U.S. simulation explores the intersection of PrEP and some sexually transmitted infections

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The use of medicines to prevent a person from becoming infected with HIV is called pre-exposure prophylaxis (PrEP). PrEP consists of two anti-HIV drugs—tenofovir DF and FTC—in one pill.

In clinical trials with gay, bisexual and other men who have sex with men (MSM), PrEP has been highly effective in preventing the spread of HIV. According to a team of U.S. researchers who analysed data from several clinical trials, the consistent use of PrEP can reduce the risk of HIV infection “by more than 95%” in MSM.

However, both in and outside of clinical trials, the use of PrEP has been associated with relatively high rates of some other sexually transmitted infections (STIs), including gonorrhea, syphilis and Chlamydia. Part of the reason for this association of PrEP with STIs is that some PrEP users do not use condoms for anal intercourse.

To gain a better understanding of the long-term effects of STI risk among PrEP users, researchers in the U.S. have developed a sophisticated computer simulation. This can model changes in sexual behaviour, PrEP adherence, STI screening and treatment, and the impact of all of these factors.

A major focus and outcome of the simulation was that over the long-term, as more MSM at risk for HIV used PrEP and were brought into regular medical care and screening for STIs, new cases of infection with gonorrhea or Chlamydia fell. We explore this and other findings from the simulation later in this CATIE News bulletin.

Study details

The research team developed a powerful simulation that could model the spread of STIs over what they described as “complex sexual networks.” The researchers informed the simulation with data from previous studies about the sexual behaviour of MSM and many other factors.

The simulation followed PrEP guidelines from the U.S. Centers for Disease Control and Prevention (CDC) about which HIV-negative MSM should be offered PrEP:

- having any male sexual partners in the past six months
- not in a monogamous partnership with a recently tested HIV-negative man
- having any anal sex (insertive or receptive) in the past six months
- having any STIs diagnosed in the past six months
- in an ongoing sexual relationship with an HIV-positive male partner

As the simulation was sophisticated, there were many other factors taken into account by the researchers. The main outcome from the simulation on which they focused was rates of gonorrhea and Chlamydia.

Results

In general, the researchers found that as more men who were eligible for PrEP used it, rates of new gonorrhea and Chlamydia fell.

When the simulation was extended 10 years into the future and assumed that 40% of MSM who took PrEP did not...
use condoms, the researchers found that 42% fewer cases of gonorrhea and 40% fewer cases of Chlamydia occurred.

**Why would rates of STIs decrease in the simulation?**

The researchers assumed that PrEP would have “no biological effect” on the risk of acquiring gonorrhea or Chlamydia. This is a reasonable assumption, as experiments in the lab have shown that tenofovir does not impair the health of these germs (FTC is also unlikely to do so). They therefore concluded that it was likely that the preventive effect on STIs seen with the simulations was due “only to the increased STI screening and treatment associated with ongoing PrEP use.”

When researchers altered the simulation so that STI screening was performed every three months (instead of every six months, as recommended in the guidelines), the proportion of infections detected and treated increased over the short term but then decreased dramatically over the long term—by an additional 50%. According to the researchers, the reason for this decrease is that more frequent screening was very likely to identify symptom-free STIs, which would then be treated. With more frequent screening, patients who return to their sexual networks would not spread STIs. As more PrEP users were screened and treated for STIs, the proportion of men in their sexual network with an STI would decrease over the long term and therefore there would be a reduced overall risk of getting an STI.

**How STI rates might increase**

In another simulation where only 50% of PrEP users received screening (and treatment when necessary) for STIs, rates of future STIs rose among sexually active MSM.

**Missed opportunities**

The study had several weaknesses, such as the following two:

- Researchers did not take into account another STI—syphilis. For more than a decade, rates of syphilis in some sexually active MSM have been increasing in the U.S., Canada and other high-income countries. It would have been interesting to model changes in syphilis over time and this would have been useful for public health authorities as well as doctors and nurses who work in the area of sexual health.
- Researchers did not take into account that there are increasing reports of gonorrhea with reduced susceptibility to antibiotics. It would have been useful to model changes in the spread of gonorrhea as the effectiveness of currently available treatment for this infection wanes.

**The whole package**

The availability of PrEP is a pivotal event in the struggle to reduce the spread of HIV. As it becomes widely deployed across many regions and countries, new HIV infections should decrease. In an ideal world, people would continue to use condoms to provide an added layer of protection from HIV and to reduce their risk of STIs. However, anecdotal reports suggest that condom use has declined among PrEP users. As a result, some public health workers, doctors and nurses worry that PrEP deployment could inadvertently help to increase the spread of other STIs. However, in the present study, over the long term, researchers underscored that PrEP does not only include anti-HIV drugs (the combination of tenofovir DF + FTC) but also regular visits to a clinician and regular, and perhaps even frequent (every three months), screening for STIs. The results of the researchers’ simulations show that PrEP should be considered as a package of interventions, of which STI screening and treatment are an important part.

The researchers stated:

“PrEP as a package prescribed and administered following CDC guidelines that include ongoing STI screening could be an effective STI prevention intervention.”

In a separate report, researchers stated: “Clinicians should continue to support PrEP as a supplement rather than replacement of condoms.”

**In Australia**
Researchers in Australia conducted a PrEP demonstration project where they made PrEP available and monitored people as per CDC guidelines. The Australian researchers stated: “We found a significant reduction in condom use and an increase in STIs over the first 12 months of follow-up. High medication adherence rates occurring with a decline in condom use and a rise in STIs suggest that prevention, early detection and treatment of STIs is a chief research priority in the current era of HIV PrEP.”

Resources

CATIE statement on the use of oral pre-exposure prophylaxis (PrEP) as a highly effective strategy to prevent the sexual transmission of HIV

Pre-exposure prophylaxis (PrEP) resources

Oral pre-exposure prophylaxis (PrEP) - fact sheet

Toronto-led team explores different PrEP deployment scenarios - CATIE News

Providing HIV PrEP: steps to patient engagement - CTAC

Guidance for the use of pre-exposure prophylaxis (PrEP) for the prevention of HIV acquisition in British Columbia - British Columbia Centre for Excellence in HIV/AIDS

WHO implementation tool for pre-exposure prophylaxis (PrEP) of HIV infection - World Health Organization (WHO)


Preexposure Prophylaxis for the Prevention of HIV Infection in the United States - 2014 Clinical Providers’ Supplement

REFERENCES:


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