Modeling the Potential Impact of Scaling Up Event-Driven PrEP Among Gay, Bisexual and Other MSM

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BACKGROUND

- Daily oral HIV preexposure prophylaxis (PrEP) is effective at preventing HIV acquisition among gay, bisexual, and other men who have sex with men (MSM).
- Event-driven PrEP (EDP), or PrEP taken around the time of sex, has been found useful for daily PrEP users with low adherence.
- However, a small proportion of PrEP users in the United States (US) practice EDP, despite high interest and willingness for the dosing regimen.

OBJECTIVE

- Understand the population-level impact of scaling up event-driven PrEP given real-world empirical data on time-varying adherence

METHODS

- We extended EpiModelHIV, an existing network-based mathematical HIV transmission model for MSM to allow initiation of EDP with varying adherence by sex act.
- EDP was implemented as the 2-1-1 dosing schedule: 2 pills on the day of sex, 1 pill a day after, and 1 pill 2 days after.
- Adherence and efficacy of EDP were parameterized using data from IPERGAY, HPTN 067/ADAPT, and AMPrEP.
- We simulated HIV transmission among 100,000 MSM under counterfactual scenarios over 10 years:
  - Baseline: Only daily oral PrEP; no EDP
  - Scenario 1: Incremental increases (0.1–2x) in EDP initiation rates to increase overall PrEP coverage levels to more than 2x baseline among MSM with daily PrEP indications who do not start daily PrEP
  - Scenario 2: Expanding EDP eligibility to any MSM sexually active in the last 6 months
  - Scenario 3: Targeting EDP eligibility to MSM who discontinued daily PrEP with low adherence.
- Models were calibrated to HIV prevalence and PrEP coverage levels among MSM in Atlanta, Georgia.

Substantial reductions in HIV incidence can be achieved over 10 years with widespread uptake of event-driven PrEP.

Figure 1. Implementation of Daily Oral PrEP vs. Event-Driven PrEP in EpiModelHIV

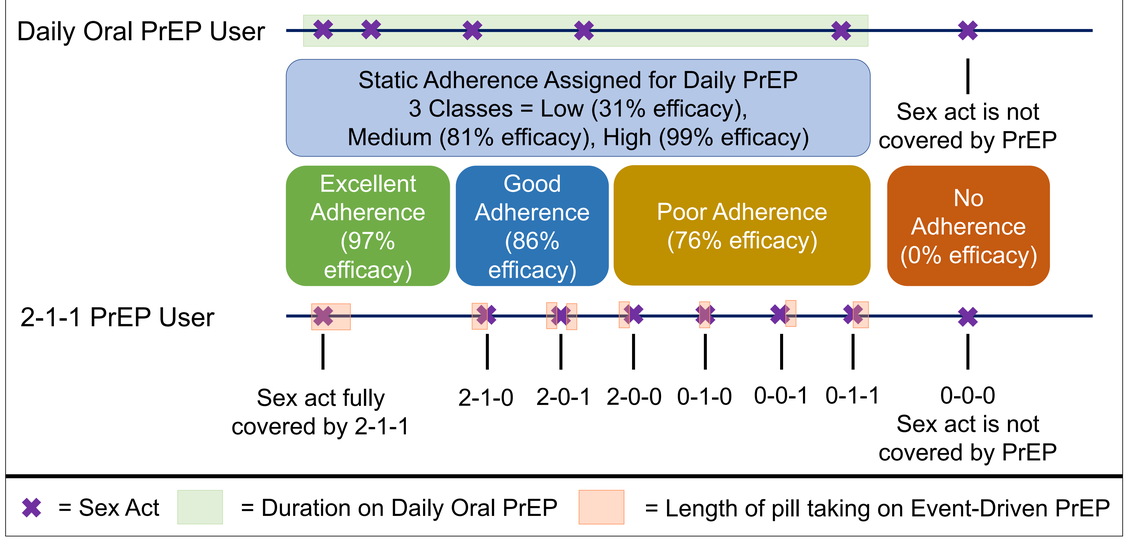


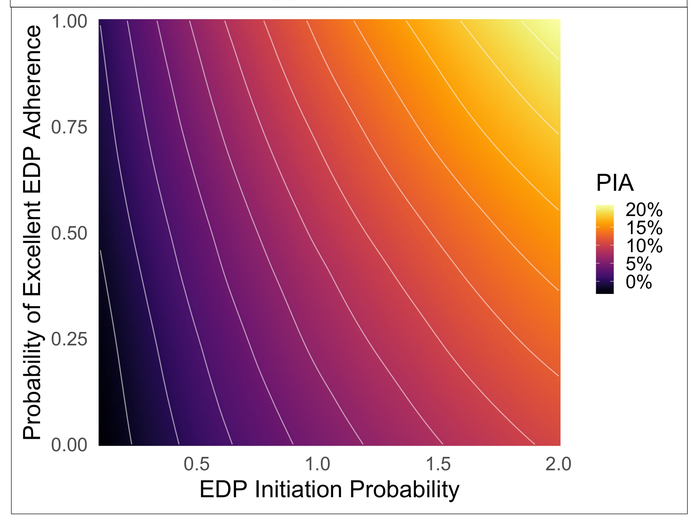
Table 1. HIV Outcomes by Event-Driven PrEP Eligibility Scenario, 2023–2033

	Outcome (95% SI, simulation interval)			
Scenarios	**Overall PrEP Coverage**	**HIV Prevalence**	**HIV Incidence (per 100 person-years)**	**Percent of Infections Averted (PIA)**
Baseline (No EDP)	27.6% (27.2–27.9)	22.6% (22.3–23.0)	0.93 (0.86–1.02)	--
Scenario 1: EDP eligibility the same as daily PrEP				
0.1 x Baseline Initiation	29.6% (29.3–30.0)	22.5% (22.1–22.8)	0.91 (0.83–0.99)	1.0% (-2.9–5.3)
Baseline Initiation	44.2% (43.8–44.6)	21.8% (21.5–22.1)	0.80 (0.73–0.86)	12.0% (7.9–15.2)
2 x Baseline Initiation	56.0% (55.5–56.4)	21.3% (20.9–21.6)	0.73 (0.67–0.80)	19.6% (16.1–23.1)
Scenario 2: EDP eligibility includes any sexual partnership in past 6 months				
	21.4% (21.3–21.5)	21.4% (21.1–21.7)	0.74 (0.68–0.82)	17.6% (14.1–21.2)
Scenario 3: EDP eligibility includes discontinued daily PrEP and prior low adherence PrEP use				
	29.6% (29.3–29.9)	22.5% (22.2–22.8)	0.93 (0.86–1.00)	0.8% (-2.8–4.8)

RESULTS

- Increasing EDP initiation such that overall PrEP coverage is more than twice that at baseline (56.0% vs. 27.6%) yielded a PIA of 19.6%.
- Expanding eligibility for EDP to any sexually active MSM resulted in a PIA of 17.6%.
- Targeting EDP for MSM discontinuing PrEP with low adherence resulted in a modest PIA of only 0.8%.
- Increasing initiation of EDP had a greater impact on PIA compared to improving EDP adherence.

Figure 2. Sensitivity analysis varying probabilities of EDP initiation vs. excellent EDP adherence



CONCLUSIONS

- Using EDP to drastically improve overall PrEP coverage results in modest reductions in HIV incidence, while targeted EDP initiation for MSM with low daily PrEP adherence did not improve population-level outcomes over 10 years.

- This research was supported by the National Center for HIV, Viral Hepatitis, STD, and TB Prevention Epidemiologic and Economic Modeling Agreement.
- CDC Disclaimer: The findings and views described in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.