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Exploration of PrEP/PEP service delivery model in China: A pilot in eastern, central and western region

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Abstract: Since 2017, China has started a pilot exploration of pre-exposure prophylaxis (PrEP)/post-exposure prophylaxis (PEP) service aiming for human immunodeficiency virus (HIV) control. Efforts to summarize the pilot experience and sort out the gaps in service provision must be prioritized. In June-October, 2023, three provincial capital cities with two years of PrEP/PEP pilot experience in eastern, central and western China were chosen. A structural information collective tool was developed, as a framework to identify key links and steps in reviewing service procedures for PrEP/PEP service. Two main service models have been formed, including the independent offline service model led by professional health institutions and Multi-agencies (health institution/Community Based Organizations (CBOs)/Internet platform) online and offline collaborative service model. The pilot experience conceptualizes opportunities to integrate PrEP/PEP into HIV prevention efforts and, illustrates the optimizing path to move forward to reach for a high level HIV prevention and care continuum. Systematic barriers during the process of integration need to be noted and addressed. It is urgent to establish a realistic and feasible online and offline monitoring system to achieve a balance between standardized, safe, simplified and convenient services.

***Keywords*:** human immunodeficiency virus (HIV), pre-exposure prophylaxis (PrEP), post-exposure prophylaxis (PEP), service procedure model, HIV care continuum

Introduction

Since the 1980s, China has gradually formed and developed an independent human immunodeficiency virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS) prevention and control service system (*1*). In 2017, Chinese government released *The 13th five year plan of action for curbing and preventing AIDS in China*, which emphasized the responsibilities and linkage of multi-health care agencies in HIV control (*1,2*). In the process of achieving this goal, China has made a series of basic preparations, such as: China has made remarkable progress in strengthening its primary health-care system (*3,4*). Chinese government has attached significant importance to the participation of Non-government Organizations (NGOs) in HIV prevention in the past 20 years (*5-7*) and in 2015, China established China AIDS Fund for NGOs (CAFNGO) (*8*). Accompanied by Internet development, the in-depth integration of the primary health service system, Community Based Organization (CBOs) and HIV/AIDS service system, have strengthened collaboration among multi-agencies, and have improved the capability of HIV/AIDS prevention and control.

In recent years, the effectiveness of HIV pre-exposure prophylaxis (PrEP)/post-exposure prophylaxis (PEP) has been proven worldwide (*9-12*). As a new biological intervention, PrEP/PEP extends the HIV/AIDS care framework, as well as new challenges and opportunities for the innovation and reconstruction of the current health care system.

After World Health Organization (WHO) proposed PEP guidelines in 2014 (*13*) and PrEP guidelines (*10,13*) in 2015, China started PEP pilot in 2017. In 2019, China issued "Implementation plan for curbing the spread of AIDS (2019-2022)", proposed that PrEP/PEP services should be piloted and provided to target populations including men who have sex with men (MSM) (*14*). In 2020, "Guideline for HIV PEP (on trial)" (*15*) and "Experts consensus for HIV PrEP" (*16,17*) were

issued successively, providing a technical guide for the promotion of PrEP/PEP in China. In 2022, 24 provincial capital cities jointly carried out PrEP Pilot exploration (*18*).

China has accumulated practical experience in the promotion and implementation of PrEP/PEP (*17,19*). PrEP/PEP service procedure model in the pilot area, is potentially valuable to identify opportunities to: *i*) sort out the whole process of PrEP/PEP service initiation and operation; *ii*) modularize and standardize the key PrEP/PEP service process; *iii*) and reexamine the HIV care continuum. In this paper, we summarize the local PrEP/PEP service model, and illustrate the optimizing path to move forward to reach a high level HIV care continuum.

Three pilot capital cities in the eastern, central, and western regions of China

In June-October, 2023, three provincial capital cities in eastern, central and western China, namely Guangzhou, Zhengzhou, Kunming with two years of pilot experience in PrEP/PEP promotion, were chosen.

Guangzhou is the capital city of Guangdong Province, with a total area of 7,434 square kilometers, a resident population of 18,734,100, an urbanization rate of 86.48%, and a per capita GDP of 153,625 RMB in 2022 (approximately USD 22,600). Life expectancy in 2021 reached 83.18 years (*20*). The city uses the Internet platform as the main support, with the joint participation of Center of Disease Control (CDC), medical institutions and CBOs to provide PrEP/PEP services. In 2022, 200 cases of PrEP and 2,395 person-times of PEP visits were completed.

Zhengzhou is the capital city of Henan Province, with a total area of 7,567 square kilometers, a resident population of 13,008,000, an urbanization rate of 80 percent (*21*), GDP per capita 101,500 RMB (approximately USD 14,926), and life expectancy reached 80.48 in 2020 (*22*). The city provides PrEP/PEP services based on VCT outpatient clinics with the participation of CDC, medical institutions, and CBOs. In 2022, 221 cases of PrEP and 357 person-times of PEP visits were completed.

Kunming is the capital city of Yunnan Province, with a total area of 21,012.54 square kilometers, a resident population of 8.6 million, an urbanization rate of 81.1%, GDP per capita 85,146 RMB (approximately USD 12,528), and a life expectancy of 80.37 years in 2022 (*23*). The city's primary health care providers, CBOs, and pharmacies are involved in PrEP/PEP service delivery. In 2022, 369 cases of PrEP and 779 person-times of PEP visits were completed.

We comprehensively reviewed the initiation and implementation procedure of PrEP/PEP service in the project cities; proposed a series of achievable benchmark goals and optimizing paths based on the local implementation status, and analyzed the inspiration from pilot experiences.

Two basic service models were summarized

In three pilot cities, two basic PrEP/PEP service models have been innovated and evolved combining local HIV prevention and control context, which can be summarized as: The independent offline model dominated by CDC or hospital, and Multi-agencies (CDC/Hospital/Community Health Centers (CHCs)/Community Based Organizations (CBOs)/Internet platform) online and offline collaborative operation model.

Independent offline service model dominated by CDC/hospital

During the initiative stage of the project, CDC and HIV/AIDS designated anti-retroviral treatment (ART) hospitals played important roles in the construction, operation and docking of the whole process of PrEP/PEP service. The project cities established a PrEP/PEP service model led by the Voluntary Counselling and Testing (VCT) clinic of CDC/Hospital, and initially constructed a cooperative mechanism in which the staff in VCT clinics initiate counseling and risk assessment, the hospitals assist in testing, prescribing, and the CDC conducts follow-up management. With the gradual improvement of service, online functions have also gradually improved (Figure 1).

For PrEP seekers, after the clinic doctors or VCT counselors conduct pre-medication counseling assessments in the first visit, the seekers are required to give blood samples with informed consent, wait for the laboratory test results and return to the clinic, where a physician will evaluate the results and prescribe PrEP medication for one month, and if the results are abnormal, further diagnosis and treatment will be carried out. After taking PrEP medication, the patient returns to Clinic for follow-up testing and medication refills. Long-term patients with good adherence to PrEP medication may be considered for additional prescriptions of 3 months medication at a time.

For PEP seekers, based on risk assessment, clinicians prescribe a full 28-day course of PEP medication asking the seekers to give blood samples with informed consent. Medical staff will notify the seekers by phone of any abnormalities in the pre-medication test results. If HIV+, further diagnosis and ART will be provided as possible.

Hospitals that can provide laboratory testing results within 1 hour require physicians to issue medication prescriptions referring the results during the first visit. 24-hour PEP service channels at hospitals have also been developed to meet with the demand (Figure 2).

Multi-agencies (CDC/Hospital/CHCs/CBOs/Internet platform) online and offline collaborative model

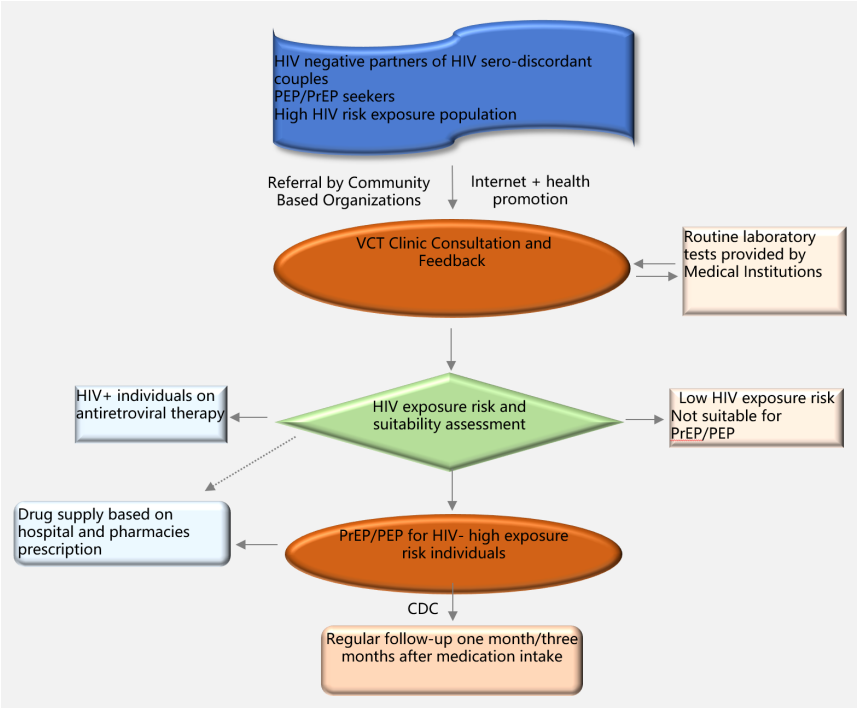

Figure 1. Independent offline service procedure dominated by CDC/Hospital.

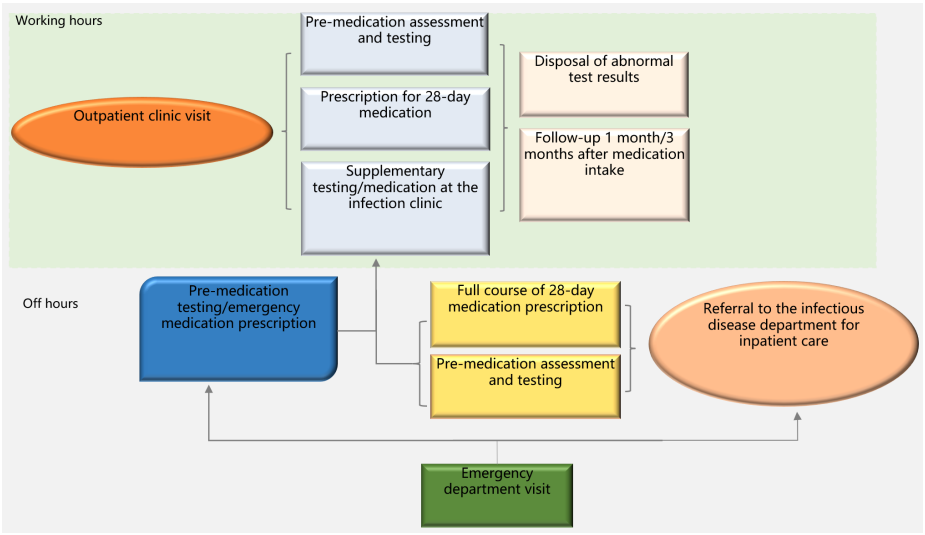

Figure 2. PEP Service procedure working and off-working hours.

Hospital- CDC-CBO -Internet platform collaborative model

In Guangzhou, where the information level is high and CBOs are widely involved in HIV/AIDS prevention, the multi-agencies joint service process was developed as follows (Figure 3):

i) The PrEP seekers initiate an online consultation to make an appointment with the CDC or a designated clinic for risk assessment offline.

ii) After risk assessment offline, the seekers receive rapid HIV/syphilis/HBV/HCV tests, and specimens for liver and kidney function, gonococcus, chlamydia, mycoplasma testing are collected by a third-party testing institution, and all test results are pushed through App to the seekers.

iii) After logging in the platform, the seeker applies for an outcome review with the internet HIV clinician.

iv) The clinician confirms the prescription; the seeker pays for the medicine; and the platform sends the PrEP medicine through logistics. Those with abnormal results are referred back to the designated hospital.

v) The CBOs launch the one-to-one follow-up and reminds them to make return appointments every three months for tests and medication refills.

vi) Those with abnormal HBV/HCV results at any stage, are referred back to the hospitals to take

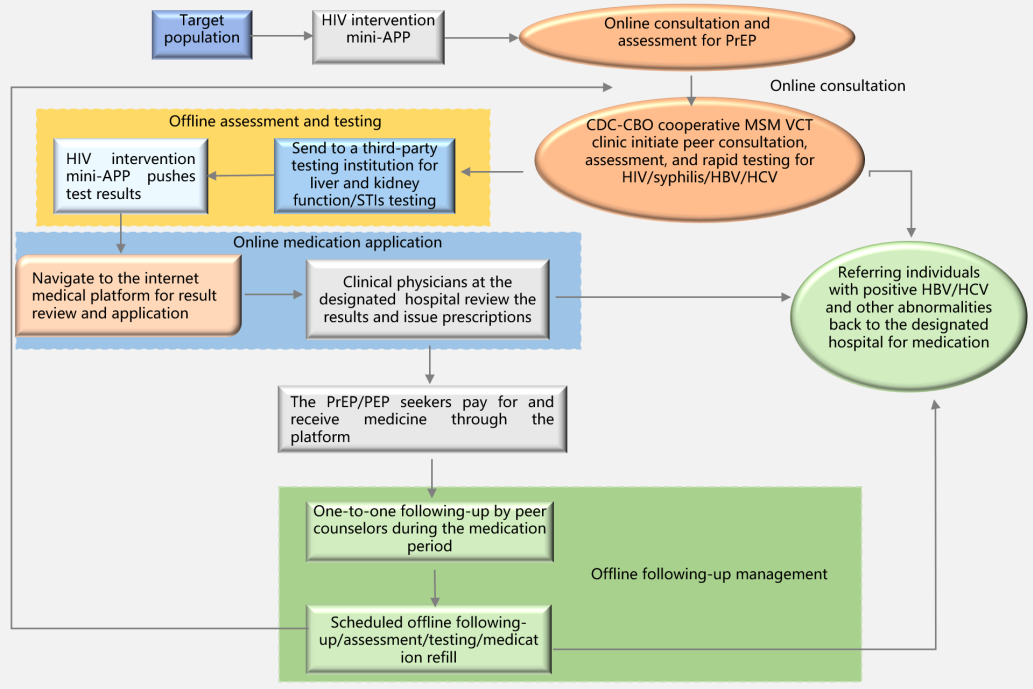

Figure 3. CDC-Hospital-CBOs online and offline collaborative model. *Data source*: Gu Y, Zeng W, Luo Y, *et al.* Exploration and practice of Internet+Pre-exposure prophylaxis model of HIV in Guangzhou. Chinese Journal of AIDS & STD. 2023; 29:1258-1261.

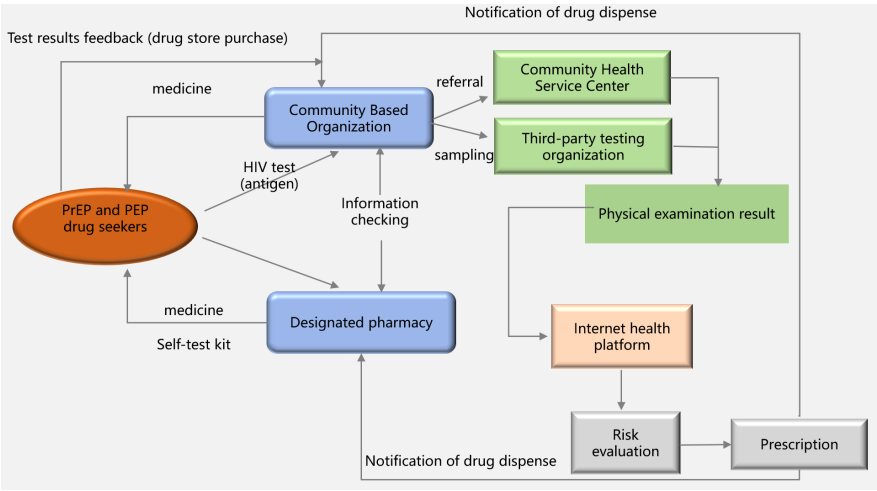

Figure 4. CHCs-CBO-Internet Platform-Pharmacies collaborative model.

medication under the guidance of hepatologists.

vii) Those with HIV+ at any stage, are referred back to the designated hospitals.

CHCs-CBO-Internet platform-Pharmacies collaborative model

In Kunming, HIV/AIDS treatment hospitals, CDC, CHCs and CBO established in-depth cooperation from the beginning of the pilot. Community health providers and pharmacies play important roles in service delivery (Figure 4):

i) CBOs conduct risk assessments for individuals with PrEP/PEP needs, and provide free rapid HIV and syphilis testing with informed consent.

ii) Individuals with PrEP requirements and HIV-test results are referred to cooperative CHCs, and blood samples are sent to third-party testing institutions for pre medication related testing. After receiving feedback on the test results (within 1-3 days), they are uploaded to the online health platform. After evaluating the test results, the online resident doctors issue medication prescriptions, push them to CBOs, and then notify the service recipients to pick up the medication face-to-face or through local express delivery; For seekers who go directly to designated pharmacies to buy medicines through CBOs online information, the staff of pharmacies

will guide them to consult the doctor to conduct online assessment, prescriptions, and free quadruple test reagent kits (HIV, TP, Hepatitis B, and Hepatitis C), checking with CBOs. All personal information is protected.

iii) PEP seekers conduct the HIV risk assessment and rapid HIV tests according to CBOs online guidance. PEP drugs prescriptions are provided through the online health platform for negative HIV testing results. CBOs provide following-up services.

CBOs-Internet platform cooperative model

Multi-agencies collaborative model in Kunming was further simplified. PrEP/PEP service seekers conduct self-risk assessment through the platform, and select to contact an online specialist. After obtaining informed consent online, they are pushed to the online health platform for medication evaluation. After obtaining a prescription and placing an order, the platform notifies CBOs to ship the reserved drugs by local express delivery, along with HIV and syphilis rapid test kits, and encourages service recipients to provide timely feedback on test results to CBOs. CBOs report the abnormal results to CDC, as well as the internet platform (Figure 5).

Achievable benchmarking goals and optimized path

According to the pilot experiences, The PrEP/PEP procedure can be classified into six modules: health education, risk evaluation, laboratory testing, outpatient service, drug provision, and follow-up. The project experts defined the achievable benchmark goals for each module, reflecting the detailed direction for future development, highlighted in increasing the coverage of knowledge dissemination and the number of clinics; improving the accessibility of laboratory testing and drug supply; promoting the feasibility and adherence of follow-up, and strengthening follow-up management. Favorable and practical route were suggested such as: Popularization of relevant knowledge, timely updating of technical guidelines, increasing the number of outpatient clinics, simplifying the risk assessment process, improving the speed of online drug logistics, purchasing follow-up services from CBOs, and lengthening the follow-up interval, *etc.* (Table 1).

Discussion

PrEP/PEP service promotes the cooperation among Multi-agencies in HIV/AIDS prevention and control.

Differentiated care strategies are rapidly becoming the norm for HIV care delivery globally (*24*). In China, HIV/AIDS prevention and control service system owns a relatively independent financing and operating mechanism during the past 30 years (*1*). Experience in PrEP/PEP pilot in project areas, highlights the feasibility of the link between primary health care and HIV care continuum (*25*). It confirmed that tailored, low-barrier approaches (*26,27*) and strategy could be effective for PrEP/PEP service provisions through cooperation of telemedicine (*28-30*), CBO and PHCs.

In 2023, China proposed to comprehensively promote regional health community in county-level, which systematically reshapes the health service system, improves the allocation, integration and efficiency of primary health resources, and prioritizes the fairness and accessibility of services (*31*). In 2022, WHO proposed to simplify the PrEP service process, to medicalize, strengthen the integration of STI/HIV testing consultation and PrEP, and improve the accessibility of PrEP/PEP services through various service supply forms such as health institutions led, community led and online services (*32*). The above factors all contribute to the integration of PrEP/PEP services within the existing service system, and scaled up PrEP/PEP–HIV/STIs testing and treatment for high-risk populations.

In the pilot cities, the advantages and disadvantages of the two kinds of service model (independent offline model dominated by CDC/Hospital, and Multi-agencies online and offline collaborative model) and their impact on HIV/AIDS are still uncertain currently. The potential barriers during the integrative HIV prevention and care continuum need to be noted and effective online and

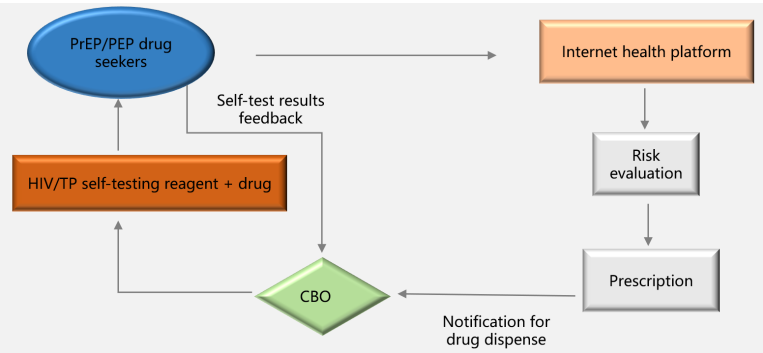

Figure 5. CBO-Internet platform cooperation model.

Table 1. Achievable Benchmark goals for PrEP/PEP service modules

Service module	Benchmark goals	Recommendations
Knowledge dissemination	Health education needs to further integrate information relevant to HIV/STI /PrEP/PEP/ART for high risk population.	Mobilize CBOs to carry out online and offline knowledge dissemination and service promotion for the target population.
Risk assessment	Risk assessment should be strictly conducted in accordance with the technical guidelines.	Strengthen online and offline training for medical professionals.
Laboratory test	1. At least one health institution in urban unit area can provide PrEP/PEP counseling and assessment, laboratory testing, and drug prescription; 2. Simplify the pre-medication testing process with reference to the world authorized PrEP guidelines.	1. Improve the testing capacity of health institutions; 2. Provide autonomous testing services through online platforms for PEP/PrEP seekers covering holidays or off-duty hours; 3. Provide HIV/STI rapid test reagents.
Outpatient services	1. Increase the number of VCT clinics and outpatient clinics for PrEP/PEP services; 2. Emphasize the importance of following-up management to improve medication safety, specification and adherence; 3. Fully acknowledge the history of PrEP/PEP use among newly enrolled patients on ART, in case of suspected breakthrough infections, conducting disease load and drug resistance gene testing; 4. Install a local online APP to provide consultation, appointment, following-up, or testing services.	1. Willingness to launch PrEP/PEP services in multi-agencies; 2. Timely update the technical guidelines in China; 3. Strengthen training and technical guidance for staffs in health institution and CBOs.
Drug supply	1. Equip each clinic with a combination of basic blocking drugs; 2. Establish a seed drug package for each clinic, ensuring that emergency drugs are available, especially for the hospitals in remote areas; 3. Improve online drug logistics and shorten the time to obtain medication.	1. Drug surveillance and management should be integrated into local health administration; 2. Internet platforms should fully upgrade providing timely and convenient logistics delivery.
Following-up management	1. Regular following-up management mechanism needs to be established for the PrEP/PEP drug users; 2. Sentinal monitoring system should be established online and offline.	1. Health education must highlight the importance of following-up visits; 2. Promote CBOs, Internet hospitals to carry out PrEP/PEP following-up visits; 3. PrEP/PEP drug users' following-up management can be integrated into HIV/AIDS care continuum; 4. Constantly updated guidelines and expert consensus on following-up helps to promote the above work; 5. Develop reminding APP to facilitate adherence.

offline monitoring systems need to be developed.

Systemic barriers during the integrative HIV prevention and care continuum need to be noted and addressed

Workers in CBOs and PHCs enabled to improve care access for vulnerable and high risk population at the local level, and enabled an optimization of the care pathway (*7*). However, in the HIV area, the debates about non-specialist PHCs' cultural competence and clinical practice, and the potential for target populations to experience discrimination and homophobia from non-expert health workers need to be noted. In addition, systemic barriers at microsocial (lack of communication about PrEP/PEP from PHCs, lack of familiarity with telehealth, uncertainty around co-navigation workflows), mesosocial (healthcare-service fragmentation, lack of PrEP/PEP-competency, logistical challenges related to insurance and obtaining diagnostic testing, extra work time and resources input), and macrosocial levels (HIV- and sexual-stigma, hesitancy about whether the service model would overcome clients' competing demands or medical mistrust) may constrain and disincentivize engagement with PrEP/PEP (*33,34*).

It is, therefore, important to understand the willingness of target population demand and the feasibility of the service in local areas. With the pilot experience, the project city proposed specific optimization objectives and paths for each service module, provide a reference for the national guidelines, as well as regional adaptable PrEP/PEP strategies (*35*).

It is urgent to establish a realistic and feasible online and offline monitoring system to achieve a balance between standardized, safe, simplified and convenient services.

Multi-agencies cooperation, led to a large amount of information for PrEP/PEP users scattered across different institutions and platforms. It is urgent to establish a systematic and standardized online and offline monitoring system for PrEP/PEP linkage, especially for PrEP care.

The PrEP care continuum sets out the path that potential end-users follow, from: *i*) being aware of, and expressing interest in PrEP, to *ii*) initiating PrEP, *iii*) taking PrEP correctly as long as HIV risk continues, and *iv*) stopping PrEP when no longer at risk for HIV (*36,37*). A monitoring approach is needed to assess whether PrEP programmes accomplish the above mentioned aims, and to identify potential implementation gaps to improve. The development of a PrEP monitoring approach is complicated for several factors, such as no common glossary for abstract terms such as "PrEP uptake", "PrEP coverage" or "PrEP persistence" (*38*). HIV risk is fluid and the diversified medication uptake and use of different formulations accompany the whole process of PrEP drug taking. In light of these challenges, there is a need to advance our understanding of which indicators are valuable for monitoring PrEP, and how these indicators can be operationalized and implemented at a programmatic level (*39*).

WHO suggested that as health services offering PrEP/PEP expand, surveillance, monitoring and reporting systems will need to be implemented alongside services, and their progress evaluated periodically. The indicators including: total PrEP recipient, PrEP coverage, volume of PrEP prescribed as key indicator for PrEP monitoring, and number of PEP recipients, PEP completion, HIV in PEP recipients for PEP monitoring (*40*), were widely recognized. Regional Monitoring and evaluation systems should be simplified and suitable for local context, and contribute to assess the impact of PrEP/PEP on the local HIV epidemic (*41*), and make sure that PrEP/PEP is being delivered safely and effectively, and that services focus on those who would benefit most (*37*).

The limitation of the research is the absence of complete data required to evaluate and compare cost-effectiveness of the two service models. An obstacle to data collection is the lack of a robust and coordinated monitoring system covering PrEP/PEP users online and offline. To address the limitation, as well as to bolster stakeholder interest in the integrative service model, the team will promote a pilot integrating service package, providing Health education- PrEP/PEP -HIV/STIs testing – ART services for target populations, and strengthen the online and offline monitoring systems during 2024-2025.

Conclusion

As China deepens its PrEP/PEP health-care pilot and provision, it has the opportunity to build an integrated, cooperative health-care system for HIV/AIDS control. Systemic barriers during the integrative HIV care continuum need to be noted and addressed. It is urgent to establish a realistic and feasible online and offline monitoring system to guide standardized, safe, simplified and convenient services.

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References

1. The Central People's Government of the People's Republic of China. China's Medium and Long Term Plan for AIDS Prevention and Control (1998-2010). *https://www.gov.cn/gongbao/content/2006/content_284340.htm* (accessd May 24, 2024). (in Chinese)
2. The Central People's Government of the People's Republic of China. Circular of the general office of the State Council on printing and distributing the 13th five year plan of action for curbing and preventing AIDS in China. *http://www.gov.cn/zhengce/content/2017-02/05/content_5165514.htm* (accessd May 24, 2024). (in Chinese)
3. Li X, Lu J, Hu S, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Xu DR, Yip W, Zhang H, Krumholz HM, Jiang L, Hu S. The primary health-care system in China. Lancet. 2017; 390:2584-2594.
4. Yip W, Fu H, Chen AT, Zhai T, Jian W, Xu R, Pan J, Hu M, Zhou Z, Chen Q, Mao W, Sun Q, Chen W. 10 years of health-care reform in China: Progress and gaps in Universal Health Coverage. Lancet. 2019; 394:1192-1204.
5. Huang S, Ong JJ, Dai W, He X, Zhou Y, Li X, Huang L, Tang W. A community-based organisation-led HIV self-testing program among men who have sex with men in China is cheaper and more effective than facility-based HIV testing: An economic evaluation. Sex Health. 2022; 19:464-472.
6. Sha S, Zhang DP, Wang P, *et al.* Evaluation of the effect of China AIDS Fund for Non-governmental organization on AIDS prevention and control in China. Chinese Preventive Medicine. 2023; 24:401-405. (in Chinese)
7. Mosnier E, Hoyer M, Artigas F, Regnault H, Richard E, Michels D, Mosnier M, Inegbeze G, Robledo MS, Spire B, Vandentorren S, Lescaudron M, Eldin C, Roux P. Enhancing sexual health and empowerment among migrant women sex workers: A community health worker-led intervention in Marseille, France. Front Public Health. 2024; 12:1359363.
8. The Central People's Government of the People's Republic of China. Notice on the establishment of a fund for social organizations to participate in AIDS prevention

and control. *https://www.gov.cn/xinwen/2015-07/21/content_2900026.htm* (accessd May 24, 2024). (in Chinese)
9. European AIDS Clinical Society. Pre-exposure Prophylaxis. *https://eacs.sanfordguide.com/art/eacs-pre-exposure-prophylaxis* (accessd June 3, 2024).
10. World Health Organization. Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV. *https://www.who.int/publications/i/item/9789241509565* (accessd June 3, 2024).
11. Centers for Disease Control and Prevention, US. Preexposure prophylaxis for the prevention of HIV infection in the united states-2021 Update. *https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf* (accessd May 24, 2024).
12. Ochieng W, Suraratdecha C. HIV self-testing, PrEP, and drug resistance: Some insights. Lancet HIV. 2024; 11:e134-e136.
13. World Health Organization. Guidelines on post-exposure prophylaxis for HIV and the use of co-trimoxazole prophylaxis for HIV-related infections among adults, adolescents and children. *https://www.who.int/publications/i/item/9789241506830* (accessd May 24, 2024).
14. The Central People's Government of the People's Republic of China. Multisectoral notice on printing and issuing the implementation plan for curbing the spread of AIDS (2019-2022). *http://www.gov.cn/xinwen/2019-10/13/content_5439036.htm* (accessd May 25, 2024).
15. National Center for AIDS/STD Control and Prevention CC. Technical guidelines for HIV post exposure prevention (Trial) *https://ncaids.chinacdc.cn/xxgx/jszl/202011/W020201116802422550750.pdf* (accessd May 14, 2024). (in Chinese)
16. Wang H, Shang H. Expert consensus on pre exposure prophylaxis for HIV in China (2023). Chinese Journal of AIDS/STD. 2023; 29:954-961. (in Chinese)
17. Wang H, Shang H. Expansion of PrEP and PEP services in China. Lancet HIV. 2022; 9:e455-e457.
18. News PengPai. PrEP: The new tools for AIDS prevention. *https://www.thepaper.cn/newsDetail_forward_22698594* (accessd June 6, 2024). (in Chinese)
19. Xu J, Tang W, Zhang F, Shang H. PrEP in China: Choices are ahead. Lancet HIV. 2020; 7:e155-e157.
20. The People's Government of Guangzhou Municipality. Statistical Communiqué on the National Economic and Social Development of Guangzhou in 2022 *https://www.gz.gov.cn/zwgk/sjfb/tjgb/content/mpost_8922708.html* (accessd June 6, 2024). (in Chinese)
21. The People's Government of Zhengzhou Municipality. Zhengzhou Overview. *https://www.zhengzhou.gov.cn/view202301.jhtml* (accessd June 6, 2024). (in Chinese)
22. Zhengzhou Health Commission Commission. Response to the proposal to improve life expectancy and implement the Healthy Zhengzhou Action. . *https://public.zhengzhou.gov.cn/D1102X/6810594.jhtml* (accessd June 6, 2024). (in Chinese)
23. Kunming Statistics Department. Statistical Communiqué on Kunming's National Economic and Social Development in 2022. *https://tjj.km.gov.cn/c/2023-07-05/4751404.shtml* (accessd May 6, 2024). (in Chinese)
24. Parrish C, Basu A, Fishman P, Koama JB, Robin E, Francois K, Honoré JG, Van Onacker JD, Puttkammer N. A sub-group evaluation of the multi-month dispensing strategy for differentiated HIV care: Is personalization of care guidelines warranted in Haiti? BMC Health Serv Res. 2022; 22:80.
25. Horn T, Sherwood J, Remien RH, Nash D, Auerbach JD; Treatment Action Group and Foundation for Aids Research HIV Prevention Continuum Working Group. Towards an integrated primary and secondary HIV prevention continuum for the United States: A cyclical process model. J Int AIDS Soc. 2016; 19:21263.
26. Rodriguez-Diaz CE, Martinez O, Bland S, Crowley JS. Ending the HIV epidemic in US Latinx sexual and gender minorities. Lancet. 2021; 397:1043-1045.
27. Siegler A, Sullivan P. The PrEP laboratory service gap: Applying implementation science strategies to bring PrEP coverage to scale in the United States. J Law Med Ethics. 2022; 50:40-46.
28. Hoth AB, Shafer C, Dillon DB, Mayer R, Walton G, Ohl ME. Iowa TelePrEP: A public-health-partnered telehealth model for human immunodeficiency virus preexposure prophylaxis delivery in a rural state. Sex Transm Dis. 2019; 46:507-512.
29. Player MS, Cooper NA, Perkins S, Diaz VA. Evaluation of a telemedicine pilot program for the provision of HIV pre-exposure prophylaxis in the Southeastern United States. AIDS Care. 2022; 34:1499-1505.
30. Zhang C, Fiscella K, Przybylek S, Chang W, Liu Y. Telemedicine experience for PrEP care among PrEP-eligible women and their primary care providers during the first year of the COVID-19 pandemic in the United States. Trop Med Infect Dis. 2022; 7:280.
31. National Health Commission, Ministry of Human Resources and Social Security, Ministry of Agriculture and Rural Affairs, National Medical Insurance Administration, National Administration of Traditional Chinese Medicine, National Disease Control and Prevention Administration, National Drug Administration, China. Guiding Opinions on Comprehensively Promoting the Construction of Closely-knit County-level Medical and Health Communities. *https://www.gov.cn/zhengce/zhengceku/202312/content_6923447.htm* (accessd May 6, 2024). (in Chinese)
32. World Health Organization. Differentiated and simplified pre-exposure prophylaxis for HIV prevention: Update to WHO implementation guidance. *https://www.who.int/publications/i/item/9789240053694* (accessed May 6, 2024).
33. Andrade EA, Betancourt G, Morales G, Zapata O, Marrero L, Rivera S, Nieves E, Miranda C, Diaz C, Beil R, Patel VV, Ross J. A community-based pre-exposure prophylaxis telehealth program focused on Latinx sexual minority men. AIDS Patient Care STDS. 2023; 37:517-524.
34. Ross J, Betancourt GS, Andrade EA, Klein A, Marrero L, Morales GA, Rivera S, Watnick DL, Patel VV. Collaborative PrEP implementation strategies for Latino men who have sex with men: A health center-community consensus process. J Community Health. 2023; 48:994-1003.
35. Ohiomoba RO, Owuor PM, Orero W, Were I, Sawo F, Ezema A, Jackson-Gibson M, Hirschhorn LR. Pre-Exposure Prophylaxis (PrEP) initiation and retention among young Kenyan women. AIDS Behav. 2022; 26:2376-2386.
36. Nunn AS, Brinkley-Rubinstein L, Oldenburg CE, Mayer KH, Mimiaga M, Patel R, Chan PA. Defining the HIV pre-exposure prophylaxis care continuum. AIDS. 2017;

31:731-734.
37. World Health Organization. Implementation tool for pre-exposure prophylaxis of HIV infection - Monitoring and evaluation. *https://www.who.int/publications/i/item/WHO-HIV-2017.17-5* (accessd May 6, 2024).
38. Dunbar MS, Kripke K, Haberer J, Castor D, Dalal S, Mukoma W, Mullick S, Patel P, Reed J, Subedar H, Were D, Warren M, Torjesen K. Understanding and measuring uptake and coverage of oral pre-exposure prophylaxis delivery among adolescent girls and young women in sub-Saharan Africa. Sex Health. 2018; 15:513-521.
39. Wijstma E, Vanhamel J, Deblonde J, Nöstlinger C, Noori T, Vuylsteke B, Laga M. An overview of programmatic indicators to monitor the roll-out of HIV preexposure prophylaxis. AIDS. 2023; 37:1-17.
40. World Health Organization. Consolidated guidelines on person-centred HIV strategic information: strengthening routine data for impact. *https://www.who.int/publications/i/item/9789240055315* (accessd May 6, 2024).
41. Vanhamel J, Wijstma E, Deblonde J, Laga M, Vuylsteke B, Nöstlinger C, Noori T. Developing evidence-informed indicators to monitor HIV pre-exposure prophylaxis programmes across EU/EEA countries: A multi-stakeholder consensus. Euro Surveill. 2023; 28:2200546.

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