Sexually transmissible infection control programs for men who have sex with men – what will they look like in 2020?

Oliver N. Refugio A,D, Chelsea Roberts A, Richard West B and Jeffrey D. Klausner A,C

A David Geffen School of Medicine, University of California, Los Angeles, 10833 Le Conte Avenue, Los Angeles, CA 90095, USA.
B Directorate of Sexual Health and HIV, Chelsea and Westminster NHS Foundation Trust, 369 Fulham Road, London, SW10 9NH, UK.
C Fielding School of Public Health, University of California, Los Angeles, 540 Charles E Young Drive, Los Angeles, CA 90024, USA.
D Corresponding author. Email: orefugio@mednet.ucla.edu

Abstract. The resurgence of sexually transmissible infections among men who have sex with men is a concern for sexual health. Traditional strategies have relied on the promotion of condom use, regular testing, treatment, and partner management. Future sexually transmissible infection control programs must combine current prevention methods with novel approaches that target the providers, patients, and mechanisms of health care delivery.

Current state of sexually transmissible infection control in men who have sex with men

The onset of the HIV epidemic in the 1980s renewed public health efforts to control sexually transmissible infections (STIs) due to the well-established synergistic relationship between HIV infection and other STIs.1 After a dramatic and steady decline through the middle of the 1990s, STIs resurfaced among men who have sex with men (MSM) and became hyperendemic.2–4 Recent trends suggest that with the advent of pre-exposure prophylaxis (PrEP), increases in STIs among MSM may be accelerating further.5–7 It is evident that current strategies need to be expanded upon, improved and combined with novel approaches. A closer examination of current barriers to STI control, as well as the anticipation of new challenges that may arise, can give us a glimpse ahead as to what STI control may look like in 2020.

Traditional STI control methods

The traditional approach to STI prevention and control has relied on promoting condom use, regular testing and treatment, and partner management.8 Condoms are known to reduce the risk of HIV infection and bacterial STI transmission.9 There was a massive increase in condom use in the 1980s due to the onset of the HIV epidemic, but currently, in some settings, consistent condom use may be declining.10 Reasons for not using condoms include preferences for intimacy, low perceived risk or consequences of infection, use of seroadaptive behaviours, and the use of HIV PrEP.11,12

Because most STIs are asymptomatic, regular screening and treatment is a critical component for reducing the reservoir of infection and the forward transmission of infection.13 Regular STI testing of high-risk MSM is recommended by international guidelines, but adherence by both providers and the population is highly variable.14,15 Furthermore, pharyngeal and rectal testing is often not performed, despite evidence that Neisseria gonorrhoeae (NG) and Chlamydia trachomatis (CT) infections are more frequently extragenital. Pharyngeal NG, rectal NG, and rectal CT infections are more often detected than urethral NG and CT infections in MSM.16,17 Additionally, there are inconsistencies in the availability of the best NG and CT detection modalities.18 Nucleic acid amplification tests (NAATs) provide highly sensitive and specific detection of NG and CT in all three susceptible anatomic sites.19–21 Currently in the USA, only laboratories that comply with the Clinical Laboratory Improvement Act and conduct a verification study may use NAATs for non-urethral testing.22

Early detection of infection and appropriate medical therapy precludes further transmission of STIs (i.e. treatment as prevention).23 In some cases, treatment soon after exposure may be warranted even before infection is detected or becomes symptomatic, a strategy known as post-exposure prophylaxis (PEP). PEP has been effective in the prevention of syphilis.23 However, an individual will only seek PEP if they are aware of their exposure to infection. Thus, STI control with PEP is only effective if an infected individual discloses their infection status to their sex partners.

Strategies are needed to increase partner notification and the use of expedited partner therapy for MSM. While not recommended in the USA Centers for Disease Control...
guidelines, many jurisdictions and global programs routinely offer extra medication(s) or additional prescriptions to expedite partner therapy.\textsuperscript{6,24} The benefit of treating partners for exposure to bacterial STIs outweighs the risk of missing other undiagnosed conditions. Partner therapy is a critical component of STI control.\textsuperscript{8} Although the future of STI control will likely employ those established methods, the persistent high rates of infection in MSM will require novel approaches in conjunction with existing strategies.

Novel approaches to STI prevention in MSM

PrEP is one of the most recent HIV prevention strategies that target individuals who are at substantial risk for infection. In 2012, the USA Food and Drug Administration approved Truvada\textsuperscript{®} (Gilead Sciences, Inc., Foster City, CA, USA) in combination with safer sex practices for use as HIV PrEP in adults following reports of its safety and effectiveness in phase III clinical trials.\textsuperscript{25,26} Truvada\textsuperscript{®} (FTC–TDF) is a fixed-dose combination of two antiviral agents: emtricitabine (FTC) and tenofovir disoproxil fumarate (TDF) labelled for once daily oral dosing. Studies have found that adherence to this daily regimen is correlated with its effectiveness in preventing HIV infection, which has been mathematically modelled to be as high as 99% in MSM, with daily oral dosing as prescribed.\textsuperscript{27,28} Thus, there has been a push to implement multifaceted approaches to promote and maximise daily adherence to FTC–TDF for PrEP. ‘On demand’ PrEP – taking FTC–TDF before and after sexual activity – has also been investigated as an alternative to daily dosing. Adverse effects caused by FTC–TDF observed in the placebo-controlled pre-exposure prophylaxis initiative (iPrEx) and USA MSM safety trials included nausea, unintentional weight loss, and reduced bone mineral density (~1.5% at 1 year without an increase in fracture risk).\textsuperscript{25,26,29} Despite those documented side effects, a recent narrative review concluded that short- and medium-term use of FTC–TDF for PrEP has a safety profile comparable to aspirin.\textsuperscript{30}

Similar to PrEP for HIV infection, prophylaxis against bacterial STIs has recently shown some promise. Bolan et al. reported decreased incidence of NG, CT or syphilis infections as a result of daily doxycycline prophylaxis among 30 high-risk MSM in a randomised, controlled pilot study.\textsuperscript{31} Larger randomised control trials should be conducted to confirm the effectiveness of STI PrEP against those bacterial infections. Daily chemoprophylaxis to reduce syphilis incidence was reported to be acceptable among MSM.\textsuperscript{32} Additionally, mathematical models have shown that syphilis chemoprophylaxis may have a substantial impact on the epidemic.\textsuperscript{33} Daily doxycycline may only be appropriate for a subset of MSM for whom the benefits outweigh the possible risks. Although doxycycline is prescribed long term for conditions ranging from acne to malaria, while generally safe, its prolonged use has been rarely associated with irritable bowel syndrome, abnormal weight gain and photosensitivity.\textsuperscript{34–36}

Currently, a few laboratories are researching vaccines to prevent bacterial STIs. While no vaccine is imminent, continued research may generate a product for further evaluation.

Existing and anticipated challenges of the STI epidemic in MSM

Although FTC–TDF for PrEP appears to be a promising agent to prevent HIV transmission, one of the main concerns regarding its implementation is risk compensation with subsequent increased rates of other STIs. Due to the reduced risk of HIV acquisition in users of FTC–TDF for PrEP, it is plausible that MSM on PrEP might reduce their condom use during anal sex and increase their number of sex partners. A similar phenomenon occurred after the introduction of highly active antiretroviral therapy (HAART). People living with HIV who were being treated with HAART were more likely to perceive less severe consequences of HIV infection and were at an increased risk of acquiring a STI.\textsuperscript{37,38} The evidence on how PrEP may influence risk behaviour is still emerging. Earlier clinical trials and more recent observational studies of PrEP users reported high STI incidence among participants.\textsuperscript{39–42} Those findings suggest that PrEP is reaching the intended high-risk MSM population. However, it is difficult to extrapolate whether those elevated STI rates were a result of risk compensation following PrEP initiation or from increased detection due to more frequent screening. In an investigation by Volk et al., 41% of participants admitted to a decrease in condom use 6 months after starting FTC–TDF for PrEP.\textsuperscript{42} In practice, STI screening of MSM should be performed quarterly, as suggested by international guidelines.\textsuperscript{33–45} If quarterly screening of PrEP users becomes routine, then MSM on PrEP may actually receive more frequent and consistent STI testing and treatment compared with MSM with similar risk profiles who are not on PrEP, thereby leading to reduction in STIs among PrEP users.

Implementation of chemoprophylaxis against HIV infection and bacterial STIs also elicits concern over the development of drug-resistant microbial species. Acquisition of drug-resistant HIV strains in initiators of FTC–TDF for PrEP has been documented in clinical trials.\textsuperscript{46,47} Among participants in the FTC–TDF for PrEP treatment arm who seroconverted during the Partner’s PrEP study, there were seven cases of detectable FTC–TDF-related mutations.\textsuperscript{47} Three of those seven seroconversions were unrecognised at baseline and did not have detectable FTC–TDF-related mutations at that time, which suggests that these mutations were likely caused by treatment rather than acquisition of an already mutated strain. However, these FTC–TDF-related mutations were no longer detectable 6 months after PrEP cessation. The clinical significance of that rapid decay in drug-resistance on the initiation of antiretroviral therapy for these patients should be further investigated. The possibility of drug resistance is also a deterrent for implementing PrEP against bacterial STIs due to the concern that the use of antimicrobials might select for drug-resistant species.\textsuperscript{38}

Advancements in technology have also created a set of new issues with regard to STI control. The different ways MSM find sex partners have evolved since the early HIV/AIDS epidemic. While bars and bathhouses still exist, the Internet and, more recently, mobile phones serve as modern methods of meeting partners for sexual encounters, especially for younger MSM.\textsuperscript{49,50} By the late 1990s and early 2000s, seeking sex
partners via the Internet was made possible by online chat rooms and websites such as AOL, Adam4Adam, Manhunt and Craigslist.\textsuperscript{51,52} Such websites may facilitate negotiating condomless anal intercourse with seroadaptive behaviours. A meta-analysis of studies on Internet-based partner selection conducted between 2002 and 2009 found that condomless anal sex was 75\% more likely to be reported among MSM who found their sex partners on the Internet compared with those who met offline.\textsuperscript{53}

Geosocial networking apps are the latest platforms for partner seeking. The apps that cater to MSM, such as Grindr, Jack’d, Scruff and Krave, connect men to each other based on geographical proximity. As with the advent of Internet-partner seeking in the past decade, there is a concern that facilitating partner meeting through those apps will increase the contact rate and STIs among MSM.\textsuperscript{54} A cross-sectional study in Los Angeles found higher odds of gonococcal and chlamydial infection in MSM who used geosocial networking apps for meeting sex partners compared to MSM who met partners through in-person methods only.\textsuperscript{55}

Concerns regarding how online avenues might affect implementation of infection control were legitimised by a syphilis outbreak in 1999, where a cluster of syphilis cases in San Francisco was associated with meeting partners in an Internet chat room.\textsuperscript{56} Public health efforts to conduct partner notification were hindered by the anonymity and privacy provided by the online chat room. Partner notification is an important component of STI control; however, it is reliant on the willingness of the infected party to disclose to their partners their exposure to infection. That process is now facilitated by free services such as inSPOT and Let Them Know, which provide anonymous partner notification via email or text message with linkage to information about testing and treatment.\textsuperscript{57,58} There is a need for service providers to integrate with these services and for a system to allow a networked electronic partner notification system. Such integration could enable healthcare providers to verify testing and treatment of contacts.

Although online partner-seeking websites or apps may be contributing to larger sexual networks and higher contact rates, they have the potential to serve as a medium to reach out to high-risk MSM in terms of STI education, prevention, screening and treatment.\textsuperscript{59,60} The San Francisco Department of Public Health successfully used online advertising for free syphilis testing at non-clinic sites.\textsuperscript{61} Similarly, Grindr and other social media have been successfully used to advertise syphilis testing among MSM in Darwin, Australia and home-based self-collection HIV testing in England.\textsuperscript{52,63}

Internet-capable devices such as smartphones and tablets have revolutionised communication and the dissemination of information. One service that utilises those technologies is Healthvana (www.healthvana.com), a self-described patient engagement platform, which is in use at clinics serving MSM in several large cities including Los Angeles, Fort Lauderdale and Chicago. It helps users along the entire STI screening and treatment continuum. With that service, patients can locate nearby STI testing facilities and view valuable information about each site, such as whether the clinic has a lesbian, gay, bisexual and transgender (LGBT) focus. At Healthvana-certified facilities, users can complete pre-visit registration and check in for an appointment from their tablet or smartphone. Through those devices, users also receive their test results, educational information and instructions about the next steps should they test positive. Healthvana allows providers to follow and monitor their patients virtually along the process. All of those features make STI testing and treatment more efficient for both patients and their providers.

**Delivery of sexual health services for MSM**

Accessibility of sexual health services varies considerably for MSM, who may encounter particular barriers to receiving care. Deterrents may be structural in nature, such as lack of services within a reasonable distance, long waiting times for appointments or test results and shortage of providers who are culturally sensitive to the specific needs of MSM.\textsuperscript{14,64} Social stigmatisation of disclosing sexual behaviours, visiting facilities designated for sexual health services, and fear of testing positive for infection may prevent MSM from receiving appropriate care.\textsuperscript{64,65} Also, cost undoubtedly limits care for certain groups of MSM.\textsuperscript{14} Despite those barriers, there are a variety of clinic-based and decentralised services available to MSM, which are in need of expansion.

Primary care is generally desirable for the continuity of health care. As patients may not readily disclose their sexual behaviours, providers must initiate the conversation by asking questions pertaining to sexual history in a culturally sensitive and non-judgmental manner.\textsuperscript{66} In a study investigating same-sex attraction disclosure to healthcare providers, only 39\% of MSM discussed their history of sexual activity with men.\textsuperscript{67} That issue could be remedied by including a question on pre-visit documents that allows patients to identify the gender of their sex partners before their provider encounter. However, knowledge of a patient’s sexual behaviours is futile if the physician is unfamiliar with the special health needs of MSM.

It may not be feasible or convenient for high-risk MSM, who are advised to receive STI screening more frequently than annually, to visit their primary care provider each time they need to be tested. Clinics designated specifically for sexual health services might be a more appropriate choice. However, MSM may delay or forego testing at those sites due to a variety of reasons, including the stigma of visiting STI clinics, excessive waiting times and lack of walk-in services. Sexual health clinics may need to be redesigned to address those barriers.

One example of an innovative clinic is the Dean Street Express, a National Health Services facility in London that offers free and confidential STI testing by appointment or walk-in visits. Its streamlined process takes an estimated hour; beginning with a computerised self-check in, followed by self-collection of specimens and finally, a rapid HIV test alongside a counsellor. Results of the other STI tests are sent via text message within 6 h. The quick turnaround time is made possible by rapid on-site diagnostics that most clinics do not possess. Reported time from diagnosis to treatment was shorter for Dean Street Express patients compared with ones who tested at a clinic whose samples were analysed offsite.\textsuperscript{68} Receiving
treatment more rapidly allows less opportunity to transmit infection. The Dean Street Express was also purposely designed to bear little resemblance to a typical clinic, in hopes of mitigating the stigma of attending a sexual healthcare facility. It may serve as a paradigm for future STI services that would be associated with reduced stigma and increased utilisation. Perhaps in the future, clinics will be created to enable self-testing and self-treatment for documented infections without the need for a provider evaluation.

MSM-focused community-based STI screening and treatment serve as an alternative source of testing for those who experience barriers to receiving care at clinic-based facilities. Such programs are more likely to provide culturally competent services and be located in areas where many MSM reside or congregate, such as LGBT centres, Pride events and gay nightclubs. Unfortunately, those community-based services are likely limited to MSM who live in urban areas or cities with prominent communities of MSM.

The final frontier of STI screening that seems to be the most convenient and mitigates structural and stigmatising obstacles to clinical care is home-based specimen self-collection or testing. A systematic review of randomised control trials investigating home-based versus clinic-based specimen collection for gonococcal and chlamydial detection found no difference in completing testing, diagnosis and treatment between the two methods. Detection rates for pharyngeal and rectal NG or CT were equal or better with self-collection compared with provider-collection in a study on the reliability of self-testing in MSM. Home-based self-collection of specimens may be comparable to clinic-based testing and is being evaluated by the ‘I Want the Kit’ (IWTK) program. IWTK (www.iwantthekit.org) is a public Internet-based service that provides STI education along with free testing for NG, CT and Trichomonas vaginalis for residents of Maryland, Washington D.C. and Alaska. Participants are mailed a kit containing supplies and directions for penile and rectal specimen self-collection, which are returned for testing. Results are provided online, and participants who test positive receive a clinic referral for treatment. Male IWTK users were found to have risk factors for STIs, high prevalence of infection and preferred home-based self-collection over attending a clinic.

myLAB Box (www.mylabbox.com, myLAB Box, Inc., Los Angeles, CA, USA) is a for-profit commercial entity that offers home-based self-collection STI screening for the same infections as IWTK, as well as for HIV and hepatitis C. That service currently does not offer testing of specimens collected from extragenital sites. Postal and self-collection STI testing services may considerably reduce the burden on publicly funded resources. Another inventive mode of STI testing found to be acceptable by MSM is test kit dispensing through electronic vending machines placed at locations frequented by MSM. All of those strategies may be needed to increase availability and frequency of testing and treatment, which are critical for STI control.

**The future of STI control programs for MSM**

The persistently high rates of STIs in MSM suggest that the existing methods of prevention are inadequate, incomplete or inefficient. Furthermore, it is likely that there are new or re-emerging facilitators of transmission that are contributing to the recent rise in STI incidence. Future STI control must combine current prevention strategies with novel approaches that target the providers, patients and mechanisms of healthcare delivery (Box 1). Although directories of ‘LGBT friendly’ providers exist, this describes little about their qualifications to care for their patients. Perhaps in the future, physicians will be certified in LGBT health and form networks that facilitate care for MSM. Ideally, FTC–TDF for HIV PrEP will be scaled up in the upcoming years, with PrEP against bacterial STIs for high-risk MSM following suit. PrEP along with the development of vaccines against NG, CT and syphilis will reduce infection rates.

By 2020, the expansion of technology-driven services will allow patients to take more ownership over their health. The future of STI testing and treatment will rely less on providers and more on diagnostics that are quick, accurate and convenient, combined with electronic results notification, disclosure to partners and management. Counselling and treatment will also be timely and amenable for patients so that they may not need to leave their homes. Telehealth will play a role in providing patients with sexual health education and information on therapies. Positive test results would initiate automated physician orders to the pharmacy or even home delivery of medications, which will shorten the time between diagnosis and treatment and reduce the number of those who are untreated. Partner notification and treatment will also incorporate those rapid and convenient methods.

All of those mechanisms will not only streamline the testing and treatment process, but also will eliminate many of the barriers that MSM encounter along the way. It is uncertain what STI control will look like in 2020, but there are many exciting possibilities to be explored. Yet, it is apparent that the methods of STI prevention and management must continue to evolve to accommodate the advances in society, medicine and technology.

**Box 1. Innovative strategies to enhance sexually transmissible infection control in men who have sex with men**

**Testing:**
- Clinic-based testing without provider encounter
- Community-based testing
- Home-based specimen self-collection
- Home-based testing

**Treatment:**
- Electronic prescription for treatment

**Partner management:**
- Electronic partner notification
- Electronic partner prescription for treatment
Conflicts of interest
None declared.

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