
Sarah Stanfield, Mia Morel, Marie-Claude Boily, James P. Hughes, Deborah Donnell, Dobromir Dimitrov
Frederick Hutchinson Cancer Research Center, Seattle, Washington, USA, Imperial College London, UK, University of Washington, Seattle, USA

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)
- Daily PrEP was optimal for an individual that:
  - Effectiveness > 80% adherence
  - Higher adherence & fewer pills
  - Fewer than half as many pills per day compared to daily PrEP
- Simulated all individuals on final regimens
- Individuals were assigned daily PrEP for 6 months and on-demand PrEP for 6 months (2-1-1 regime, with 2 pills of the day 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

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 implementation analysis
- Mean number of pills taken decreased by 20pp (Harlem) & 34pp (Bangkok) in the implementation 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 found individuals who would benefit from on-demand PrEP

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