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POPULATION IMPACT OF EXPANDING PREP USAGE IN SOUTH AFRICA: MODEL COMPARISON ANALYSIS

Sarah Stansfield[1], Jesse Heitner[2], Lise Jamieson[3], Gesine Meyer-Rath[3,4], Leigh Johnson[5], David Kaftan[6], Anna Bershteyn[6], Jennifer Smith[7], Valentina Cambiano[7], Loveleen Bansi-Matharu[7], Andrew Philips[7], Mia Moore[1], Ruanne Barnabas[2], Marie-Claude Boily[8], Dobromir Dimitrov[1]

[1]Fred Hutchinson Cancer Center, Seattle, WA, United States [2]Massachusetts General Hospital, Boston MA, United States [3]Health Economics and Epidemiology Research Office, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa [4]Department of Global Health, Boston University School of Public Health, Boston, Massachusetts, USA [5]University of Cape Town, South Africa [6]New York University Grossman School of Medicine, NY, United States [7]University College London, London, United Kingdom [8]MRC Centre for Global Infectious Disease Analysis, School of Public Health, Imperial College London, United Kingdom

BACKGROUND

Long-acting injectable cabotegravir (CAB-LA) has demonstrated superiority to daily oral tenofovir disoproxil fumarate/emtricitabine (TDF/FTC) for HIV pre-exposure prophylaxis (PrEP) in two clinical trials (HPTN 083 & 084) and is recommended by the WHO for people at high risk of HIV. The **HIV Modeling Consortium** and **HPTN Modeling Center** conducted a comparative modelling analysis of the potential impact of expanding PrEP coverage by offering CAB-LA to men and women in South Africa.

METHODS

- Three independent age- and risk-stratified HIV transmission models (**Synthesis**, **EMOD-HIV** & **Thembisa**) were separately parameterized and calibrated to local data from South Africa
- **PrEP coverage expansion from current levels to 5-20% of the uninfected population** with either TDF/FTC or CAB-LA after 5 years (Figure 1) was simulated by recruiting PrEP users based on model-specific targeting of PrEP use by risk
- Models assumed 95% CAB-LA effectiveness based on HPTN 083 and model-specific TDF/FTC effectiveness
- Population impact and efficiency of PrEP expansions were evaluated over 20 years compared to baseline scenarios of TDF/FTC use only (Figure 1, black lines).

Model	Synthesis	EMOD-HIV	Thembisa
Description	Stochastic individual-based	Stochastic individual-based	Deterministic compartmental
TDF/FTC effectiveness	90-95% efficacy >80% adherence in 90% population	58%	85% men 65% women
TDF/FTC discontinuation*	0.01-0.05 per 3 months	0.31 per 3 months	0.84 per year
PrEP targeting	9% adults have PrEP indication+	3.5% adults at high risk, 20.5% low risk^	22% women & 32% men at high risk+

* Discontinuation rate despite continued risk
+ PrEP available to all but targeted to some groups
^ 76% adults are not PrEP eligible

Expanding PrEP access with CAB-LA in South Africa may be highly effective & efficient if used in periods of substantial risk

RESULTS

- In baseline scenarios with no PrEP expansion, HIV prevalence was similar in all models (~17%), while HIV incidence and ART use varied (Figure 2), and median PrEP coverage remained ≤2%

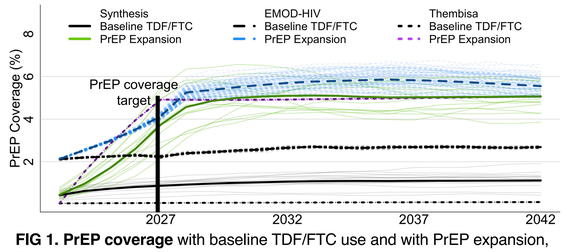


FIG 1. PrEP coverage with baseline TDF/FTC use and with PrEP expansion, 5% coverage level shown

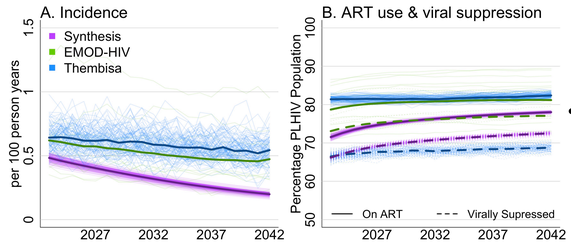


FIG 2. Baseline incidence and **ART use and viral suppression**

- **Achieving 5% PrEP coverage with CAB-LA by 2027 may avert 46% (Synthesis), 35% (EMOD-HIV), and 12% (Thembisa) of new infections over 20 years** (Figure 3)
- Increasing coverage to 20% may increase the impact by 12 percentage points (pp) (Synthesis), 18pp (EMOD-HIV), and 23pp (Thembisa)
- 5% coverage with oral TDF/FTC would be expected to *reduce* impact by 16pp (Synthesis), 21pp (EMOD-HIV), and 3pp (Thembisa) compared to 5% CAB-LA coverage
- **5% CAB-LA coverage was projected to be highly efficient in two models with 14 (Synthesis) and 13 (EMOD-HIV) additional person-years (PYs) on CAB-LA needed to prevent one infection**, compared to 119 PYs (Thembisa, Figure 4)

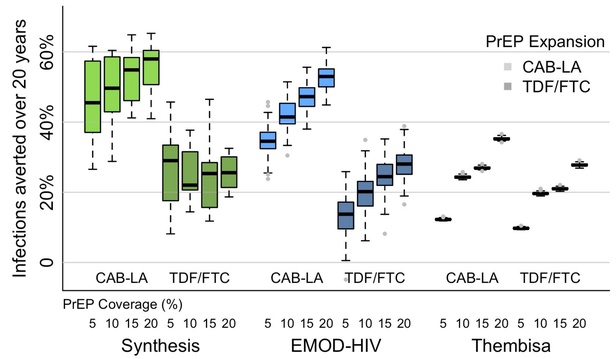


FIG 3. Infections averted over 20 years with PrEP coverage 5-20% and PrEP expansion with either CAB-LA or TDF/FTC

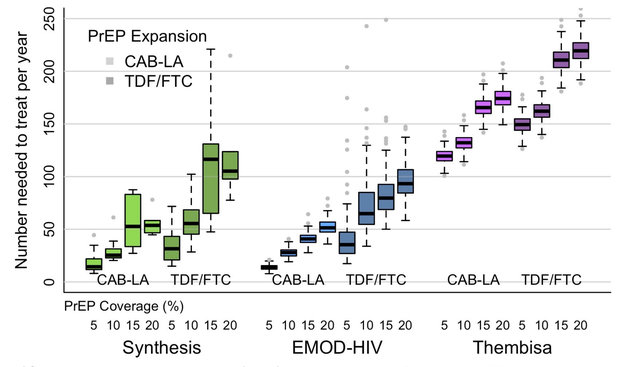


FIG 4. Number needed to treat (NNT) to prevent one infection over 20 years with PrEP coverage 5-20% and PrEP expansion with either CAB-LA or TDF/FTC

INTERPRETATION

- A smaller increase in infections averted with increased PrEP coverage for Synthesis showed the limited effect of increasing users once those at substantial risk have been covered
- Higher NNT for Thembisa could reflect lower incidence in that model
- PrEP expansion with TDF/FTC instead of CAB-LA *reduced* intervention impact due to lower assumed effectiveness and (in EMOD-HIV) higher discontinuation

CONCLUSIONS

- **Offering CAB-LA in South Africa could impact the HIV epidemic substantially if it results in higher PrEP coverage** and is adequately targeted to people at high risk of acquiring HIV
- Expanding PrEP could be highly efficient if predominately used during periods of substantial risk

ACKNOWLEDGEMENTS

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Corresponding author:
sstansfi@fredhutch.org