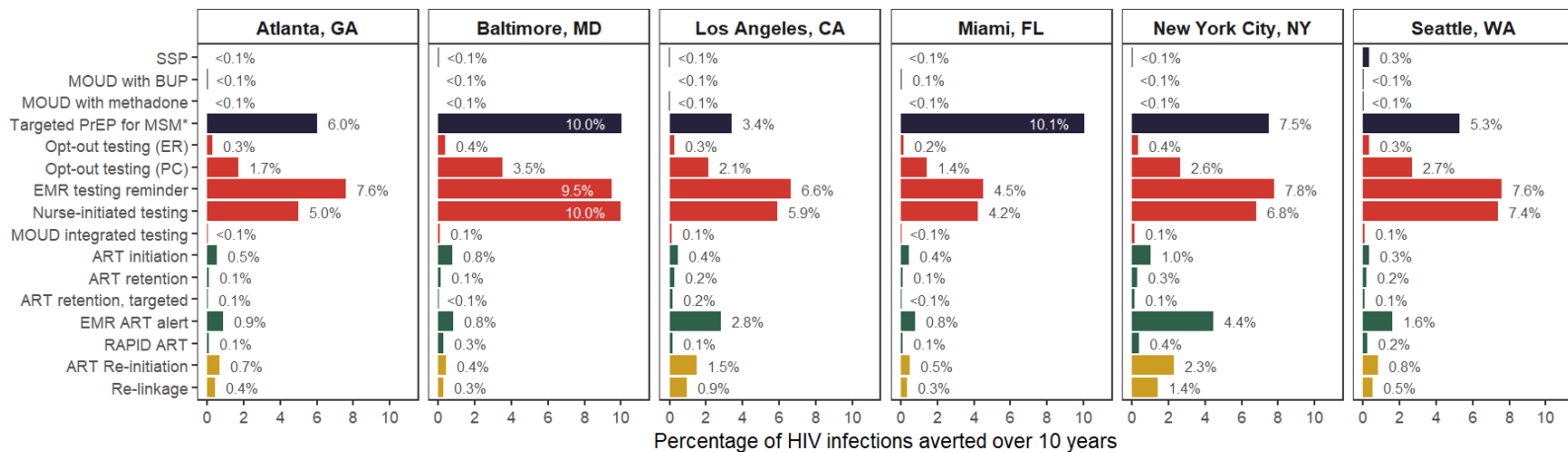




Results

Percentage of total averted infections:

- No single intervention averted more than 10.1% of new infections (PrEP in Miami)



Intervention Category ■ HIV Prevention Program ■ HIV testing ■ ART engagement ■ ART re-engagement



Conclusion

- The value of individual HIV interventions depends on microepidemic context.
- Combination implementation strategies for HIV should be tailored to microepidemic context in order to provide the most value and have maximum impact on reducing the public health burden of HIV.
- A rapid scale-up of multiple evidence-based interventions will be needed to meet the newly-established targets for HIV elimination in the United States.



Our Scientific Advisory Committee

- **Czarina N Behrends, PhD**, Department of Healthcare Policy and Research, Weill Cornell Medical College
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