

Population impact of expanding PrEP coverage by offering long-acting injectables PrEP to MSM in US and Canada: Model comparison analysis

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HPTN

HIV Prevention
Trials Network

ANNUAL MEETING

2022



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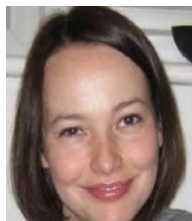


Sarah Stansfield

Past Members and Collaborators



H Coupland

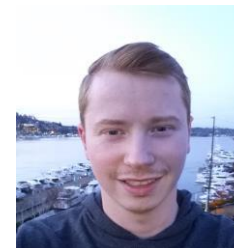


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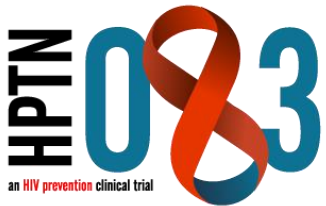
B Adamson



S DeMontigny

Motivation

- Two clinical studies (**HPTN 083** and **HPTN 084**) have shown that long-acting injectable cabotegravir (**LA PrEP**) is highly efficacious at preventing HIV among cisgender MSM and transgender women in North and South America, South Africa and Thailand and Vietnam and women in Sub-Saharan Africa, respectively.



- **66% lower risk of HIV infection** in participants receiving CAB compared to TDF/FTC in **HPTN 083**
- **89% lower risk of HIV infection** in participants receiving CAB compared to TDF/FTC in **HPTN 084**



- Currently **approved for use as PrEP** in US. WHO discussed their recommendations on a guidance meeting in March. Expected soon.

What is the importance of these results?

NIAID is funding research on 4 types of long-acting HIV prevention.

INTRAVAGINAL RING (IVR)



Polymer ring inserted into the vagina releases antiretroviral drug over time.

IMPLANT



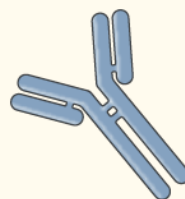
Device implanted in the body releases antiretroviral drug over time.

INJECTABLE



Long-acting antiretroviral drug is injected into the body.

ANTIBODY



Antibody is infused or injected into the body.

- Efficacy demonstrated against highly effective competitor
- Completely different delivery route which may appeal to new users
- It brings us a step closer to HIV vaccine



Reduce your risk of getting HIV by:



Using condoms



Ensuring that your partners who are living with HIV are taking treatment



Using PrEP to prevent getting HIV if you have ongoing risk, including during pregnancy



Using sterile needles and syringes for all injections



Getting tested and treated for sexually transmitted infections

Outline of the analysis

- Joint project of the HPTN Modelling Center and the HIV Modelling Consortium
- Other key stakeholders:
 - the HIV prevention team at WHO and
 - Gates Foundation
- Main objective: Conduct a model comparison analysis of the population-level impact of **expanding PrEP coverage by offering LA PrEP**, over different time horizons, derived from transmission-dynamic models of HIV in different geographic areas and selected risk populations.

Participating models



HPTN modeling center

Team: Kate Mitchell
Romain Silhol

Mia Moore

Marie-Claude Boily

Dobromir Dimitrov

Simulated Epidemic:
MSM, Atlanta



McGill University

Team: Carla M Doyle
Rachael M Milwid
Mathieu Maheu-Giroux
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Simulated Epidemic:
MSM, Montreal

Erasmus
University
Rotterdam



Erasmus University

Team: Marjolein van
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Simulated Epidemic:
MSM, Amsterdam



Thembisa

Team: Lise Jamieson
Gesine Meyer-Rath
Leigh Johnson

Simulated Epidemic:
Generalized, South
Africa



HIV Synthesis model

Team: Jennifer Smith
Loveleen Bansil-
Matharu
Valentina Cambiano
Andrew Philips

Simulated Epidemic:
Generalized, Southern
& Eastern Africa



EMOD

Team: Anna Bershteyn,
David Kaftan
Simulated Epidemic:
Generalized, Sub-
Saharan Africa

- **Population-level effectiveness:** Cumulative fractions of new HIV infections averted over 20 years for different intervention scenarios compared to base-case scenarios
- **Population-level efficiency:** Additional person-years on PrEP needed to prevent one HIV infection for different intervention scenarios compared to base-case scenarios
- **Cost-effectiveness:** The additional cost per disability-adjusted life year (DALY) averted over 20 years for different intervention scenarios compared to base-case scenarios

PrEP expansion – 80+ scenarios

- 1) **Overall PrEP coverage target** (oral and LA PrEP users combined)
 - 15%, 30%, 40%, 50%
- 2) **Time to achieve targeted PrEP coverage**
 - 5 years, 10 years
- 3) **Proportion of current/projected oral PrEP users switching to LA PrEP**
 - 0%, 15%, 30%, 50%, 100%
- 4) **Distribution of LA PrEP** (excluding those who switch from oral PrEP)
 - based on current PrEP eligibility criteria at each setting
 - proportionally across risk and age groups
- 5) **Assumptions about LA PrEP** (same for all teams)
 - Per act efficacy – 91% (MSM, North America) and 95% (generalized, South Africa)
 - Discontinuation rates – 16.8% (MSM, North America), 8.4% (generalized, South Africa)

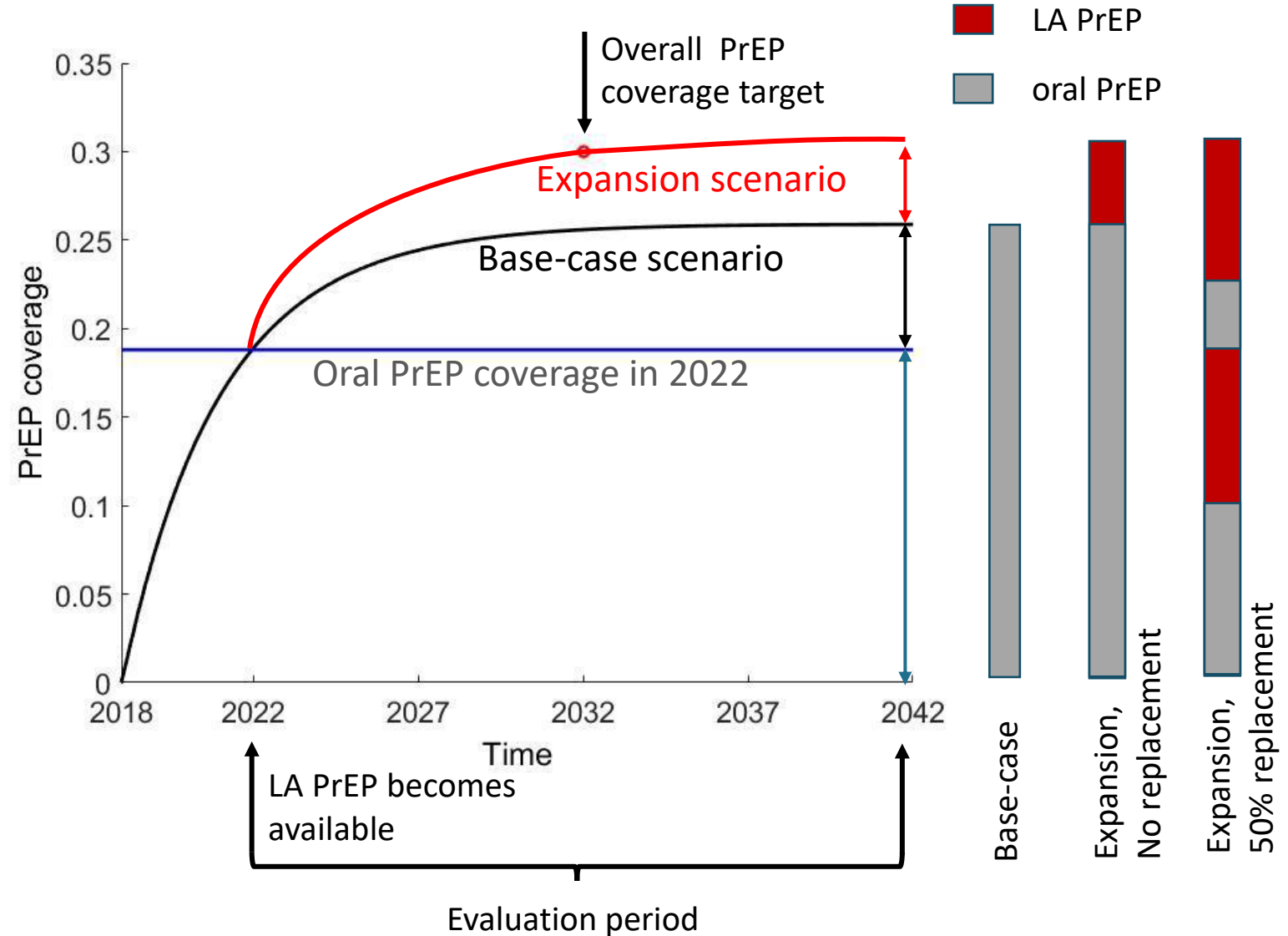
PrEP expansion scenarios - example

Base-case scenario:

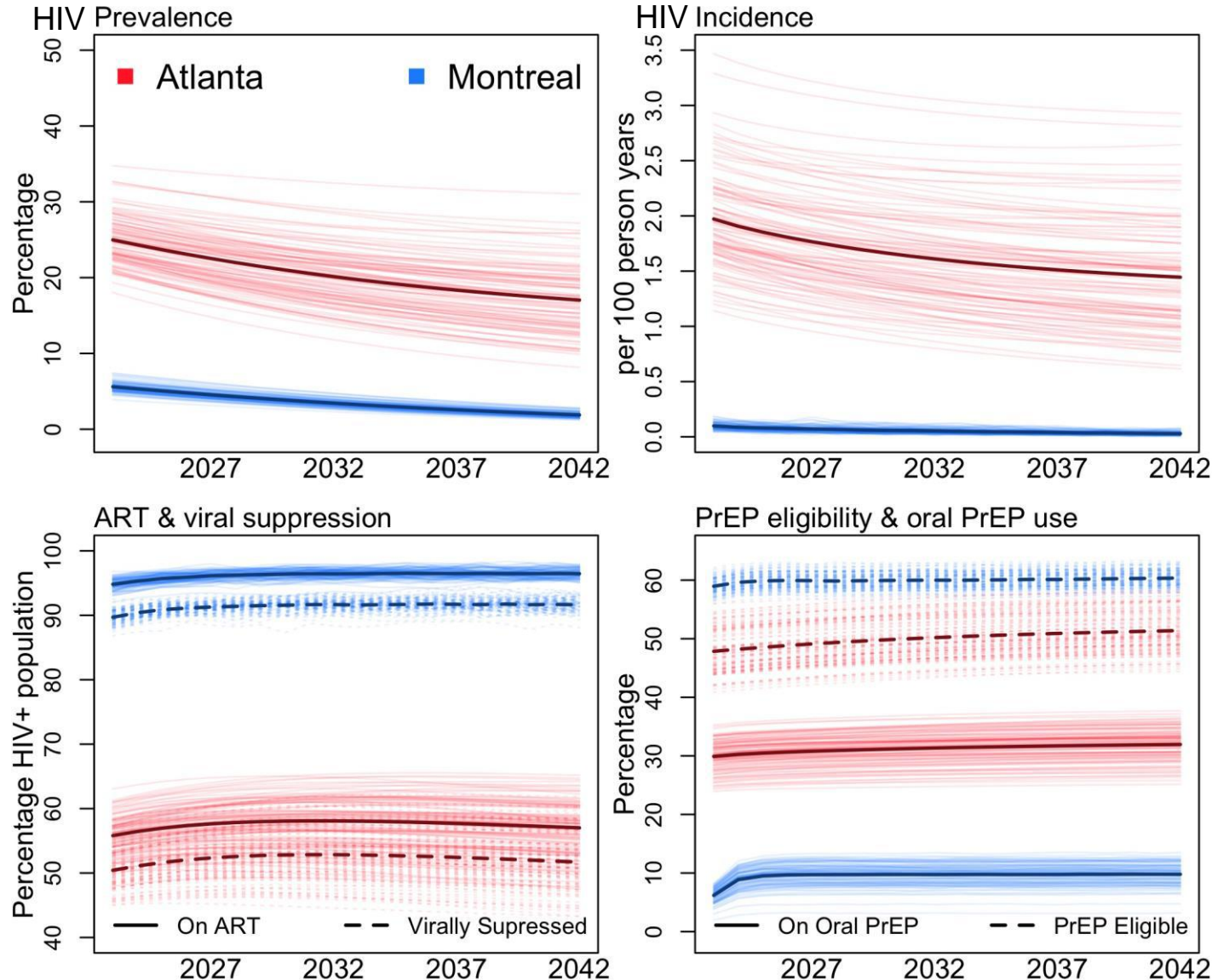
- Oral PrEP introduced in 2018
- 18.8% oral PrEP coverage in 2022
- 25.6% expected oral PrEP coverage in 2032

Expansion scenarios:

- **30%** overall PrEP coverage target
- Achieved in **10 years** (2032)
- **80%** of current/potential oral PrEP users choose LA PrEP instead when available



Base-case scenario with oral PrEP only



Atlanta Model

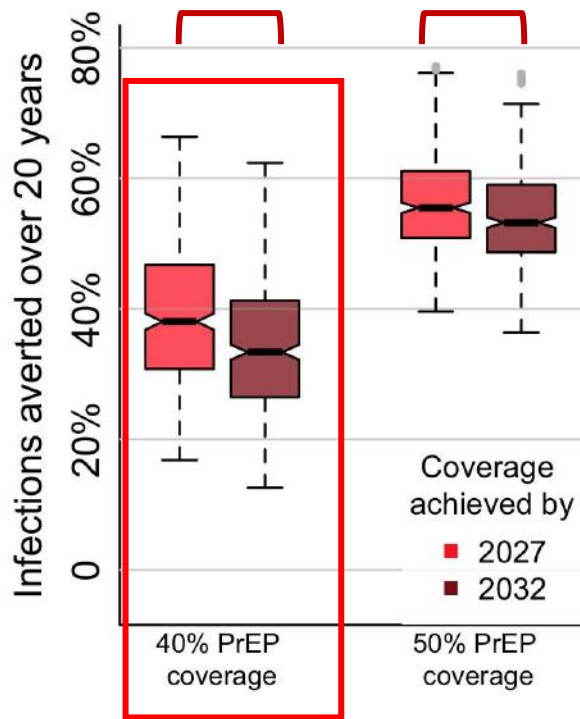
- Higher HIV prevalence & HIV incidence
- Low ART coverage & high oral PrEP coverage
- High oral PrEP effectiveness: **82%** (range 75%-87%)
- PrEP eligible are at **~3 times higher risk** to acquire HIV

Montreal Model

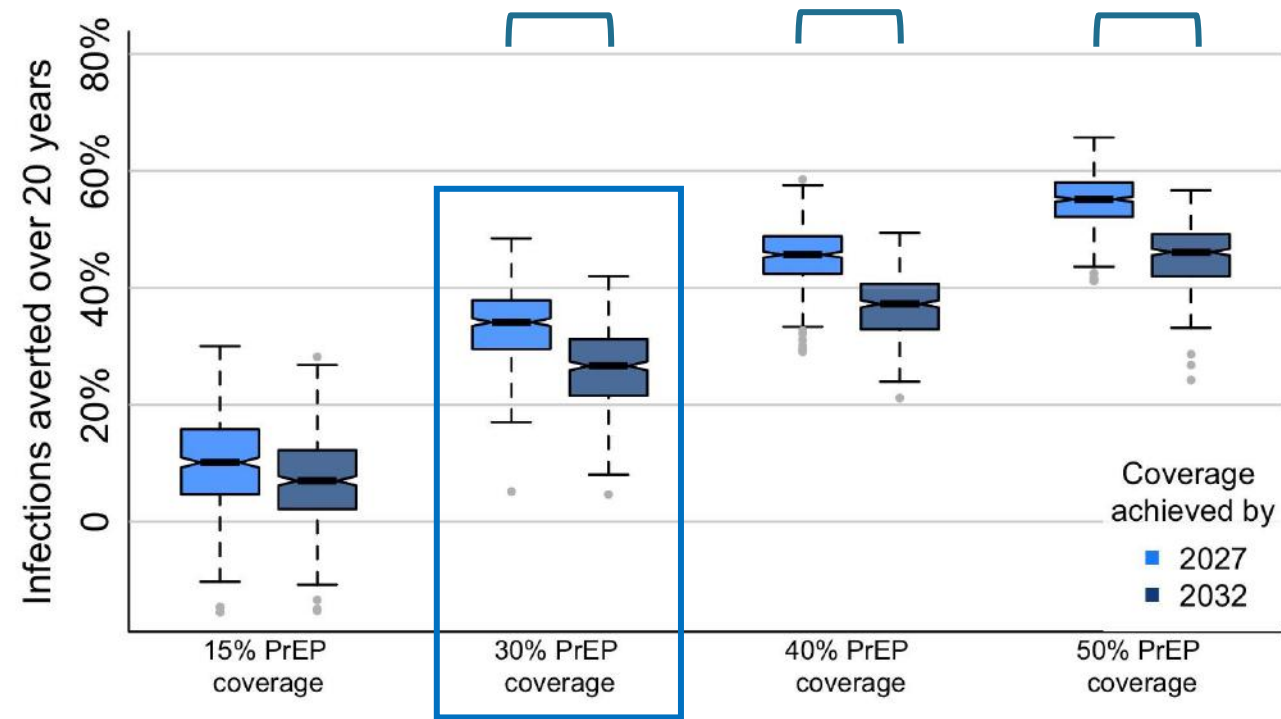
- Low HIV prevalence & HIV incidence
- High ART coverage & low oral PrEP coverage
- High oral PrEP effectiveness: **86%**
- PrEP eligible are **> 10 times higher risk** to acquire HIV

Expanded PrEP coverage among eligible: Population effectiveness

Atlanta: Increasing overall PrEP coverage 5 years earlier by 8-10 pp led to **averaging 25-40% points more infections averted** compared to 7-10 percentage points more infections averted in **Montreal** by 20 pp to avert **close to 40%** of new infections



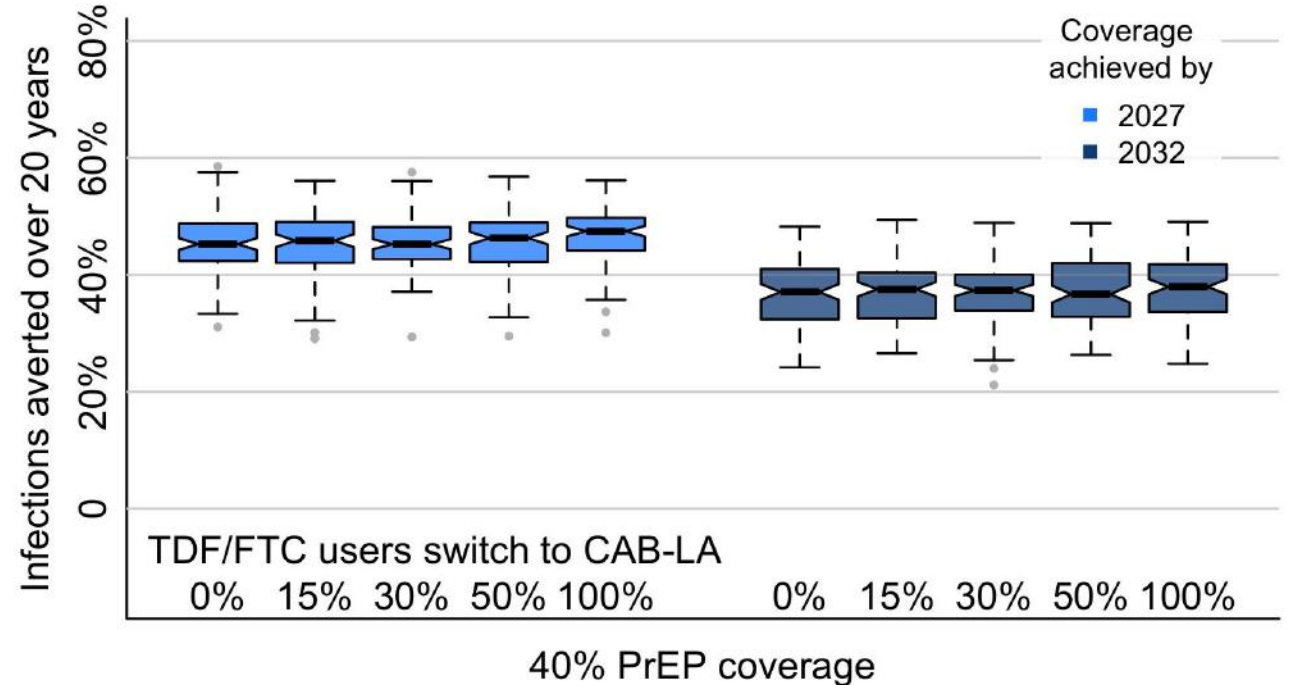
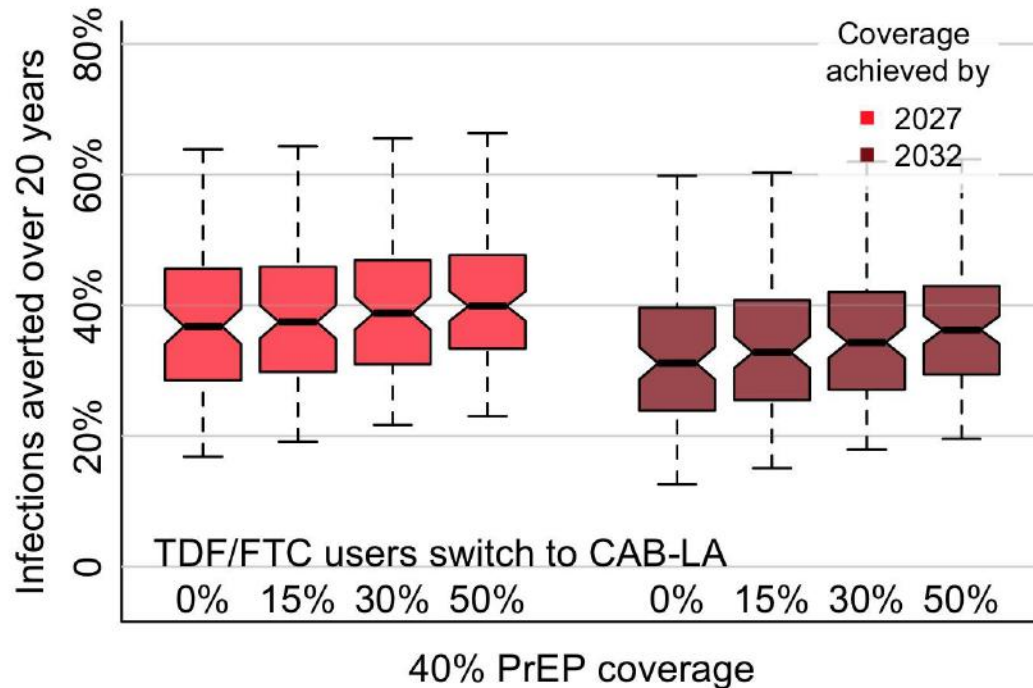
15% and 30% coverage levels not applicable as baseline PrEP coverage in Atlanta is 30%



Notches in boxplot show 95% CI for the median.
Dotted lines show maximum/minimum without outliers

Expanded PrEP coverage among eligible: Effect of switching to LA PrEP

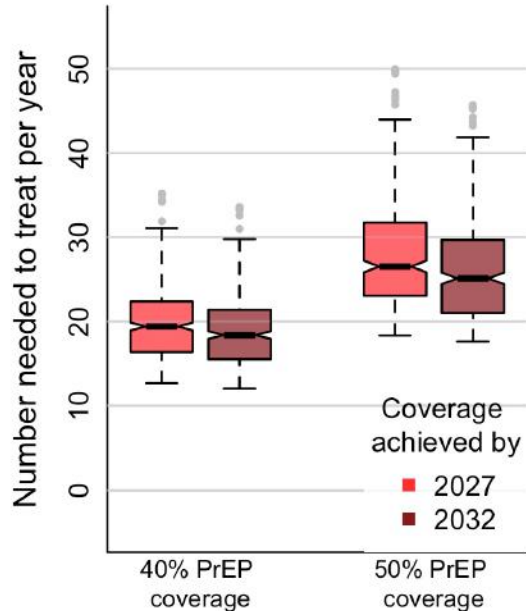
Switching existing users from oral to LA PrEP has a **small positive effect (up to 3 pp)**



*Notches in boxplot show 95% CI for the median.
Dotted lines show maximum/minimum without outliers*

Expanded PrEP coverage among eligible: Population efficiency

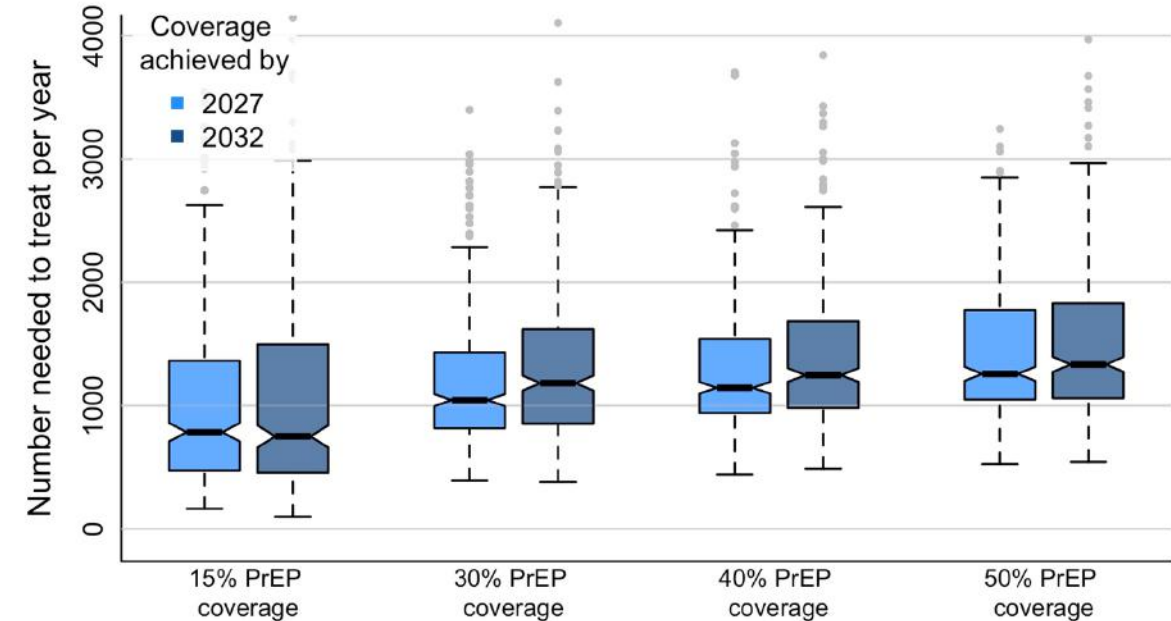
Atlanta: Population Efficiency



For comparison:
NNT = 62 iPrEx
= 78 Partners PrEP
= 25-32 Black adolescents
= 150-250 White adolescents

- Increasing overall PrEP coverage by 8-10 percentage points resulted in **~20 NNT**
- More efficient** than IPREX & Partners PrEP, **comparable** with interventions among black adolescents
- Switching oral PrEP users to LA PrEP** improves efficiency by **~10%**

Montreal: Population Efficiency

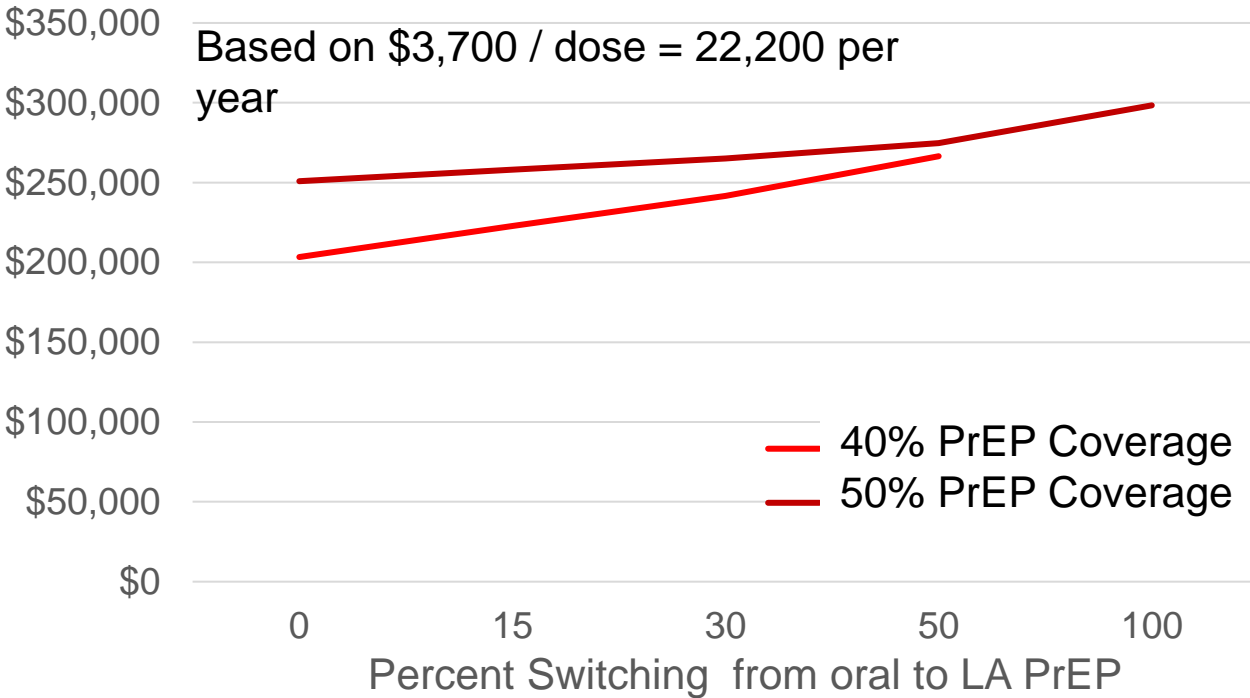


- NNT extremely high** because of very low HIV incidence (*note different scale on y-axis*)
- Switching to LA PrEP did not change NNT when expanded among PrEP eligible

Notches in boxplot show 95% CI for the median
Dotted lines show maximum/minimum without outliers

Expanded PrEP coverage among eligible: Cost-effectiveness analysis CEA by Jesse Heitner (UW)

Atlanta



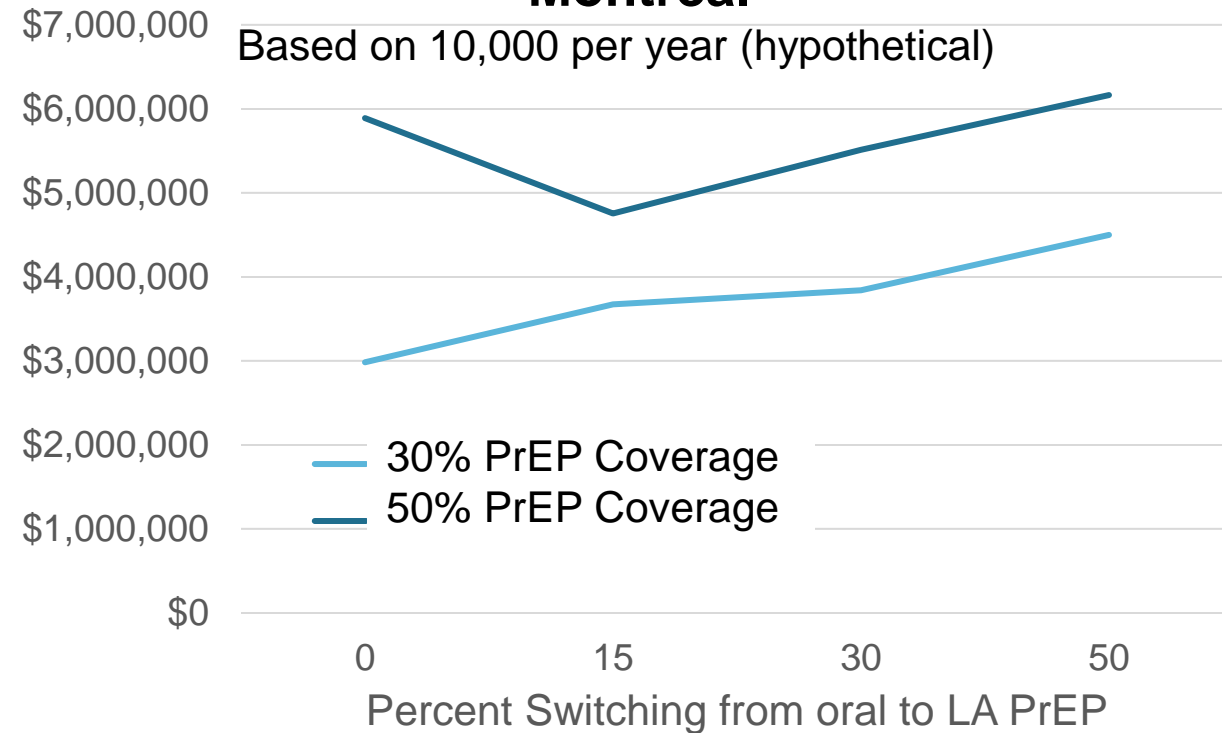
Cost parameters represent US National averages

Cost effectiveness shown for **coverage achieved in a 5 year timeline.**

Neither costs nor effects discounted in this model (to be updated in future, which will worsen cost-effectiveness).

Not particularly cost effective compared to generic oral PrEP, but can be cost-effective compared to branded oral PrEP (not shown)

Montreal



Cost parameters are specific to MSM in Montreal.

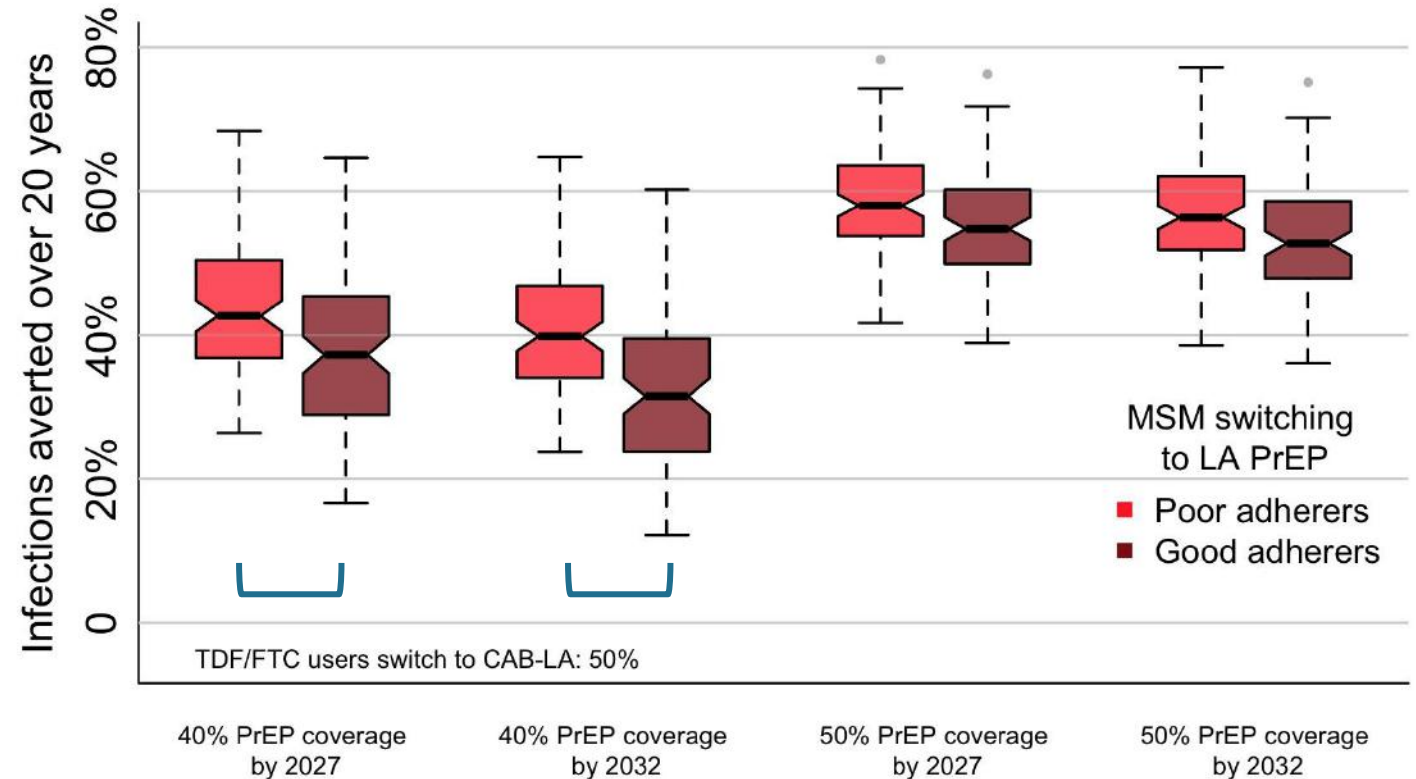
Though price point is unknown, **LA-PrEP is not expected to be cost effective for this population** at even the price of oral PrEP

Targeting by adherence to oral PrEP

Alternative scenarios in Atlanta with 50% of oral PrEP users switching to LA PrEP:

- **Poor adherers** switch to LA PrEP, Oral PrEP effectiveness **increases to 90%**
- **Good adherers** switch to LA PrEP, Oral PrEP effectiveness **decreases to 60%**

Population Effectiveness



Up to 20% difference in effectiveness

- Adding LA-PrEP may **avert a significant proportion (35-40%) of expected new HIV infections over 20 years** in settings with already high oral PrEP (like Atlanta, USA) if it results in ~10 pp increase in overall coverage among PrEP eligible population
- **Substantially larger increase in overall PrEP coverage (~20 pp) is needed** to achieve comparable reduction in settings with low current PrEP use (like Montreal, Canada).
- If PrEP coverage is expanded among PrEP eligible MSM, switching existing users from oral to LA PrEP is predicted to have **only a small positive effect** due to the high efficacy and adherence to oral PrEP assumed in the models. **Much stronger effect if expanded proportionally.**
- Expanding the PrEP toolbox with LA-PrEP could be a highly efficient and possibly cost-effective intervention in places with high HIV incidence (like Atlanta) **but unlikely to be cost-effective in settings with low HIV incidence** (like Montreal).

Thank you

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