A review of internet-based testing services for HIV and sexually transmitted infections (STIs)

Question

- What are the examples of providing internet-based HIV/STI testing services in high-income settings (both publicly and privately funded)?
- What is the uptake of such services and which population groups benefit from them?
- What are the implications of these services for access, standard of practice, quality of care, and costs?

Key Take-Home Messages

- The integration of digital technologies into HIV and STI testing is becoming more prevalent (1), and appears to influence testing behaviours (1–4).
- Three models offering online HIV/STI testing that do not require a face-to-face visit with a healthcare provider have been identified: by ordering a test kit online and having it delivered via mail (5, 6), by ordering a self-collection kit online, having it delivered via mail and returning it (7, 8), or by generating a laboratory requisition online or scheduling specimen collection at a lab (9, 10).
- In high-income settings examined in this review, a large variety of online HIV/STI testing services are available. In Canada, GetCheckedOnline (British Columbia), GetAKit (Ontario), and I'm Ready (Canada-wide) offer free testing for HIV and/or STIs; test kits can also be ordered for a fee from manufacturers' or other commercially available websites (10, 11). In the UK, numerous publicly-funded services offer free online ordering of HIV/STI self-testing kits and/or self-collection kits (8, 12–14). It appears that in the U.S., most of these services are offered privately and require payment (15–18).

Rapid Response: Evidence into Action

The OHTN Rapid Response Service offers quick access to research evidence to help inform decision making, service delivery, and advocacy. In response to a question, the Rapid Response Team reviews the scientific and grey literature, consults with experts if required, and prepares a review summarizing the current evidence and its implications for policy and practice.

Suggested Citation
Rapid Response Service. A review of internet-based testing services for HIV and sexually transmitted infections (STIs). Toronto, ON: The Ontario HIV Treatment Network; March 2022.

Prepared by
Danielle Giliauskas

Program Leads / Editors
David Gogolishvili

Contact
rapidresponse@ohtn.on.ca

For more information visit
www.ohtn.on.ca/rapid-response-service

The Ontario HIV Treatment Network
1300 Yonge Street, Suite 600
Toronto ON M4T 1X3

- Online HIV/STI testing has been found to be acceptable and of interest in several studies across different settings (12, 19, 20).
- Some studies reported that in-clinic diagnosis rates appear to be comparable to online diagnosis rates (21, 22), but one study found that online diagnosis rates were lower, as those with symptoms were encouraged to test in-clinic (23).
- Internet-based HIV/STI testing services are used by a wide variety of population groups including men who have sex with men (24), young adults (25, 26), heterosexual men and women (23), transgender and non-binary individuals (12), people with a history of drug use (5), and people with limited access to traditional testing facilities (21).
- Some online testing services utilized targeted advertising such as Grindr (24), Facebook, Instagram, and community HIV prevention sites (27) to encourage testing among populations at higher risk.
- One report examining the impact of GetCheckedOnline found that generally, the majority of users indicated engaging in behaviours that may lead to a higher chance of infection (e.g. condomless intercourse, multiple partners) (22).
- Services may employ different ways to assess HIV/STI risk. For example, one Canadian and one UK service report that symptomatic individuals are encouraged to test in-clinic with a healthcare provider (23, 28); one U.S. service requires users to disclose date of last test (29), and one service in Italy requires users to fill out a risk-assessment form (30).
- One study from the UK found that that offering online HIV and STI testing changed individuals' testing patterns in a geographic area with unmet needs (20). Authors found that while introducing online STI testing increased the number of tests, cost of testing, and total number of diagnoses, the average cost per diagnosis decreased (20). After two years, total diagnoses increased, with online testing accounting for 37% of all testing (20).
- Ordering HIV self-test kits and STI self-collection kits via mobile apps was found to be feasible and acceptable in pilot trials, and may be a way to increase HIV/STI testing among young men who have sex with men (25).

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The Issue and Why it's Important

Literature examining digital interventions related to the prevention and treatment of HIV and STIs is broad in scope. At least four systematic reviews, published in 2020 or 2021, describe the impact digital technology has had on HIV and/or STI testing uptake:

- A meta-analysis found that integrating digital technology (i.e. internet-enabled devices, such as computers, tablets, and smartphones) into HIV testing approaches increased testing uptake among men who have sex with men and transgender women (1).

- Another systematic review found that HIV self-testing with digital supports (i.e. the use of digital interventions such as website-based, social media, digital vending machines, mobile apps, text messaging) increased uptake of HIV testing and successfully linked participants to treatment; additionally, it was deemed feasible, acceptable, and preferable (4).

- A systematic review assessing the effectiveness of mobile health interventions in preventing STIs and promoting preventive behaviors found that text-messaging interventions and smartphone application messages may increase STI and/or HIV testing (2).

- Another systematic review examining mobile health technology interventions (i.e. those utilizing text messages or mobile apps) designed to improve HIV prevention or treatment outcomes among men who have sex with men concluded that they were feasible, acceptable, and demonstrated evidence of preliminary efficacy (3). Of note, among the 13 included HIV prevention interventions, eight focused on encouragement of HIV testing (3).

Evidently, the Internet has allowed for an increase in the uptake of HIV and/or STI testing in a variety of different ways (1–4). A systematic review from 2020 examines HIV testing strategies outside of healthcare settings and describes testing provision as one intervention that can increase HIV testing coverage outside of traditional healthcare settings (31). Specifically, this systematic review includes nine testing provision interventions in Europe that use the internet as a means of test provision (31). Typically, facilitating online access to testing means the user bypasses traditional face-to-face interaction and assessment with a healthcare provider. Based on the overwhelming number of studies that discuss online testing options, there appear to be three general models that allow individuals to obtaining kits via the internet (the examples provided below are free):

6. CATIE. HIV self-testing: Putting it into practice. [Webinar]. 2021. Available from: https://www.catie.ca/hiv-self-testing-putting-it-into-practice Accessed December 2, 2021.

7. IWTK. Collecting your samples. 2020. Available from https://iwantthekit.org/get-tested/collecting-your-samples/ Accessed November 30, 2021.

8. Wilson E, Free C, Morris TP, Syred J, Ahamed I, Menon-Johansson AS, et al. Internet-accessed sexually transmitted infection (e-STI) testing and results service: A randomised, single-blind, controlled trial. PLoS Medicine. 2017;14(12):e1002479.

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10. TeleTest. STD test. 2021. Available from: https://teletest.ca/app/tests/std/ Accessed December 3, 2021.

11. bioLytical Laboratories. INSTI HIV self test. 2021. Available from: https://shop.insti.com/insti-hiv-self-test Accessed December 3, 2021.

12. Day S, Smith J, Perera S, Jones S, Kinsella R. Beyond the binary: Sexual health outcomes of transgender and non-binary service users of an online sexual health service. International Journal of STD & AIDS. 2021;32(10):896–902.

- by ordering a test kit online (e.g. GetaKit in Canada or HIV Self-Test Scotland in the UK)

- by ordering a self-collection kit online (e.g. I Want The Kit in the U.S. or Umbrella Health in the UK)

- by generating a laboratory requisition/scheduling specimen collection at a lab online (e.g. GetCheckedOnline in Canada or Webtest in Australia (32).

All three of the above models appear to be alternatives to in-person, clinic-based appointments. For self-collection kits, results are obtained by sending samples off to a laboratory for testing by mailout or drop-off. Note that not all online testing services are identical: kits vary by manufacturer, some only offer testing for certain STIs, while others require users to complete a survey. While the examples provided above are free, there are many online services where users have to pay out-of-pocket, or have their insurance billed (33).

It should also be noted that benefits to self-testing or self-collection has been discussed in the literature and include convenience, confidentiality, speed, access, and privacy, and in addition can reduce the burden on existing health systems (34). This is of particular importance as a 2021 systematic review examining barriers and facilitators to HIV testing in Canada found that testing services should be accessible, convenient, and confidential in order to improve uptake (35). Of note, free provision of HIV self-testing was the subject of a previous Rapid Response, published in 2020 (36). It should also be mentioned that one article published in 2021, based on stakeholder interviews with healthcare professionals conducted between 2019 and 2020 in Ontario and textual analyses of government documents and private for-profit digital healthcare websites, states that their findings on public-private laboratory funding disparities discredit the claims that digital healthcare necessarily generates cost savings, or that it enhances patients' access to care (9). The authors compare privately offered digital HIV/STI testing services to paying "to skip the line" (9).

This review explores current websites or smartphone apps that facilitate delivery of HIV and/or STI self-test kits or self-collection kits, as well as websites that enable users to generate a laboratory requisition or book a laboratory appointment for specimen collection.

What We Found

We were able to identify numerous websites currently in operation in high-income settings that allow users to order HIV and/or STI self-tests or self-collection kits to a desired address. The majority of studies examining outcomes of these online services—namely, those that offered free self-tests or self-collection kits—were

13. Gasmelsid N, Moran BC, Nadarzynski T, Patel R, Foley E. Does online sexually transmitted infection screening compromise care? A service evaluation comparing the management of chlamydial infection diagnosed online and in clinic. International Journal of STD & AIDS. 2021;32(6):528–32.

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17. Testkitlabs.com. STD testing: Getting Americans tested. 2014. Available from: https://testkitlabs.com/ Accessed December 3, 2021.

18. US Expert Services. FDA approved test with lowest STD test pricing. 2021. Available from https://www.stdlabs.com/std-test-pricing Accessed December 3, 2021.

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primarily those that were publicly funded, or were public-private partnerships.

The following sections detail these currently active websites, organized by geographic region, that allow users to order STI and/or HIV self-collection kits, or self-test kits, or generate requisition forms/schedule specimen collection at a lab. The overwhelming majority of free services was described in the published literature.

Large online retailers—such as Amazon—do have HIV home tests available for purchase, but these are not included in this review. While some retailers that specifically sell self-test kits for HIV and other STIs, or that allow users to schedule specimen collection at a nearby lab are included, this review does not exhaustively list all of these out-of-pocket services, as there are likely numerous vendors. For example, in the Netherlands alone, 20 websites with a Dutch web address sell either self-sampling or self-testing kits for chlamydia, as identified in a 2019 study (37).

The final section titled "Other studies" contains services that examined HIV self-testing online, but are not classified as online services as they do not currently offer users to order tests online.

Canada

GetCheckedOnline

GetCheckedOnline (GCO) is a free and confidential online HIV/STI testing service, developed by the BC Centre for Disease Control (BCCDC) (28). However, GCO does suggest in-person appointments for symptomatic cases: "We recommend you see a health care provider for assessment when: [y]ou have symptoms, such as discharge, pain, itching, or sores on the genitals, [and/or] [y]ou had sex with someone who has an STI" (28).

Users create an account, and complete an online questionnaire in order to generate a lab requisition form with a unique code (28). The user then presents lab requisition to a participating LifeLabs (via printout or smartphone) and is provided with specimen collection materials (28). Result notifications are received via email in 7–10 days, and are available to users on their account (28). Users are to call the STI clinic at the BCCDC if any results are positive; a nurse will review results with user and explain how to access treatment (28).

Numerous studies examining the various facets of GCO have demonstrated that:

- GCO is able to effectively engage individuals who experience testing barriers (38);

20. Turner KME, Looker KJ, Syred J, Zienkiewicz A, Baraitser P. Online testing for sexually transmitted infections: A whole systems approach to predicting value. PLoS ONE. 2019;14(2):e0212420.

21. Banerjee P, Thorley N, Radcliffe K. A service evaluation comparing home-based testing to clinic-based testing for chlamydia and gonorrhoea in Birmingham and Solihull. International Journal of STD & AIDS. 2018;29(10):974–9.

22. Haag D, Thomson K, Gilbert M. The impact of getcheckedonline.com BC's internet-based testing program for sexually transmitted and blood-borne infections. 2018. Available from: https://dishiresearch.ca/resource/the-impact-of-getcheckedonline-com-bcs-internet-based-testing-program-for-sexually-transmitted-and-blood-borne-infections/ Accessed November 29, 2021.

23. Barnard S, Free C, Bakolis I, Turner KME, Looker KJ, Baraitser P. Comparing the characteristics of users of an online service for STI self-sampling with clinic service users: A cross-sectional analysis. Sexually Transmitted Infections. 2018;94(5):377–83.

24. Huang E, Marlin RW, Young SD, Medline A, Klausner JD. Using Grindr, a smartphone social-networking application, to increase HIV self-testing among Black and Latino men who have sex with men in Los Angeles, 2014. AIDS Education & Prevention. 2016;28(4):341–50.

- men who have sex with men reported positive experiences using GCO, describing the service as accessible, convenient, and private compared to clinic-based testing (39);

- post-test HIV testing knowledge and sexual risk behaviours were comparable among GCO users and clinic-based testers (39);

- clients using CGO were 22% more likely to repeat testing when compared to clinic-based clients, and may therefore contribute to earlier diagnosis of HIV and/or STIs (40);

- existing clinical prediction rules to detect asymptomatic chlamydia and/or gonorrhea infection, based on five predictors, were valid when applied to the GCO testing environment (41).

A comprehensive report published in 2018 goes into further detail about who is using this service. Between September 2014 and December 2017, approximately one in 20 people who tested through GCO tested positive for an infection, a rate similar to what is observed in an STI clinic setting (22). Additionally, self-collected throat and rectal swabs for chlamydia and gonorrhea were introduced in 2016, as throat and rectal chlamydia and gonorrhea infections currently account for nearly half (45%) of all chlamydia and gonorrhea infections in GCO clients (22).

From March 2016 to December 2017 in the province of British Columbia, 40% of those who created accounts identified as female, 59% as male, and 1% as other, which included trans, genderqueer, 2 Spirit and intersex (22). Additionally, authors found that across the province, those testing through GCO indicated sexual behaviours that may lead to increased risk of infection, including condomless sex (43%), four or more sex partners (28%), and delaying testing for HIV (20%) or STIs (20%) (22).

GetaKit

Launched in 2020, GetaKit is a program that allows eligible individuals in Ontario to order an HIV test online from getakit.ca and have it delivered to their home or other pick-up location in 1–3 business days (5). The HIV test and shipping are free of charge (5). To determine eligibility, participants complete anonymous mandatory online screening; eligible candidates then complete a survey which collects data on sex, gender, ethnicity, sexual orientation, HIV test history, and sex and drug use practices (5). There is no requirement to report results to GetaKit, though participants are encouraged to do so (5). In examining data from July 2020 to April 2021 of eligible participants who completed the baseline survey (n=399), authors observed that 71% (n=283) were part of an HIV priority population group, 66% were White (n=264), 68% identified as men (n=270), 74% identified as gay (n=287; all genders), and 53% indicated a history of

25. Biello KB, Horvitz C, Mullin S, Mayer KH, Scott H, Coleman K, et al. HIV self-testing and STI self-collection via mobile apps: Experiences from two pilot randomized controlled trials of young men who have sex with men. mHealth. 2021;7:26.

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29. TakeMeHome. See if you qualify. 2022. Available from: https://takemehome.org/see-if-you-qualify/ Accessed January 6, 2022.

30. Polilli E, Sozio F, Di Stefano P, Sciacca A, Ursini T, Paoloni M, et al. Web-Based HIV testing in Abruzzo, Italy: Analysis of 15-month activity results. AIDS Patient Care & STDs. 2016;30(10):471–5.

substance use (n=194) (5). As of April 2021, of the 57% of individuals (n=228) who reported test results, one result was reported as positive, for a positivity rate of 0.44% (5).

Testing for other STIs on GetaKit is planned to be rolled out in 2022 (42).

I'm Ready (app)

I'm Ready, Test is a mobile app where users can order up to three free HIV self-tests for delivery or pick-up at community sites (6). Within the first three months of the program, the website had more than 14,000 visitors; 1,579 consented to enter the study (6); 1,100 participants ordered 2,653 HIV test kits, and three positive test results were submitted, which were all from key populations (6).

TeleTest

Available only in Ontario, TeleTest offers a Basic test (urine) for chlamydia, gonorrhea, and trichomoniasis (CAD 25), and a Standard test for chlamydia, gonorrhea, syphilis, trichomoniasis, and HIV (CAD 29) (10). The user is able to "Add on" a test for herpes simplex virus 1 & 2 (CAD 19), hepatitis C (CAD 19), and a self-swab test for rectal gonorrhea/chlamydia and pharyngeal gonorrhea/chlamydia (CAD 49) (10). Users then choose a nearby location and arrive in-person to provide the sample(s) (10). Costs reflect the administration fee for set up, while the Ontario Health Insurance Plan (OHIP) covers the cost of the lab tests (10).

INSTI HIV Self Test

Canadians are able to order an HIV self-test directly from the manufacturer of the INSTI HIV self-test (11). One test retails for CAD 34.95, while a twin pack retails for CAD 54.95 (11).

United States

As a 2021 publication notes, in the U.S. "…no specific guidance exists for care and follow-up of STIs diagnosed by laboratories associated with online testing services" (33). The study raises several concerns about online testing in the U.S., including result disclosure, linkage to treatment, and counselling (33). The American Sexually Transmitted Diseases Association (ASTDA) published a position statement in November 2021 on direct-to-consumer STI testing services (whether ordered online or obtained elsewhere), making general recommendations for consumer protection and empowerment, clinical management, test selection, laboratories, and policy (43).

I Want The Kit

I Want The Kit (IWTK) is an online screening program where users in certain areas of the U.S. can order home collection kits for chlamydia,

31. Croxford S, Tavoschi L, Sullivan A, Combs L, Raben D, Delpech V, et al. HIV testing strategies outside of health care settings in the European Union (EU)/European Economic Area (EEA): A systematic review to inform European Centre for Disease Prevention and Control guidance. HIV Medicine. 2020;21(3):142–62.

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35. Laprise C, Bolster-Foucault C. Understanding barriers and facilitators to HIV testing in Canada from 2009–2019: A systematic mixed studies review. Canada Communicable Disease Report. 2021;47(2):105–25.

gonorrhea, and trichomonas, and HIV self-test kits (44). The service is promoted as STI testing that is "...free, convenient, confidential, and accurate..." with the aim of decreasing the transmission and burden of STIs, while educating users about prevention (45). Home collection kits include a postage-paid return envelope; users receive a text or email when their samples are received and another when their results are ready for viewing (7). For HIV self-test kits, users do not report results to IWTK, but are encouraged to visit a healthcare provider or clinic for confirmatory testing (7). Of note, operations of IWTK at Johns Hopkins University ceased during a three-week hiatus due to COVID-19 in the spring of 2020; upon reopening in early April, clinical services began referring individuals to IWTK, and significant increase in uptake and usage was observed (46).

Two studies examining different elements of the IWTK program were found in the literature:

- Individuals who visited the IWTK website had the option of completing an online survey, which asked questions regarding demographics, attractiveness of the service, acceptability, and experiences using IWTK (19). Prior users of IWTK were satisfied with the service, citing ease of use with the swabs; out-of-clinic screening was preferred by 62% of respondents (n=283), with 26% stating they had no preference (n=119) (19). There was a desire for point-of-care testing options for STIs, with a majority of participants willing to provide a fingerstick blood sample (19).

- Another study examined the distribution of chlamydia, gonorrhea, and trichomonas by anatomic site (urogenital and rectal) among paired samples of IWTK users (i.e. the same participant submitted both urogenital and rectal specimen) (47). Between August 2013 and December 2016, 881 paired specimens were submitted; authors found that nearly 51% (n=67) of all positive tests were identified exclusively through rectal testing, suggesting that these infections would have been missed through urogenital-only testing (47).

UCLA Free HIV Self-Test Program

This ongoing program allows users to receive a free HIV self-test via three options: a local vending machine, a printable voucher redeemable at select drug stores, and mailed to a preferred address (48). A study from 2016 details how advertisements on Grindr were used to direct men who have sex with men to the above website for HIV self-testing in Los Angeles County in April and May of 2014 (24). All users who visited the site (regardless of study participation) received a free HIV self-test; of the 334 requests for a free test, 67% (n=224) of requests were for mailed tests (24). Men who identified as Black or Latino, 18 years or older, were invited to take a survey on their testing experience (24). Of the 122 participants who met

36. Rapid Response Service. Free HIV self-testing: Best practices, positivity rates, and associated costs. Toronto, ON: The Ontario HIV Treatment Network; August 2020. Available from: https://www.ohtn.on.ca/rapid-response-free-hiv-self-testing-basic-practices-positivity-rates-and-associated-costs/ Accessed December 3, 2021.

37. den Daas C, Sukel B, Bos H, van den Broek Is. Evaluation and enumeration of online test providers for sexually transmitted infections, specifically chlamydia, in the Netherlands. Sexually Transmitted Infections. 2019;95(5):380–5.

38. Gilbert M, Thomson K, Salway T, Haag D, Grennan T, Fairley CK, et al. Differences in experiences of barriers to STI testing between clients of the internet-based diagnostic testing service GetCheckedOnline.com and an STI clinic in Vancouver, Canada. Sexually Transmitted Infections. 2019;95(2):151–6.

39. Salway T, Thomson K, Taylor D, Haag D, Elliot E, Wong T, et al. Post-test comparison of HIV test knowledge and changes in sexual risk behaviour between clients accessing HIV testing online versus in-clinic. Sexually Transmitted Infections. 2019;95(2):102–7.

the eligibility criteria, 66% (n=81) received a self-test and were thus invited to complete a follow-up survey (24). Seventy percent (n=57) completed the follow-up survey; of these, 93% (n=53) received a test in the mail (24). Authors observed that among survey participants, self-testing for HIV was acceptable and delivery by mail was preferred (24).

TakeMeHome

Take Me Home is a free online HIV self-testing program, advertised online (via Grindr, Facebook, Instagram) that was launched (coincidentally) one week after a stay-at-home order due to COVID-19 was announced in Oregon (27). To be eligible, participants had to be 18 years or older, and had not tested for HIV in the prior 12 months; two tests could be ordered at one time (27). Within 24 hours, orders for 73% (n=109) of the stock of 150 allocated kits were received (27). Subsequently, an additional 324 kits were ordered, and users were limited to one kit (27). Between the launch date of March 31, 2020 and May 31, 248 kits had been ordered by 233 individuals who were assigned male at birth (27). Nearly one-quarter (22%, n=51) of these individuals lived in rural or remote areas (27). Data from participants ordering the kit between April 4–May 31, 2020 (n=149) revealed that one-third (34%, n=51) had never tested for HIV before (27).

This public-private partnership was featured in a September 21, 2021 issue of the CDC's *Morbidity and Mortality Weekly* and reports on data from the project's first year (49). Over the first year, eligibility was expanded to include people who had more recently tested for HIV, and some jurisdictions allowed two kits per order (49). During the first year, 5,325 kits were ordered by 4,904 unique persons: 67% (n=3,304) identified as men, 26% (n=1,295) as Hispanic or Latino, and 36% (n=1,764) reported never having testing for HIV before (49). Additionally, kit orders were matched to HIV case surveillance by two health departments, which estimated that 0.6%–0.8% of individuals who received a kit were representing new HIV diagnoses (49).

HIV Home Test Giveaway

HIV Home Test Giveaway (HHTG) is a program in New York State that uses online advertising to recruit cisgender men, transgender, and gender non-conforming individuals who have sex with men, for free HIV self-testing, where eligible participants receive a code to redeem on the manufacturer's website (50). Two HHTG programs were run: one in New York City, and one for residents of New York State (excluding New York City). Over five waves of the program (2015–2020) run in New York City, 17,383 individuals were eligible for the program, with 70% (n=12,182) redeeming a code; 46% (n=7,935) responded to the follow-up survey (50). Most respondents were younger than 35, nearly half of the respondents identified as Black or Latino, and a third had not tested in the previous year (50). For HHTG in New York State (three waves: 2016–2018), 3,197

40. Gilbert M, Salway T, Haag D, Elliot E, Fairley C, Krajden M, et al. A cohort study comparing rate of repeat testing for sexually transmitted and blood-borne infections between clients of an internet-based testing programme and of sexually transmitted infection clinics in Vancouver, Canada. Sexually Transmitted Infections. 2019;95(7):540–6.

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43. Exten C, Pinto CN, Gaynor AM, Meyerson B, Griner SB, Van Der Pol B, et al. Direct-to-consumer sexually transmitted infection testing services: A position statement from the American Sexually Transmitted Diseases Association. Sexually Transmitted Diseases. 2021;48(11):e155–e9.

44. IWTK. What to order. 2020. Available from https://iwantthekit.org/get-tested/what-to-order/ Accessed November 29, 2021.

45. IWTK. About us. 2020. Available from: https://iwantthekit.org/about-us/ Accessed November 29, 2021.

were eligible, and 63% (n=2,022) redeemed a code; 47% responded to the follow-up survey (n=1,510) (51), and 22 respondents in the follow-up survey were first-time HIV testers (51). Among all eligible participants, Black participants had the highest rate of never being tested for HIV, followed by Hispanic, and Other/Mixed participants (51). The HHTG appears to be currently active.

MyChoices (app)

MyChoices is a smartphone application that is currently being tested in several cities in the U.S.; only participants enrolled in the study can use the app (52). Eligible participants are cisgender men who have sex with men, aged 15–24 (53). The app includes personalized recommendations, such as HIV testing frequency, HIV testing and PrEP care sites, and ability to order free HIV and STI test kits (53). A pilot trial demonstrated that participants felt the app was useful, and that they would recommend it to a friend (53).

A study published in April 2021 describes the pilot trial of MyChoices and LYNX, which is another app for young men who have sex with men that offers home-based HIV testing (25); however, we were not able to locate a URL for the LYNX app. Both apps have the aim of increasing HIV testing among young men who have sex with men aged 15–24 who have not recently tested for HIV and who may be at high risk of contracting HIV (25). Authors note that "[b]oth apps include the ability to order a HIV self-test with rapid results and a kit for STI self-collection and mailing of samples for syphilis, gonorrhea and chlamydia to a lab for testing" (25). In the pilot trial in five U.S. cities, authors found that HIV self-testing kits and STI self-collection kits were highly acceptable, with 87% of participants reporting that ordering through the app was extremely/very helpful (25). Those who did not order the kits preferred to test in a clinic setting (25). Authors note that MyChoices and LYNX are currently being tested in a full-scale efficacy trial (25).

TestKitLabs

A U.S.-based online store for ordering STI tests, this website "… provides medical grade instant/rapid test kits for personal use and clinical use for detecting STDs" and appears to ship worldwide (17). Rapid test kits are available for chlamydia, gonorrhea, syphilis, and hepatitis B; a multipack of all four kits retails at USD 74.95 (17).

LetsGetChecked

Available in the U.S., Ireland, and the UK, LetsGetChecked is a website and app that offers "home STD testing with treatment included" (54). Users can order three tests: Simple 2 tests for chlamydia and gonorrhea (USD 99), Standard 5 (most popular) tests for chlamydia, gonorrhea, syphilis, trichomoniasis and HIV (USD 149), and Complete 8 tests for everything from Standard 5 plus garderella, mycoplasma, and ureaplasma (USD 249) (54). Treatment is only

46. Melendez JH, Hamill MM, Armington GS, Gaydos CA, Manabe YC. Home-based testing for sexually transmitted infections: Leveraging online resources during the COVID-19 pandemic. Sexually Transmitted Diseases. 2021;48(1):e8–e10.

47. Jordan NN, Jett-Goheen M, Hsieh YH, Gaydos JC, Gaydos CA. Detection of three sexually transmitted infections by anatomic site: Evidence from an internet-based screening program. Sexually Transmitted Diseases. 2020;47(4):243–5.

48. UCLA Free HIV Self-Test Program. Welcome to the UCLA Free HIV Self-Test Program! 2021. Available from: http://freehivselftests.weebly.com/ Accessed November 30, 2021.

49. Hecht J, Sanchez T, Sullivan PS, DiNenno EA, Cramer N, Delaney KP. Increasing access to HIV testing through direct-to-consumer HIV self-test distribution—United States, March 31, 2020–March 30, 2021. Morbidity and Mortality Weekly Report. 2021;70(38):1322.

50. Edelstein ZR, Wahnich A, Purpura LJ, Salcuni PM, Tsoi BW, Kobrak PH, et al. Five waves of an online HIV self-test giveaway in New York City, 2015 to 2018. Sexually Transmitted Diseases. 2020;47(5S Suppl 1):S41–S7.

51. Johnson MC, Chung R, Leung SJ, Edelstein Z, Yuan Y, Flavin SM. Combating stigma through HIV self-testing: New York State's HIV Home Test Giveaway program for sexual minorities. Journal of Public Health Management & Practice. 2020;03:03.

provided for chlamydia, trichomoniasis, gardnerella, mycoplasma, and ureaplasma at no additional charge (54).

GoTestMeNow

GoTestMeNow is a network of laboratories in New York and New Jersey (Enzo Clinical Labs, Inc.) where users order a lab test online, and then walk into a laboratory where samples are collected and tested (15). Their website has seven menu items, with the most expensive offering testing for chlamydia, gonorrhea, syphilis, trichomoniasis, hepatitis B, hepatitis C, and HIV-1 and HIV-2 (USD 319) (15). The cheapest test for ordering is a syphilis test (USD 39) (15). Additionally, a test can be ordered for herpes-1 and herpes-2 (USD 85) (15).

STDcheck

A nationwide service, STDcheck.com allows users to pay for and book an HIV test in the nearest laboratory setting online (16). Individual tests are available for purchase and include chlamydia, gonorrhea, syphilis, hepatitis A, hepatitis B, hepatitis C, herpes-1 and herpes-2, HIV-1 and HIV-2 (16). One can purchase the 10 Test Panel with HIV RNA early detection for USD 258 (16).

STDlabs

STDlabs is another online vendor where users can be tested for STIs at a laboratory location of their choice within the U.S.; there are over 4,500 participating locations (55). A complete STD Test Panel costs USD 199 and includes tests for syphilis, gonorrhea, chlamydia, hepatitis B, hepatitis C, herpes-1 and herpes-2, and HIV-1 and HIV-2 antibody tests (18).

United Kingdom

The UK has a vast network of sexual health clinics supported by the National Health Service (NHS) that offer a variety of free services, including HIV self-tests and STI home-collection kits.

For example, the National Chlamydia Screening Program aims to reduce harms associated with undiagnosed chlamydia infection (56). Run by the NHS in the UK, individuals under the age of 25 are able to order "chlamydia screening postal kits" for free via a postal code or town search, from the NHS website (57). Some online services identified via this link include CheckUrself, TakeATestUK, Home STI Kits at Greenwich Sexual Health, and FreeTest. Note that this list of services is not exhaustive; additionally, some of these services are not limited to only testing for chlamydia. Several other services, such as Conifer, FreeTestingHIV, HIV Self-Test Scotland, and Test Now Stop HIV at 56 Dean Street were identified through Google searches. Evidently, the UK has a considerable number of online options for ordering self-test and self-collection kits. One study

52. MyChoices. About us. 2021. Available from http://www.mychoicesapp.com/Home/About Accessed November 30, 2021.

53. Biello KB, Hill-Rorie J, Valente PK, Futterman D, Sullivan PS, Hightow-Weidman L, et al. Development and evaluation of a mobile app designed to increase HIV testing and pre-exposure prophylaxis use among young men who have sex with men in the United States: Open pilot trial. Journal of Medical Internet Research. 2021;23(3):e25107.

54. LetsGetChecked. Home STD testing with treatment included. 2021. Available from https://www.letsgetchecked.com/home-std-test/?imp=cpc&imp=cpc&gclid=Cj0KCQiAnaeNBhCUARIsABEee8V9FCbrjZDDeqzkN3JxH3p3e4KpOBrse9D0pPcF5oVBf2kECVD_a2MaAgNqEALw_wcB Accessed December 3, 2021.

55. US Expert Services. How it works. 2021. Available from: https://www.stdlabs.com/how-it-works Accessed December 3, 2021.

56. Public Health England. NCSP: Programme overview. 2021. Available from: https://www.gov.uk/government/publications/ncsp-programme-overview/ncsp-programme-overview Accessed December 1, 2021.

57. National Health Service. Chlamydia—Free online tests for u-25s. 2021. Available from: https://www.nhs.uk/service-search/other-services/chlamydia---free-online-tests-for-u-25s/locationsearch/344 Accessed December 3, 2021.

notes that online screening has been introduced as a way to meet the high demand for sexual health services in the UK (13).

The following studies are based on testing sites that appear to offer free online testing for HIV and/or STIs in the UK and that have been described in the academic literature.

SH:24

Numerous publications describe SH:24, a website that offers free postal self-sampling kits for chlamydia, gonorrhea, HIV, and syphilis (26). SH:24 delivers to more than 50 regions in the UK; those living outside these regions are directed to Fettle, another service that allows users to order free HIV and STI self-sampling kits (58). Some of the findings from the SH:24 program are detailed below. Note that the data from these studies is from Lambeth and Southwark, two boroughs in London that have some of the highest rates of HIV and STI infections in all of England (59). Local clinic data suggest that annually, approximately 17,000 individuals in these boroughs are turned away because clinics are unable to meet demand (60).

- A cross-sectional study of STI testing activity (online and in-clinic) for residents aged 16 years and older in Lambeth and Southwark examined data from 6,456 STI tests ordered in January–March 2016 (23); 55% (n=3,582) of tests were performed using clinic services, while 45% (n=2,874) were performed online; compared to clinic users, online users were more likely to be female, white, British, between the ages of 20–30, homosexual or bisexual, test negative for chlamydia or gonorrhea, and live in less deprived areas (23). Authors suggested that online users may be less likely to test positive, as those who are symptomatic are encouraged to test in the clinic opposed to via online signposting (23).

- A randomized controlled trial among young adults aged 16–30 in Lambeth and Southwark examined randomly invited users to test for STIs via text message in one of two ways: via a web-link to SH:24 (n=1,031) (intervention group), or at a walk-in sexual health clinic (n=1,032) (control group) (8). At six weeks, 50.0% of the intervention group had completed an STI test compared to the control (26.6%), and 2.8% of the intervention group verses 1.4% of the control had been diagnosed with an STI (8).

- A sub-sample from the above randomized controlled trial among participants who had never tested for any STI (n=528) found that those who received the text message with a web-link to SH:24 reduced the time to any STI test and had nearly twice the number of testers when compared to the control group (26).

58. SH:24. About SH:24. 2021. Available from: https://sh24.org.uk/about-sh24 Accessed December 2, 2021.

59. Southwark Council. Lambeth, Southwark and Lewisham Sexual Health Strategy 2018–23: Statistical appendix. 2018. Available from: https://www.lambeth.gov.uk/sites/default/files/co-lambeth-southwark-and-lewisham-sexual-health-strategy-2018-23-statistical-appendix.pdf Accessed December 2, 2021.

60. Turner KM, Zienkiewicz AK, Syred J, Looker KJ, de Sa J, Brady M, et al. Web-based activity within a sexual health economy: Observational study. Journal of Medical Internet Research. 2018;20(3):e74.

61. Umbrella Health. About us. 2021. Available from: https://umbrellahealth.co.uk/about-us/ Accessed December 1, 2021.

62. Manavi K, Hodson J. Observational study of factors associated with return of home sampling kits for sexually transmitted infections requested online in the UK. BMJ Open. 2017;7(10):e017978.

63. Elliot E, Rossi M, McCormack S, McOwan A. Identifying undiagnosed HIV in men who have sex with men (MSM) by offering HIV home sampling via online gay social media: A service evaluation. Sexually Transmitted Infections. 2016;92(6):470–3.

- The introduction of SH:24 was found to change patterns of STI testing in Lambeth and Southwark (20). Total number of tests and diagnoses increased, as did cost; however, average cost per diagnosis was slightly reduced (20). Two years after introduction of the service, test kits ordered online accounted for 37% of tests provided in the sampled areas (20).

SHL London

One study examined the sexual health outcomes of transgender and non-binary individuals who used SHL, an online sexual health screening service that allows users to order STI self-collection kits (12). Data on users who registered between April and December of 2019 were collected and anonymized; of the total registrants, 0.42% (n=504) identified as transgender, non-binary/gender fluid or other, which comprised the sample population for this study (12). During the study period, 463 kits were ordered successfully; 355 kits were returned for testing by 302 unique users (12). Test positivity among this population was 0.7% for HIV, 3.4% for gonorrhea, 4.8% for chlamydia, and 5.5% for syphilis (12). Nearly 20% engaged in high-risk behaviours (such as chemsex or group sex); this group was also more likely to engage in sex work (12). Of the 82 individuals who completed a service evaluation of the study, 85% (n=70) gave the service a "5/5-star" rating (12).

Umbrella Health

Umbrella Health is a sexual health service located in Birmingham and Solihull in England that offers free, accessible, and confidential services (61) as well as free home sampling kits for chlamydia, gonorrhea, syphilis, hepatitis B, and HIV for those living within the specified areas (14). Participants are asked a range of questions to determine the appropriate type of sampling kit they would receive; kits could be delivered to an address of choice (e.g. home) or to a clinic or pharmacy (62). Between July and December 2016, 58% (n=3,099) of the total number of requested kits (n=5,310) were returned; kits that were delivered to a home, and kits delivered to economically less deprived neighbourhoods were more likely to be returned (62). Another study examining data from January–June 2016 found that among patients who undertook testing for chlamydia and gonorrhea, the home-based diagnosis rates were comparable to those who attend clinic for testing (8% vs. 10% in home-based and clinic-based groups, respectively). The overall treatment rate was lower in the home-based compared to the clinic-based group (82% vs. 88%) (21).

letstalkaboutit

Residents living in the county of Hampshire were among the first in the UK to be able to access free STI self-collection kits online if asymptomatic (13). A retrospective service evaluation aimed to

64. Ahmed-Little Y, Bothra V, Cordwell D, Freeman Powell D, Ellis D, Klapper P, et al. Attitudes towards HIV testing via home-sampling kits ordered online (RUClear pilots 2011-12). Journal of Public Health. 2016;38(3):585–90.

65. Branson BM, Handsfield HH, Lampe MA, Janssen RS, Taylor AW, Lyss SB, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. Morbidity and Mortality Weekly Report: Recommendations and Reports. 2006;55(14):1-CE-4.

66. Groos A, Peardon-Freeman S, McFarlane K, Braithwaite S, Gajjar D, Murch P, et al. Free online chlamydia and gonorrhoea urine test request in Queensland, Australia: Convenience of home sample collection versus pathology collection centre attendance for faster results. Sexual Health. 2021;18(3):254–9.

67. Groos A, Peardon-Freeman S, McFarlane K, Braithwaite S, Gajjar D, Murch P. Free online chlamydia and gonorrhoea urine test request in Queensland: Sexually transmissible infections testing can be hard for young people even if the process is easy. Sexual Health. 2020;17(6):543–6.

68. Atomo Diagnostics. Atomo HIV self test. 2021. Available from: https://www.atomohivtest.com/home.php#about Accessed December 3, 2021.

69. Williams C. HIV self testing kits now in Australia—Discreet results in 15 minutes. 2021. Available from: https://emen8.com.au/health/sexual-health/hiv-self-testing-kits-now-in-australia/ Accessed December 3, 2021.

identify if there were differences in demographic characteristics among those diagnosed with chlamydia in clinic or via the online service (13). In the first six months of the service, 23,712 STI screens were completed in the clinic where 8.9% (n=2,066) tested positive for chlamydia; of the 15,917 who completed online tests, nearly 4.8% of tests (n=775) were positive (13). Those diagnosed with chlamydia online were more likely to be women, White, or non-heterosexual (13). Those who were diagnosed with chlamydia online were more likely to receive treatment sooner compared to those in clinic; additionally, those diagnosed in clinic were more likely to need re-treatment (13). No difference was found in age or among those living in an area of deprivation (13).

56 Dean Street

Launched in November of 2011, "Dean Street at Home" of 56 Dean Street in London sought to reach high-risk, hard-to-reach MSM though HIV home-sampling through advertisements on partner-finding social media sites (63). This service aimed to eliminate barriers to HIV testing, increase testing options for men who have sex with men, and offer HIV information online (63). A two-year service evaluation described the uptake of the service, positivity rate, and the acceptability of the service (63). Of the total number of samples received (n=5,696), 98% (n=5,574) were non-reactive and 2% (n=122) were reactive (63). Some of these ended up being false reactive (n=14), some individuals who submitted samples already knew they were positive (n=14), and 11 were classified as "unconfirmed individuals"; in total, there were 82 samples that were confirmed as positive (63). The post-test email survey, sent to all users who returned a sample, found that the service was highly acceptable (63). It appears that 56 Dean Street has since rebranded their at-home testing and self-collection services to TestNowStopHIV.

RUClear

A study from 2016 describes the expansion of RUClear (Greater Manchester Chlamydia Programme), an online resource where residents could order home-sampling kits to post to a lab for detection of chlamydia infection (64). From June 2011 to December 2012, this service was expanded to include HIV home-sampling kits via dried blood spot (64). Of the 5,179 kits ordered, 59.1% (n=3,062) were returned for testing; seven new diagnoses of HIV were detected (0.23%) (64). Authors note that this met the UK and U.S. guidelines for cost-effectiveness in HIV screening (>1 new HIV diagnosis per 1,000 tests conducted) (64, 65). Of the individuals who returned kits for testing, 79.9% (n=2,447) completed questionnaires; respondents valued the accessibility and convenience the service provided, and were supportive of the service (64).

70. Bell SFE, Lemoire J, Debattista J, Redmond AM, Driver G, Durkin I, et al. Online HIV self-testing (HIVST) dissemination by an Australian community peer HIV organisation: A scalable way to increase access to testing, particularly for suboptimal testers. International Journal of Environmental Research and Public Health. 2021;18(21):11252.

71. SmartHealth. How it works. 2014. Available from: https://sti.smarthealth.me/how-it-works Accessed December 3, 2021.

72. SmartHealth. Select a product. 2014. Available from: https://sti.smarthealth.me/order Accessed December 3, 2021.

73. autotest VIH®. Home. 2021. Available from: http://autotest-vih.eu/en/ Accessed December 7, 2021.

74. Rahib D, Delagreverie H, Gabassi A, Le Thi TT, Vassel E, Vodosin P, et al. Online self-sampling kits to screen multipartner MSM for HIV and other STIs: Participant characteristics and factors associated with kit use in the first 3 months of the MemoDepistages programme, France, 2018. Sexually Transmitted Infections. 2021;97(2):134–40.

75. Lydie N, de Barbeyrac B, Bluzat L, Le Roy C, Kersaudy-Rahib D. Chlamyweb Study I: Rationale, design and acceptability of an internet-based chlamydia testing intervention. Sexually Transmitted Infections. 2017;93(3):179–87.

Australia

Webtest

Introduced in July of 2020, Webtest is a free online chlamydia and gonorrhea test request service available to residents of Queensland aged 16 and older (32). Tests can be ordered in one of two ways – by downloading a pathology request form and visiting a specimen collection centre, or by ordering a self-collecting kit (32). Two studies detail findings from the pilot trial of Webtest (66, 67). One study found that between August 2017 and December 2019, there were 4,632 Webtest requests; 2,609 results were received (66). Chlamydia positivity was 6.8% (n=198) across those aged 16 and older, with those younger than 29 having a higher positivity rate (66), and 68% of tests ordered were though self-collection kits, compared to 32.0% ordered by downloading a pathology form and visiting a request centre (66). Reminder calls to website users to encourage sample submission did not generate more additional samples for testing (67).

Atomo

The only HIV self-test approved for use in Australia, Atomo costs AUD 39 including shipping; results are available in 15 minutes (68). On World AIDS Day in 2021 (December 1), it was announced that HIV test kits would soon be available for purchase at some pharmacies in Australia (69).

We identified one study which examined the feasibility and acceptability of ordering Atomo for free online, to determine if the service would engage men who have sex with men, especially those who were infrequent or naïve testers (people who have never been tested before), or those who lived in rural areas (70). Hosted by a peer-led community organization Queensland Positive People (QPP), the study does not list an affiliated website, nor does QPP currently appear have a link for ordering HIV self-tests, perhaps because the study reached completion (70). Between December 2016 and April 2018, 927 free kits were ordered by 794 individuals; 38% (n=305) lived outside a major city, 62% (n=494) identified as men who have sex with men, 45% (n=353) had never tested for HIV before, and 51% (n=403) would not be willing to pay for an HIV test (70). Only 9.8% (n=78) of participants would be willing to pay AUD 40 or more for a test; the median amount participants would be willing to pay is AUD 20 (70). Considering that Atomo costs AUD 39, authors concluded that in order for the program to be effective, external funding or subsidization would be necessary (70).

SmartHealth

Australians are able to purchase an online pathology request form for STI screening from SmartHealth, and then visit a collection centre for testing (71). This service tests for chlamydia, gonorrhoea,

76. Kersaudy-Rahib D, Lydie N, Leroy C, March L, Bebear C, Arwidson P, et al. Chlamyweb Study II: A randomised controlled trial (RCT) of an online offer of home-based Chlamydia trachomatis sampling in France. Sexually Transmitted Infections. 2017;93(3):188–95.

77. Polilli E, Sozio F, Di Stefano P, Clerico L, Di Iorio G, Parruti G. Preliminary evaluation of the impact of a Web-based HIV testing programme in Abruzzo Region on the prevention of late HIV presentation and associated mortality. International Journal of Infectious Diseases. 2018;69:44–6.

78. van Rooijen MS, Koekenbier RH, Hendriks A, de Vries HJ, van Leeuwen P, van Veen MG. Young low-tisk heterosexual clients prefer a chlamydia home collection test to a sexually transmitted infection clinic visit in Amsterdam, the Netherlands, a cross-sectional study. Sexually Transmitted Diseases. 2016;43(11):710–6.

79. Soderqvist J, Gullsby K, Stark L, Wikman M, Karlsson R, Herrmann B. Internet-based self-sampling for Chlamydia trachomatis testing: A national evaluation in Sweden. Sexually Transmitted Infections. 2020;96(3):160–5.

80. Grandahl M, Larsson M, Herrmann B. 'To be on the safe side': A qualitative study regarding users' beliefs and experiences of internet-based self-sampling for Chlamydia trachomatis and Neisseria gonorrhoeae testing. BMJ Open. 2020;10(12):e041340.

syphilis, HIV, and hepatitis B, for AUD 95, though tests can be ordered just for chlamydia and gonorrhea, HIV and syphilis, and hepatitis B and C (72).

France

autotest VIH

Available in eight languages, the above website is a vendor for autotest VIH, a rapid HIV test manufactured in France, that can be ordered online throughout Europe (73). It was the first HIV self-test approved for use in the European market (73).

We identified a few studies from France that offered online testing of HIV and other STIs, but it should be noted that we were unable to locate URLs associated with the following services.

MemoDepistages

Developed by the public health agency of France, MemoDepitages is an online program aimed at increasing quarterly testing among men who have sex with men with multiple partners by providing free self-sampling kits for syphilis, gonorrhea, chlamydia, HIV, hepatitis B, and hepatitis C (74). Men who have sex with men were recruited online through advertisements on dating apps and targeted ads on websites; users who clicked on the ads were directed to questionnaire that verified participants' eligibility (74). Upon acceptance, a self-sampling kit would be sent within 24 hours (74). Of the 7,158 eligible, 47.9% (n=3,428) ordered a kit; of these, 56.8% (n=1,948) were returned (74). There were lower return rates for men who had not attended college and for those who reported a difficult financial situation; additionally, men who reported having between 11 and 20 partners in the past year were also more likely to return their kit (74).

Chlamyweb Study

This intervention conducted in 2012 offered free online chlamydia testing via home-sampling to sexually active young adults aged 18–24 living in France (75). The purpose of the intervention was to determine if testing over the internet increased the number of young people diagnosed with chlamydia compared to the current testing strategy (76). Participants (n=11,075) received an offer of a free self-sampling kit (n=5,531), or were invited to be screened in primary care settings (n=5,544) (76). Authors observed that screening frequency was three times higher among those who received a self-sampling kit (76). Positivity for chlamydia was similar in both groups: 6.8% in the self-sampling kit group, and 6.3% in the primary care setting group (76).

81. Grandahl M, Mohammad J, Larsson M, Herrmann B. Users' opinions of internet-based self-sampling tests for chlamydia trachomatis and neisseria gonorrhoeae in Sweden. Acta Dermato-Venereologica. 2020;100(18):adv00315.

82. Centers for Disease Control and Prevention. eSTAMP (Evaluation of Rapid HIV Self-testing Among MSM Project). 2020. Available from: https://www.cdc.gov/hiv/pdf/research/interventionresearch/compendium/si/cdc-hiv-eSTAMP_SI_EBI.pdf Accessed November 29, 2021.

83. MacGowan RJ, Chavez PR, Borkowf CB, Owen SM, Purcell DW, Mermin JH, et al. Effect of internet-distributed HIV self-tests on HIV diagnosis and behavioral outcomes in men who have sex with men: A randomized clinical trial. JAMA Internal Medicine. 2020;180(1):117–25.

84. Gabriel MM, Dunn DT, Speakman A, McCabe L, Ward D, Witzel TC, et al. Protocol, rationale and design of SELPHI: A randomised controlled trial assessing whether offering free HIV self-testing kits via the internet increases the rate of HIV diagnosis. BMC Infectious Diseases. 2018;18(1):531.

85. Witzel TC, Gabriel MM, McCabe L, Weatherburn P, Gafos M, Speakman A, et al. Pilot phase of an internet-based RCT of HIVST targeting MSM and transgender people in England and Wales: Advertising strategies and acceptability of the intervention. BMC Infectious Diseases. 2019;19(1):699.

Italy

Abruzzo Region web-based tool

To increase screening among high-risk groups in the Abruzzo Region of Italy, an online risk calculator was developed that guided users through a self-evaluation that, after answering the last question, scored users on the likelihood of having acquired HIV or an STI (30). A score of "moderate" or "high-risk" redirects users to a portal where they can book a test online, which is free and can be done anonymously (30). Upon arrival for the pre-booked appointment, individuals receive counselling regarding prior testing and high-risk behaviours before drawing blood samples (30). Preliminary results from February 2014 to May 2015 found that of the 3,046 individuals who booked an appointment and attended a counselling session, 28 (0.92%) tested positive for HIV, and 92.8% of them (n=26) were linked to care (30). A second study examining clinical data (February 2014–June 2017) of newly diagnosed HIV patients enrolled at the study clinic found that 67% (n=59) were diagnosed through standard diagnostic procedures and 33% (n=29) were diagnosed through the web-based tool (77). Individuals who presented with AIDS-defining conditions were significantly more likely to be in the group diagnosed through standard procedures (13 versus 1, p=0.02) (77). Authors concluded that HIV testing that was free and voluntary via the web-based tool was able to diagnose patients with less advanced HIV (77).

Netherlands

A review of online testing providers for chlamydia in the Netherlands aimed to enumerate the number of providers, estimate the proportion of testing that is done online, and evaluate the websites based on 20 quality indicators (37). Authors identified 20 websites that sold tests (12 self-sample, eight self-test) (37). Five of the 12 self-sample providers scored satisfactory and met the conditions of reliable testing (sensitivity and specificity above 95%) as well as had active follow-up in case of a positive test result (37). Of the eight providers that offered self-tests, none met these conditions (37). Authors estimate that roughly 10–15% of chlamydia testing in the Netherlands takes place through self-sampling or self-testing (37).

An earlier study conducted in 2012 and 2013 found that among low-risk heterosexuals under the age of 25 who submitted an appointment request at the Amsterdam STI clinic (n=1804), the preference for testing was via a home collection kit (n=1,451; 80%) (78).

Sweden

Swedish National Healthcare Service (1177.se and klamydia.se)

Testing for chlamydia via self-sampling has been gradually implemented in Sweden since 2006 and is available within the public health care system for free in all Swedish counties using one of two national e-Health websites (above) (79, 80). Tests can be ordered repeatedly, but users must be over the age of 15 and have a national registration number (81). One study examining the diagnostic outcomes of this service found that in recent years, self-sampling increased substantially (79). Specifically, between 2013–2017 self-sampling among women increased by 115%, compared with 71% for men; in-clinic testing volumes remained fairly constant (79). In 2017, 20.3% of all chlamydia cases were diagnosed via self-sampling, with a detection rate slightly higher than the detection rate in clinics (5.5% versus 5.1%) (79).

The Swedish National Healthcare Service offers both chlamydia and gonorrhea self-sampling for free as an integrated part of the healthcare system (81). One study examining the experiences of users who ordered self-sampling kits in 2018 and 2019 from the Uppsala Region (n=1,785) found that more than 90% of respondents considered the service to be "good" or "very good"; the main reason for getting tested was to check for infection after having unprotected sex (81). The majority of the respondents were single and heterosexual; test use was motivated by sexual risk behaviours (81). A second study among individuals in Uppsala Region using the service collected qualitative data to obtain a better understanding of user experiences (80). Twenty men and women aged 18–49 agreed to participate in telephone interviews (80). The interviewees cited that accessibility, ease of use, confidentiality, avoiding clinic visits, and fast results were appreciated by users; concerns

included handling of personal data, unreliable postal services, and uncertainty about the procedure (80). Overall, authors concluded that benefits outweighed the barriers (80).

Other studies

Some studies have examined whether or not people will use free HIV self-tests if offered, where tests are provided via the internet; thus, the online service itself is not examined. One example of this is the eSTAMP trial (Evaluation of Rapid HIV Self-testing Among MSM Project), a year-long intervention which sought to increase HIV testing among men who have sex with men by offering tests via the internet in the U.S. (82). Authors found that testing among participants in the intervention arm was significantly higher compared to the control (82, 83). Authors concluded that provision of free HIV self-tests increased awareness of HIV infection (83).

A similar study in the UK, SELPHI (An HIV Self-Testing Public Health Intervention), sought to determine if offering free HIV self-testing kits via mail increased the rate of HIV diagnosis and linkage to care among HIV negative men, trans men, and trans women who have sex with men (84). Users were recruited on geolocation social-sexual networking apps and on Facebook (85). Authors found that the study reached those who had not previously tested for HIV, despite 58% of men who have sex with men reporting condomless anal intercourse in the previous three months (85). Analysis of quantitative and qualitative data revealed that the intervention was acceptable and that the kits were highly useable (85).

Factors That May Impact Local Applicability

This review is broad is scope, and examines HIV and STI tests that can be ordered online, either as self-collection kits, self-test kits, or in a laboratory. However, the self-collection or self-tests kits discussed in this review may vary depending on the manufacturer used. This may impact rates of uptake and positivity. Access to online testing varied in numerous aspects: some studies discussed trials where kits and services were not open to the general public, while other studies examined kits that were available at no cost to the general public. This review does not include HIV/STI testing services as part of PrEP prescribing and initiation, or other HIV/STI testing services requiring direct interaction with prescribing health care providers.

What We Did

We searched Medline (including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE®) using a combination of terms (online* or internet* or mobile* or telehealth* or telemedicine* or web*) in titles or abstracts AND (HIV or STIs or STD* or chlamydia or gonorrhea or gonorrhoea or syphilis or sexually transmitted or STBBI* or sexual health) in titles or abstracts AND (test* or screen*) in titles or abstracts. Searches were conducted on November 12, 2021 and results limited to English articles published from 2016 to present. Studies from low- and middle-income countries as well as titles and abstracts with the phrase "web of science" were excluded. Reference lists of identified articles were also searched. Grey literature and website searches on Google using different combinations of these terms were also conducted. The searches yielded 1,318 references from which 85 were included.