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Estimating benefits from using on-demand oral PrEP by MSM in US and Thailand: A Modeling study

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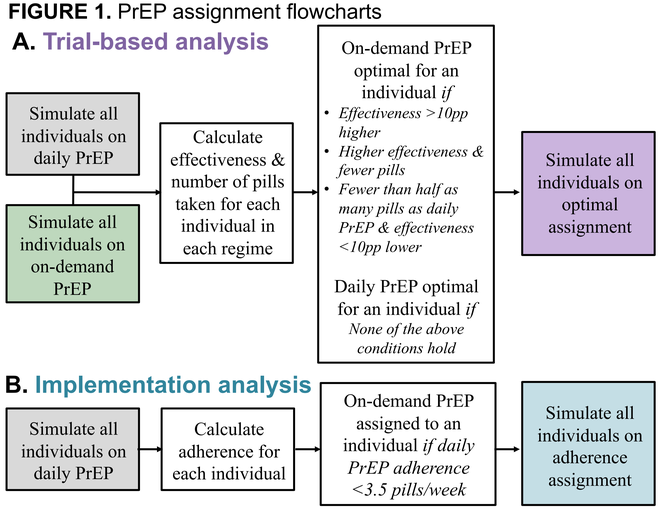
BACKGROUND

- Daily and on-demand pre-exposure prophylaxis (PrEP) with oral TDF-FTC are both effective at preventing HIV acquisition among men who have sex with men (MSM)
- Only daily PrEP is recommended in the US
- **GOAL: identify sub-groups of MSM who would have higher effectiveness or significantly lower pills taken with similar effectiveness when using on-demand PrEP**

METHODS

- Simulated the reduction in HIV risk in two synthetic cohorts of 10,000 MSM prescribed oral PrEP in Harlem and Bangkok
- PrEP adherence and sexual behavior patterns were calibrated to data from the HIV Prevention Trials Network (HPTN) 067. PrEP efficacy was based on number of pills per week (Anderson, 2012, Sci Transl Med)
- PrEP effectiveness was based on the number of pills taken around individual's sex acts
- Individuals were assigned daily PrEP for 6 months and on-demand PrEP for 6 months (2-1-1 regime, with 2 pills the day of sex and 1 pill on each of the following 2 days)
- For each individual, we assigned their regimen with the trial-based and implementation analysis frameworks (Fig. 1)
- Simulated the whole cohort for 6 months on final regimens

FIGURE 1. PrEP assignment flowcharts



MSM with low adherence to daily PrEP (not low sex frequency) **benefit most from switching to on-demand PrEP**

RESULTS

- Full cohort mean effectiveness improved slightly on optimal regimes (Fig. 2A & B)
- On-demand PrEP assigned for 36% (Harlem) & 30% (Bangkok) of individuals in the trial-based analysis and 30% (Harlem) & 11% (Bangkok) in the implementation analysis
- **Mean effectiveness increased** by 18 percentage points (pp, Harlem) & 7pp (Bangkok) in the trial-based analysis and 20pp (Harlem) & 34pp (Bangkok) in the implementation analysis (Fig. 2C & D)
- **Mean number of pills taken decreased** by 9 (Harlem) & 34 (Bangkok) pills per 100 days in the trial-based analysis and 2 (Harlem) & increased by 1 (Bangkok) in the implementation analysis
- **On-demand PrEP was optimal mainly for MSM with low adherence to daily PrEP;** there was little advantage to assigning on-demand PrEP by sex frequency (Fig. 3)

FIGURE 2. Effectiveness for the whole population (A & B) and subgroups (C & D). Red dots indicate mean values. White dots indicate median values.

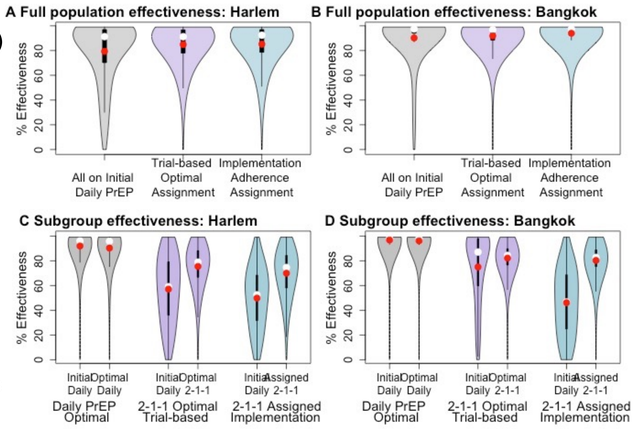
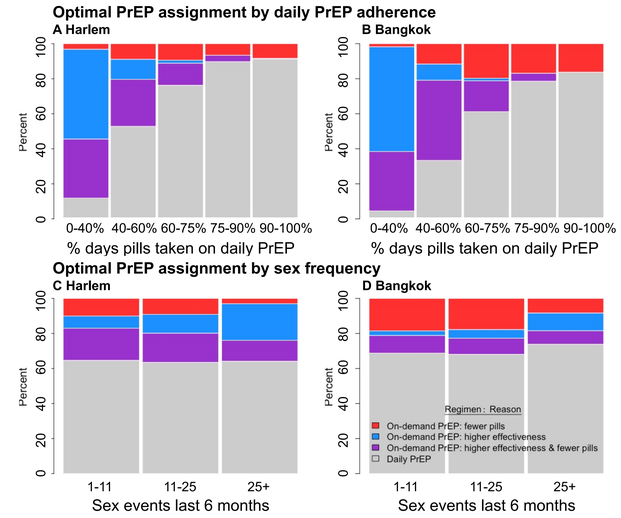


FIGURE 3. Those for whom on-demand 2-1-1 PrEP was optimal by adherence to daily PrEP (A & B) and sex frequency (C & D) in the trial-based analysis



CONCLUSIONS

- On-demand PrEP could benefit many MSM by increasing effectiveness or significantly decreasing pill count with similar effectiveness
- These results were robust to different circumstances: the Bangkok site of the HPTN 067 trial had much higher mean PrEP adherence than the Harlem site
- Most MSM for whom on-demand PrEP was optimal (in the trial-based analysis) had lower adherence to daily PrEP suggesting that **on-demand PrEP should be offered to individuals with difficulty taking daily PrEP consistently**
- The implementation analysis showed that using a cutoff of daily PrEP adherence <3.5 pills/week worked to find individuals who would benefit from on-demand PrEP

ACKNOWLEDGEMENTS

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