

Public health significance of human immunodeficiency virus pre-exposure and post-exposure prophylaxis

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To eliminate the public health threat of the global human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) epidemic by 2030, the Joint United Nations Programme on HIV/AIDS launched 90-90-90 control targets in 2014 to help end the spread of HIV. China has responded actively by scaling up and expanding HIV testing and implementing early antiretroviral therapy (ART). In progressing towards achieving the 90-90-90 targets, China, in 2018, achieved higher percentages on the second (83.4% *vs.* 79.5%) and third (94.2% *vs.* 79.9%) “90” targets than the average global levels but a lower percentage on the first “90” target (69.3% *vs.* 79.9%), the aim of which is to have 90% of all people living with HIV (PLWHIV) knowing their HIV status. At the same time, the estimated number of PLWHIV in China increased from 0.81 million in 2013 to 1.25 million in 2018. In addition, while AIDS ranked third for the number of cases of nationally notifiable legal infectious diseases in 2019, it ranked first for the number of deaths resulting from such diseases. The above evidence indicates that overreliance on HIV testing and early ART is far from sufficient to control HIV completely. It is necessary to move forward with direct prevention and control strategies that reduce the risk of HIV infection in key populations. HIV pre-exposure prophylaxis (PrEP) and non-occupational post-exposure prophylaxis (nPEP) are just two of the measures that need to be fully utilized in this effort.

The following three pieces of evidence show that nPEP and PrEP have robust HIV prevention effects. First, real-world studies have confirmed the efficacy of oral PrEP and nPEP in HIV prevention. For example, a real-world PrEP study in the United States found that no HIV seroconversion

occurred in men who have sex with men (MSM) who insisted on taking PrEP drugs (0/753), while two individuals who discontinued PrEP seroconverted to HIV (2/219).^[1] A meta-analysis showed that only 2.6% (500 people) of the 19,546 MSM who were prescribed nPEP seroconverted to HIV.^[2] A new generation of PrEP has emerged, including the long-acting PrEP based on the 2016 HIV prevention trials network 083 clinical trial with higher drug adherence, which has ensured its ability to better prevent HIV infection.^[3] These facts also indicate the prospects for the widespread application of PrEP.

Previous studies showed that the willingness of key populations to nPEP was relatively higher than that of PrEP.^[4,5] Additionally, the willingness to take PrEP among MSM varies across studies, and reports of the actual uptake of oral PrEP among Chinese MSM are limited.^[6] In addition, there was still a great gap between the real uptake of PrEP and the assumed PrEP acceptance among key populations in China.^[7] A national survey of Chinese physicians regarding their willingness to prescribe PrEP and nPEP found that a high proportion of physicians were willing to prescribe PrEP and nPEP to key populations to prevent HIV, while a lack of guidance and drug indication hindered their willingness and practice of PrEP and nPEP prescription (unpublished study data).

However, four main challenges currently lie ahead in the promotion and implementation of PrEP and nPEP in China. (1) Neither national formal clinical guidelines for PrEP and nPEP nor authoritative publicity and educational materials exist in China. This lack of resources makes it

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difficult for physicians to recommend or prescribe PrEP and nPEP. (2) PrEP and post-exposure prophylaxis (PEP) drugs are relatively and prohibitively expensive for most key populations in China, especially when PrEP requires persistent long-term usage. (3) Adhering to a strict discipline of daily PrEP medication is difficult to maintain, which directly impacts the implementation and efficacy of PrEP. The event-driven regimen of PrEP can only be used for MSM and is not suitable for other high-risk populations due to the way in which the drugs operate.^[8] (4) The model for successfully implementing the prescription and use of PrEP and nPEP in China remains unclear. The parameters of the model for collaboration between the Chinese Center for Disease Control and Prevention, the community-based organization workers in high-risk populations, and the physicians who administer PrEP and nPEP are still uncertain. Therefore, studies of appropriate models for implementing PrEP and nPEP in China are lacking and are urgently required.

Based on the above challenges, we make the following recommendations:

- (1) Conduct more real-world studies on various key populations to better understand the effects, risks, and safety issues of PrEP in different populations and under varied contexts.
- (2) Promote HIV prevention and control strategies and integrate PrEP and nPEP as supplements into the current comprehensive HIV control and prevention strategy in China, promote PrEP and nPEP among key populations who are suitable and truly need these two HIV prevention strategies, prioritizing HIV high-risk populations in the provision of direct HIV prevention and treatment services.
- (3) Formulate clinical guidelines for prescribing PrEP and nPEP based on evidence from domestic studies as soon as possible. Organize specialists and experts to create official propaganda and educational materials to support key populations and health workers by implementing the steps and methods needed for adopting PrEP and nPEP.
- (4) Improve the medication adherence of high-risk populations to oral PrEP through innovative intervention methods, including electronic medication reminder kits^[9] or social software-based medication reminders. Long-acting PrEP seems effective and safe, but more real-world studies should be conducted. Develop some innovative strategies to further improve compliance with PrEP medication and efforts to prevent HIV infection.
- (5) Learn from PrEP implementations in other countries and regions and explore the most suitable strategies for implementing PrEP and nPEP for various high-risk groups in China through scientific research projects.

In summary, while addressing the expansion of HIV testing and early ART for PLWHIV, we should fully consider the role of PrEP and nPEP and integrate them into a comprehensive HIV prevention and control strategies in China to effectively promote HIV prevention and control and reduce the epidemic of HIV infection in key populations in China.

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Conflicts of interest

None.

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