P - 905

Modelling the Impact of Scale-Up of Long-Acting Injectables for HIV Prevention and Treatment in the United States

Presenting author:
Andrew Brogan
ViiV Healthcare, Durham, NC, USA
andrew.p.brogan@viivhealthcare.com
619.627.6545

Andrew P. Brogan[1], Gavin Jones[2], Melanie Schroeder[3], Rob Blissett[2], Jeremy Fraysse[1], Aimee A. Metzner[1], Sarah-Jane Anderson[4], Johan Klint[2], Jonathan Tosh[3], Cindy Garris[1], Julie Priest[1]

[1]ViiV Healthcare, Durham, NC, USA; [2]Maple Health Group, LLC, New York, NY, USA; [3]ViiV Healthcare, London, UK; [4]GSK, London, UK

Please scan the QR code for additional resources

Key Takeaways

- **Current HIV prevention and treatment efforts are insufficient to achieve Ending the HIV Epidemic (EHE) targets, highlighting the need for additional strategies to accelerate reductions in annual new HIV acquisitions.**
- **Expanding LAI PrEP and LAI ART represents an important opportunity to accelerate progress toward EHE targets, with increasing use projected to substantially reduce HIV acquisition through complementary prevention and treatment pathways.**
- **LAI strategies could generate substantial economic value alongside improved HIV outcomes, with LAI PrEP and combined prevention and treatment strategies yielding positive long-term return on investment.**

Plain Language Summary

- We used a mathematical model, based on recent US HIV data, to estimate how greater use of long-acting injectable (LAI) HIV prevention and treatment could affect the HIV epidemic and its costs over the next 10 years.
- The results suggest that expanding LAI PrEP for HIV prevention and LAI ART for HIV treatment could prevent a substantial number of new HIV acquisitions and accelerate progress toward national goals for ending the HIV epidemic. Greater use of these options was associated with greater reductions in HIV transmission.
- In addition to improving HIV outcomes, greater use of LAI options could provide substantial economic value. LAI PrEP and strategies combining LAI prevention and treatment were projected to provide a positive long-term return on investment.

Introduction

- The US has made ending the HIV epidemic a national priority through the National HIV/AIDS Strategy (NHAS) and the federal Ending the HIV Epidemic in the U.S. (EHE) initiative.[1] These initiatives aim to reduce new HIV acquisitions by 75% by 2025 and 90% by 2030. From a 2017 baseline of approximately 37,000 annual new HIV acquisitions, the latter correspond to <9,300 by 2025 and <3,000 by 2030.[2]
- Despite advances in HIV prevention and treatment, important gaps remain across the care continuum. Uptake, adherence and persistence with daily oral pre-exposure prophylaxis (PrEP) remain suboptimal among individuals who could benefit, while challenges with adherence to daily oral antiretroviral therapy (ART) may affect sustained viral suppression. Addressing these barriers is important to reduce ongoing HIV transmission and accelerate progress towards EHE goals.
- Long-acting injectable (LAI) therapies offer an alternative to daily oral regimens and may address these unmet needs. LAI PrEP has demonstrated superior efficacy versus daily oral PrEP in clinical trials and may help overcome barriers to uptake, adherence and persistence.
- For people with HIV, LAI ART expands treatment options and may support adherence and sustained viral suppression, thereby reducing the potential for HIV transmission.

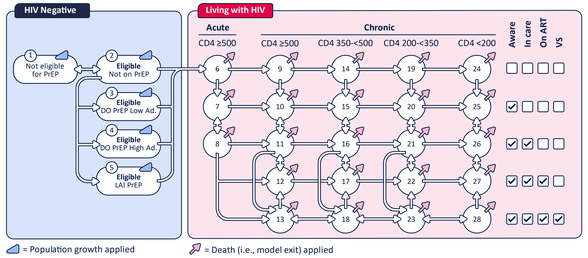
Methods

- We developed a compartmental dynamic HIV transmission model, calibrated to recent US Centers for Disease Control and Prevention (CDC) surveillance data,[3,4] to estimate the epidemiologic impact and return on investment of scaling up LAI PrEP and ART in the US over 2025-2034.

Model Overview

- The model was informed by established HIV transmission modelling approaches, including the CDC HIV Optimization and Prevention Economics (HOPE) model.[5-7] The US population (aged ≥15 years) was stratified by HIV acquisition risk, with people living with HIV represented across acute and chronic disease stages, continuum-of-care states, and CD4 strata to capture disease progression and associated costs (**Figure 1**).
- Daily oral PrEP was modelled by adherence level (0–3 vs ≥4 pills/week), with adherence-specific protection and drug costs reflecting pill use (**Table 1**). Adherence distributions and protection were informed by the iPrEx open-label extension study,[8] corresponding to an overall effective protection of 59.5% among oral PrEP users.
- LAI PrEP was modelled with 92% effectiveness based on Hawkins et al. (2025),[9] implicitly accounting for delayed or missed injections reflected in the effectiveness estimate. LAI ART injections were assumed to be received as scheduled; exploratory viremic switching assumed viral suppression following the switch.

Figure 1. Model Compartment and Transition Flow Diagram.



Abbreviations: Ad, adherence; ART, antiretroviral therapy; CD4, cluster of differentiation 4; DO, daily oral; LAI, long-acting injectable; PrEP, pre-exposure prophylaxis; VS, virally suppressed. Footnotes: Numbers represent the compartment indexes in the model.

Epidemiological Data Calibration

- The model was calibrated to CDC surveillance data available over the 2017–2024 calibration period[3,4] using stochastic parameter sampling, consistent with established epidemiological modelling approaches.[10] Inputs for calibration included HIV prevalence (overall, diagnosed, and undiagnosed), annual new diagnoses, the UNAIDS diagnosis/treatment/viral-suppression indicators, and all-cause mortality among people living with HIV. Historical PrEP use was informed by published AIDSVu data.[11,12] PrEP use during the projection period was held constant at the coverage level from the last available time point (2024), providing a current-care comparator against which the changes in PrEP and ART use needed to approach EHE targets could be assessed.

Cost Outcome Estimation & Inputs

- For 2025–2034, annual healthcare system costs, including antiretroviral therapy, hospitalizations, outpatient care, and monitoring, were assigned to model compartments according to projected occupancy. Separately, estimated lifetime HIV management costs were applied to each new acquisition occurring during the projection period, assuming eventual diagnosis.
- Net cost benefit was calculated as cumulative lifetime costs avoided for averted acquisitions minus intervention costs. Return on investment was calculated as the ratio of cumulative lifetime costs avoided for averted acquisitions relative to cumulative additional prevention costs for LAI PrEP and/or LAI ART scenarios under the projected time 2025-2034.
- Cost inputs are summarized in **Table 1**. Annual costs were expressed in 2025 US dollars, with healthcare inflation applied where required. Drug costs used 2026 WAC prices, with daily oral PrEP and ART costs weighted by 2026 market shares, assumed constant throughout the projection period. Administration costs included LAI administration (PrEP and treatment) and any additional visits not captured within PrEP monitoring; ART monitoring was assumed to be included in background HIV disease management costs. All future costs were discounted at 3.0% annually.
- Lifetime HIV management costs were estimated externally to the model, based on incremental healthcare costs between people with and without HIV, and applied to each new HIV acquisition during the projection period, assuming eventual diagnosis.

Table 1. Modelled Annual Cost Inputs[13-20].

Cost Group	Parameter	Cost
(Projection Period) Annual Cost Inputs		
Daily Oral PrEP	DO Medication – Low adherence group	$3,180
	DO Medication – High adherence group	$11,660
	DO Monitoring	$1,268
LAI PrEP	LAI Medication	$25,374
	LAI Administration	$88
	LAI Monitoring	$1,611
Treatment	DO ART Medication	$47,868
	LAI ART Medication	$43,255
	LAI ART Administration	$159
Background Disease Management	CD4 ≥200 - Undiagnosed	$6,891
	CD4 ≥200 - Diagnosed, Not on ART	$7,811
	CD4 ≥200 - Diagnosed, on ART	$12,216
	CD4 <200 - Undiagnosed	$27,825
	CD4 <200 - Diagnosed, Not on ART	$29,967
	CD4 <200 - Diagnosed, on ART	$31,866
End of Life Care	Excess Costs in Final Months of Life (one-off)	$43,142
Lifetime Cost Inputs		
Annual healthcare system (ART & other resource use) for all HIV acquisitions		$47,184

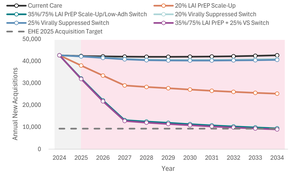
Abbreviations: ART, antiretroviral therapy; CD4, cluster of differentiation 4; DO, daily oral; LAI, long-acting injectable; PrEP, pre-exposure prophylaxis.

Results

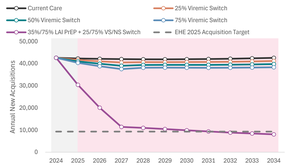
- Scale-up of LAI PrEP and LAI ART was projected to substantially reduce HIV acquisition relative to continuation of current care (**Figure 2A**; **Table 2**).
- A 20% LAI PrEP scale-up was projected to avert 134,880 HIV acquisitions.
- A scenario combining 35% LAI PrEP scale-up with switching 75% of low-adherence daily oral PrEP users approached but did not meet the EHE 2025 acquisition target by 2034 (9,488 vs 9,300 acquisitions). Adding a 25% switch of virally suppressed individuals from daily ART oral to LAI ART achieved the target, with additional reductions in HIV acquisition primarily driven by improved treatment persistence.
- Cumulative HIV-related costs averted exceeded intervention costs, highlighting the potential long-term economic benefits of the combined strategy (**Figure 3**).
- All LAI PrEP and LAI ART scenarios yielded positive net cost benefits ($15.5–$195.0B); LAI PrEP scenarios achieved returns of $2.22–$2.96 per $1 invested (**Table 2**).
- In an exploratory analysis assuming individuals with viremia achieved viral suppression after switching from daily oral to LAI ART, switching 25–75% from daily oral ART increased overall viral suppression and averted 12,551–37,558 acquisitions, with incremental benefits in the context of high overall suppression (**Figure 2B; Table 2**).

Figure 2. Projected Impact of LAI Strategies

A. LAI PrEP Scale-Up & Virally Suppressed Switch to LAI Treatment*

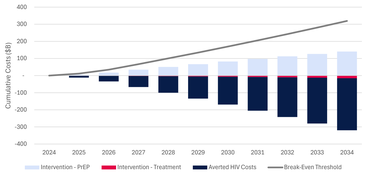


B. Explorative - Viremic Switch to LAI Treatment**



Footnote: *A: LAI PrEP scenarios included 20% scale-up and 35% scale-up combined with switching 75% of low-adherence DO PrEP users to LAI PrEP. LAI ART scenarios included switching 20% or 25% of VS individuals from DO ART to LAI ART, and a combined scenario with 35% PrEP scale-up, 75% low-adherence PrEP switching, and 25% VS switching to LAI ART. **B: Exploratory viremic-switch scenarios included switching 25%, 50%, or 75% of people with viremia from DO ART to LAI ART, and a combined scenario with 35% PrEP scale-up, 75% low-adherence PrEP switching, 25% VS individuals switching, and 75% viremic switching to LAI ART. Note: Grey shading indicates the calibration period; pink shading indicates the projection period.

Figure 3. Cumulative (10-Year) Intervention and Averted Acquisitions Lifetime HIV Costs



- **Scenario**: 35% LAI PrEP scale-up, with 75% of low-adherence daily oral PrEP users switching to LAI PrEP and 25% of virally suppressed individuals switching from daily oral ART to LAI ART.
- **Positive bars**: Additional costs associated with LAI PrEP scale-up (▫).
- **Negative bars**: Treatment cost savings from LAI ART's lower WAC versus standard of care (■) and lifetime HIV costs averted through prevented acquisitions (■).
- **Break-even line (—)**: Total savings plotted on the positive axis; intervention costs below this line indicate net cost savings.

- When combining the 35% PrEP scale-up scenario with optimising treatment for individuals virally suppressed on daily oral ART and with viremia on daily oral ART, this exploratory LAI ART strategy averted 293,346 acquisitions over the projected time 2025-2034 and achieved the EHE 2025 acquisition target by 2032.

Table 2. LAI PrEP and LAI ART Scenarios Projected Over 2025-2034

Scenario*	EHE 2025 Target Met	Intervention costs ($B)	Averted Acquisitions	Averted Cost ($B)	Net Cost Benefit ($B)	Max ROI** ($/$)
Scenarios (%LAI PrEP Scale-Up / %Low-Adh Switch to LAI PrEP / %VS Switch to LAI ART)						
20% / 0% / 0%	No	$49.0B	134,880	$145.3B	$96.3B	$2.96
35% / 75% / 0%	No	$135.0B	277,872	$299.4B	$164.3B	$2.22
0% / 0% / 20%	No	-$7.9B	11,793	$12.7B	$20.6B	N/A
0% / 0% / 25%	No	-$9.9B	14,828	$16.0B	$25.9B	N/A
35% / 75% / 25%	Yes (2034)	$125.4B	282,236	$304.1B	$178.6B	$2.42
Explorative Scenarios Including %Viremic Switch to LAI ART						
0% / 0% / 0% / **25%**	No	-$2.0B	12,551	$13.5B	$15.5B	N/A
0% / 0% / 0% / **50%**	No	-$4.0B	25,072	$27.0B	$31.0B	N/A
0% / 0% / 0% / **75%**	No	-$6.0B	37,558	$40.5B	$46.5B	N/A
35% / 75% / 25% / **75%**	Yes (2032)	$121.1B	293,346	$316.0B	$195.0B	$2.61

Abbreviations: ART, antiretroviral therapy; EHE, ending the HIV epidemic; LAI, long-acting injectable; low-adh, low-adherence; N/A, not applicable; PrEP, pre-exposure prophylaxis; ROI, return on investment; VS, virally suppressed.

*Scenario-specific uptake levels were gradually implemented over 2025–2027, reaching target levels in 2027.

**Values indicate the return on $1 invested. ROI was not applicable for LAI ART-only scenarios because the WAC of LAI ART was lower than that of daily oral ART, resulting in cost savings rather than incremental intervention cost.

Limitations

- The model evaluates the overall setting population and implicitly assumes transmission-related behaviors remain constant in the future; changes in behavior over time may result in alternative outcome projections but conclusional differences are not expected.
- Lifetime cost estimates assume all new acquisitions are diagnosed and treated, resulting in some overestimation. However, as most people who acquire HIV are diagnosed in their lifetime, this is not expected to be significant; lifetime cost inputs reflect mean treatment durations for people diagnosed with HIV in the US.
- Evidence on switching individuals with viremia from daily oral ART to LAI ART remains limited; exploratory analyses were informed by available evidence and motivated by increasing real-world use and evolving guideline recommendations. Ongoing studies will further inform this strategy.

Conclusion

- Investment in innovative LAI PrEP and LAI ART could meaningfully accelerate progress toward US EHE goals by reducing HIV transmission.
- A combined strategy of expanding PrEP uptake and increasing LAI use among PrEP users with suboptimal adherence and people with HIV could achieve the EHE 2025 target by 2032.
- LAI interventions could generate substantial economic value, including healthcare cost savings and positive long-term return on investment from a public health perspective, supporting their broader implementation and scale-up.

References: 1. The White House. National HIV/AIDS Strategy for the United States 2022–2025. Washington, DC; 2021. **2.** U.S. Department of Health and Human Services. Ending the HIV Epidemic. AHEAD; 2019. **3.** Centers for Disease Control and Prevention (CDC). AtlasPlus. Accessed [Jul 2026] **4.** Centers for Disease Control and Prevention. HIV Surveillance Report. 2026; HIV diagnoses, deaths, and prevalence, 2024. **5.** Sorensen et al., PloS one. 2012 Feb 10;7(2):e29098. **6.** Viguerie et al., AIDS. 2025 Jul 1;39(8):1024-31. **7.** Jacobson et al., JAIDS . 2022 Apr 1;89(4):374-80. **8.** Grant et al., The Lancet infectious diseases. 2014 Sep 1;14(9):820-9. **9.** Hawkins et al., *Infect Dis Ther* 14, 1739–1753 (2025). **10.** Dankwa et al., PLOS Computational Biology 21, no. 11 (2025): e1013647. **11.** AIDSVu. Tools & Resources: Datasets. https://aidsvu.org/resources/#/datasets. Accessed [Jul 2026]. **12.** Sullivan et al. J Med Internet Res. 2020;22:e23173. **13.** Micromedex. *RED BOOK Online*. Accessed [Jan 2026]. **14.** Brogan et al. PharmacoEconomics. 2024;42:447-461. **15.** Oglesby et al. *Open Forum Infect Dis.* 2021;8(Suppl 1):S516-S517. **16.** Ward et al. J Manag Care Spec Pharm. 2020;26:104-116. **17.** Beck et al. PLoS One. 2011;6:e27830. **18.** Cohen et al. Pharmacoecon Open. 2025;9:869-886. **19.** Bazzazzadehgan et al. *Value Health*. 2024;27:S74-S75. **20.** Trickey et al. Lancet HIV. 2023;10:e295-e307.