Calculating PrEP's Capacity to Prevent HIV in the Real World

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Researchers have devised a model to estimate the number of men who have sex with men (MSM) who would have to be taking Truvada as pre-exposure prophylaxis (PrEP) in order to prevent one HIV infection; the model also calculated the cost per additional quality-adjusted life-year (QALY) gained among the treated population. The investigators published their findings from various simulations in the journal PLOS ONE. They note that the clinical- and cost-effectiveness of PrEP varies dramatically.

One QALY is the equivalent of an additional year of life lived in perfect health. However, if that year is compromised by less than perfect health, the number is designated as somewhere between zero and one. For each HIV infection prevented in this study, 2.24 QALYs were gained.

The researchers characterized MSM populations in the models according to various risk factors for contracting HIV, including PrEP adherence, condom use, sexual frequency, the prevalence of HIV in the population, and the use of antiretroviral (ARV) therapy among HIV-positive people in the population. For PrEP's base-case efficacy, the researchers looked to the results of the iPrEx study, which found that PrEP's population-level efficacy was 44 percent.

Over a 72-week period in iPrEx, an estimated 30 percent of participants in the active arm of the placebo-controlled study always had detectable drug in their systems at monthly clinic visits, 39 percent inconsistently had detectable drug and 31 percent never had any detectable drug. (Note, having detectable drug did not necessarily indicate daily PrEP use.) The result of this pattern of adherence was that PrEP reduced by 44 percent the rate of new HIV cases among those assigned to take PrEP when compared with the placebo group.

The modeling in PLOS ONE started with a base-case scenario in which there was a 44 percent PrEP efficacy, as well as 19 percent HIV prevalence (the CDC's estimate of HIV prevalence among MSM in the United States) and 40 percent condom use among the MSM population. In this scenario, the estimated number needed to treat (NNT) for one year to prevent one HIV infection was 64, and the cost to gain one QALY was $160,000. Adjusting that scenario for a 35 percent prevalence of HIV in the population (as is the case among MSM in Baltimore, MD), the NNT was 35 and the cost per QALY was $27,000. Adjusting the first scenario to account for PrEP adherence high enough to result in a 92 percent population-level efficacy (as was the case among those in the iPrEx study who always had detectable drug), the NNT was 35 and the cost per QALY was $3,000.

When looking at a scenario in which there was population of monogamous, mixed-HIV-status relationships in which the HIV-positive partners were taking ARV, the average PrEP efficacy was 44 percent and there was 40 percent condom use, the researchers projected that the NNT was 90 and the cost per QALY was $280,000.

The investigators have created online risk calculators that allow MSM to enter personal information into the model to create customized estimates.

To use the personal risk calculator, click here.

To use the cost-effectiveness risk calculator, click here.

To read the study, click here.

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http://beta.docker.poz.com/article/PrEP-models-26339-9409