

Assessment of online self-testing and self-sampling service providers for sexually transmitted infections against national standards in the UK in 2020

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► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi. org/10.1136/sextrans-2021-055318).

ABSTRACT

standards.

management.

Objectives Online testing for STIs may help overcome

barriers of traditional face-to-face testing, such as stigma and

inconvenience. However, regulation of these online tests is

lacking, and the quality of services is variable, with potential

short-term and long-term personal, clinical and public health

implications. This study aimed to evaluate online self-testing

Methods Providers of online STI tests (self-sampling and

self-testing) in the UK were identified by an internet search

of Google and Amazon (June 2020). Website information

on tests and associated services was collected and further

survey, sent twice (July 2020, April 2021). The information

obtained was compared with British Association for Sexual

Healthcare guidelines and standards for diagnostics and STI

Results 31 providers were identified: 13 self-test, 18 self-

sample and 2 laboratories that serviced multiple providers.

Seven responded to the online survey. Many conflicts with

national guidelines were identified, including; lack of health

promotion information, lack of sexual history taking, use of

testing, inappropriate infections tested for, incorrect specimen

type used and lack of advice for postdiagnosis management.

Conclusions Very few online providers met the national STI

management standards assessed, and there is concern that

were not covered by this study. For-profit providers were the

least compliant, with concerning implications for patient care

and public health. Regulatory change is urgently needed to

ensure that all online providers are compliant with national

guidelines to ensure high-guality patient care, and providers

this will also be the case for service provision aspects that

tests licensed for professional-use only marketed for self-

information was requested from providers via an online

Health and HIV and Faculty of Sexual and Reproductive

and self-sampling service providers in the UK against national

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Received 5 October 2021 Accepted 23 February 2022 Published Online First 12 April 2022

INTRODUCTION

are held to account if non-compliant.

STIs are an increasing public health problem in the world,¹ including the UK.² Early diagnosis is a core intervention for guiding appropriate management, thus reducing the risk of antimicrobial resistance (AMR) emergence, preventing sexual and reproductive health (SRH) sequelae and reducing onward transmission.¹ Therefore, access to validated and approved testing services is vital. Tests for self-directed use available to purchase online ('online tests') are increasingly popular, especially due to the COVID-19 pandemic.³ Even pre-COVID-19, online tests were widely viewed as an asset to public health, with studies demonstrating

they can overcome barriers such as stigma and inconvenience,^{2,4} and were the second most frequent testing service type in the UK's National Chlamydia Screening Programme in 2019.² Online tests come in two main forms: self-sampling, where the user can order a kit and take a specimen independently before posting for laboratory testing⁵ and self-testing, where the user collects a specimen, conducts and interprets the test themselves.⁵

However, drawbacks to online testing have been widely reported. Barriers for use include language and health or digital literacy.⁴ Lack of interaction with a health professional may also worry users and can result in improper management of infections.⁶ UK standards for providers of sexual health services are published by BASHH and the Faculty of Sexual and Reproductive Healthcare (FSRH).^{7 8} These standards stipulate that services must include health promotion and prevention interventions and correct signposting information,^{7 8} however, these may not always be present,⁹ leaving users vulnerable to making misinformed decisions. Additionally, private testing may result in underreporting to national surveillance systems, posing issues for epidemiological monitoring.^{6 10}

A key concern of online testing is the quality of the tests themselves. Although regulatory standards such as CE-marking are often used to assess quality,¹¹ this may not always indicate good performance.¹² Poor diagnostic accuracy can lead to false-positives resulting in unnecessary treatment, with AMR risk and relationship implications, and false-negatives can result in further transmission and SRH sequalae.¹³ Furthermore, some testing panels include infections that are not recommended for routine testing (eg, *Mycoplasmas* and *Ureaplasmas*).^{14 15}

In this study, we assessed whether UK patients accessing online STI tests are receiving quality of care consistent with national STI diagnostics and management standards. First, we identified and characterised online test providers in the UK, before comparing them with BASHH guidelines^{7 16} and FSRH/BASHH standards.⁸

METHODS

Internet search of providers

To identify tests available in the UK, a structured search of Google and Amazon was completed on 27 June 2020. These platforms were chosen to enable both services and purchasable products to be identified. Search details are available in online supplemental table 1. To produce results similar to what a consumer would find, searches used layman's

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To cite: Clarke E, Horner PJ, Muir P, *et al. Sex Transm Infect* 2023;**99**:14–20.



terms and less well-known infections (eg, trichomoniasis) were not included. Also, terms that produced mainly educational or medical results (eg, "sexually transmitted infections") were not included.

According to click through data,¹⁷ most Google users do not go past the first page of search results, however for thoroughness the first five pages of results were screened by title and description. All Amazon results were screened. Inclusion criteria for a provider were:

- 1. The test had to be available in the UK.
- 2. The test had to be either self-sampling or self-testing.
- 3. The test was not provided by an individual borough (administrative unit), as these are geographically limited.

However, services commissioned by the National Health Service (NHS) that covered more than one borough were included. This was to represent this service type, available more generally to the UK population, in our findings.

Data on tests available were extracted iteratively from eligible websites. For products identified through third-party sellers, the original provider was identified and any other tests they provided also recorded.

Provider guestionnaire

Further information was requested from providers and associated laboratories through an online questionnaire sent in July 2020, guided by categories identified during data extraction and guidelines.^{7 8 16} Questionnaires were tailored for each provider. The full set of questions is available in online supplemental table 2. In March 2021, BASHH published a position statement¹² regarding online services, emphasising the existence of poor practice. The statement called for increased regulation of these services, to enable providers not conforming with national guidelines to be held to account. Consequently, the questionnaire was sent again in April 2021 to the providers who did not respond in 2020, in the hope that the position statement publication would increase the response rate.

Comparison with guidelines

Data obtained from providers were categorised into: test audience, pretest process, test process (test type and specimen type), health information, postdiagnosis actions (eg, follow-up and treatment) and accreditation. Comparison of tests with BASHH and FSRH guidelines was then conducted.^{7 8 16} Not all standards or all aspects of each standard could be measured (eg, laboratory turnaround times or safeguarding), as they referred to internal processes or information that was not available on public-facing websites. Accessibility (eg, languages) was not considered to be within the scope of this work. A full list of pathogen-specific guidelines is available alongside online supplemental table 3.

RESULTS

Overview of provider responses

The Google and Amazon search returned 13 self-test and 18 self-sample providers, as well as two laboratories that serviced multiple providers. All of the self-test providers and 13 of the self-sampling providers were private. All but one self-sample providers were from the UK, self-test providers were global but available on UK platforms. In the first round of surveys, two providers completed the questionnaire, and one requested a phone call. The second round prompted four more replies. Therefore, most information was collected from provider websites. Provider names have been anonymised, in accordance with the survey terms of consent (online supplemental table 2).

Guidelines that providers were compared with are summarised in table 1. Tests and specimen types are shown in table 2, with comparison to national guidelines. Further test details are in online supplemental table 3A,B. Overall, providers closest to the guidelines were NHS-commissioned free services, providing an appropriate range of tests, correct sample types and comprehensive information.

Test audience and pretest processes

Theme 1 was often not met. Although low-risk symptomatic patients were eligible to use online services at the time of data collection due to COVID-19 modifications to maintain access to testing,¹⁸ private self-sample providers who advertised to symptomatic patients did not distinguish between severity of symptoms, and testing for individuals with severe symptoms, including pelvic pain, was recommended. Advice on accessing HIV postexposure prophylaxis (PEP) was not mentioned by eight of the selfsample providers (seven private, one NHS-commissioned). With regard to triage or history taking pretesting, some self-sample providers (both private and NHS-commissioned) used an online questionnaire (the contents of which were not analysed) to recommend tests, but most providers did not have this feature.

Self-test providers did not appear to provide any form of triage for uses related to as websites seemed primarily commercial and test inserts were mostly unavailable. However, five self-test providers offered tests that were marked as professional-use only.

Test process

While both types of providers did offer tests for the minimum requirement in theme 2, these were often available individually or in various packages, leaving users able to pick and choose. For self-testing kits, the main pathogens were chlamydia (n=8), HIV (n=5) and gonorrhoea (n=5). Less common were herpes (n=2), trichomoniasis (n=4), syphilis (n=4), hepatitis B (n=2), hepatitis C (n=2), Gardnerella (n=1) and Candida albicans (n=1).

mining, A All self-sample providers offered tests for chlamydia and gonorrhoea, but availability varied for other tests (table 2). Selfsample tests were available in various combinations, some with 12 tests in one bundle. Free services provided a smaller range of tests than paid-for services. Multiple private self-sample services offered tests individually or within bundles for organisms generally regarded as commensal, such as Ureaplasmas or Mycoplasmas but species was sometimes unclear. Private self-sample providers sometimes exaggerated the importance of testing for these commensal organisms when compared with the literature.^{14 15} Gardnerella infection was repeatedly used as a proxy for bacterial vaginosis, contrary to recommendations.¹⁹ Additionally, two paid self-sample services claimed an advantage over the NHS by testing for organisms not included in routine testing.

The NHS by testing for organisms not included in routine testing. Specimen type often conflicted with guidelines (table 2). Self-st sample types were not assessed against these guidelines as bey were developed for laboratory-based diagnostic methods test sample types were not assessed against these guidelines as they were developed for laboratory-based diagnostic methods, however five self-test providers requested cervical samples, which should be clinician-collected.²⁰ For self-sample services, five providers (all private) requested urine samples for chlamydia and gonorrhoea; four of these had no option for the recom-mended vaginal swab samples.^{20 21} The remaining provider did offer a vaginal swab, however this was offered separately from their main test package. For herpes, at least seven private selfsample providers requested urine samples. BASHH guidance states 'Urine tests are inappropriate for the diagnosis of herpes' and instead recommends that lesion swabs are taken for Nucleic

Theme		Relevant BASHH	Relevant FSRH/BASHH
Theme	Summary	standards'*	standards*
1. Test audience and pretest process	 Symptomatic patients are not advised to use online services (however this guidance was modified due to COVID-19 to maintain access to services, and low-risk symptomatic patients could use online services).¹⁸ Providers of STI care should have in place an effective triage system to direct users to the most appropriate service. Services should take a medical and sexual history. Those who need HIV postexposure prophylaxis should not use online services and should be directed to a clinic. 	1.2.6 1.5.7 1.5.8 1.5.9 1.5.10 2.4.5 2.4.7 2.4.8 2.5.2 2.5.8	3.1.3 3.2.3
2. lest process	 Specimens for chlamydia, gonorrhoea, syphilis and HIV should be taken from all exposed sites as a minimum. Specimens for microbiological testing obtained during the examination should be in line with national guidance. All providers of services commissioned to manage STIs should use the 'gold standard' test for the infection they are screening for. Service users should be advised about the sensitivity of the assays for detecting infection. 	2.4.5 2.4.8 2.5.11 2.5.14 2.5.15 3.4.2 3.4.4 3.4.8 3.4.10 3.5.1 3.5.6	3.3.2 3.3.3
3. Health information	Service users should be fully informed on the nature and limitations of the test, as well as have access to health promotion and prevention interventions including encouragement of safer sex behaviour and condom usage.	2.4.5 2.5.12	2.1.6 3.3.3
4. Postdiagnosis actions	 Clear pathways with choices for individuals to obtain care, treatment and further management must be available if an STI is identified. Service users must be given information on the need for partner notification, re-testing as appropriate and advised that this is part of STI management. If services are unable to provide specialist support or additional tests, the provider should be able to provide onwards referral. Treatment should follow national guidelines. 	2.4.5 2.4.10 4.4.1 4.4.8 4.4.11 4.4.16 4.5.5 4.5.13 8.4.6 8.4.8	1.1.12 1.1.13 3.5.6
5. Accreditation	 Service providers should have relevant accreditation such as CE-marked products, United Kingdom Accreditation Services accredited laboratories and be registered with the Care Quality Commission. Services should comply with the joint FSRH/BASHH standards for online providers⁸ and other BASHH guidelines. 	2.4.1 2.5.1 3.4.1 3.5.4 3.5.10 3.5.12 6.4.8	1.4.2 1.4.12 3.3.1

Table 1 Summary of recommendations from the BASHH standards for the management of STIs⁷ and the joint BASHH/Faculty of Sexual and Reproductive Healthcare (FSRH) standards for online and remote providers of sexual and reproductive health services⁸

These were used to assess whether online providers were providing an adequate standard of care to patients.

*Not all standards or all aspects of each standard were able to be measured due to the nature of information available on provider websites.

Acid Amplification Testing (NAAT), or blood for serology in certain circumstances.²²

Eleven self-test providers reported sensitivity and specificity estimates, which were all >85%, however information about reference tests or sample sizes was often unavailable. Due to lack of website information and low survey response rate, it was not possible to obtain information on diagnostic methods and accuracy from most self-sample providers. Four private self-sample providers gave values for 'accuracy' over 95%, however this was not mentioned for all tests. One NHS-commissioned self-sample provider gave sensitivity and specificity of >95% for all tests offered.

Health information and signposting

To assess theme 3, we reviewed whether sites gave information on STI symptoms, window periods, transmission routes and health promotion. It was difficult to ascertain health promotion materials for many self-test providers as package inserts were often unavailable. As some self-tests were marked as professional-use only, it is expected that information would be targeted at healthcare professionals.

Only five self-sample providers (four NHS-commissioned, one private) provided information on all topics of window periods, transmission routes, symptoms and infection prevention. For other self-sample providers (mostly private, but one NHS-commissioned), information was not on the test page or was inconsistently mentioned. One private self-sample provider gave links to Wikipedia.

Follow-up/Treatment

It was difficult to assess whether theme 4 was met as postdiagnosis processes were not always shared. All self-test providers that did include this information advised seeing a health professional after a positive result. For self-sample providers, options included a private consultation, treatment ordered online (mainly for chlamydia) or advice to

Table 2	Pathogens	s tested for	by online se	lf-test and s	elf-sampl	le prov	iders, anc	l the samp	les requ	lested for each	ı pathogen, c	ompared aga	ainst nationa	I BASHH stan	dards for the	management	of STIs ^{7 16}
Type	Provider ID	Chlamydia	Gonorrhoea	Oral/Rectal chlamydia or gonorrhoea	Syphilis	HIV	lepatitis	Hepatitis (C c	Herpes 1 and/ or 2)	Trichomoniasis	Mycoplasma genitalium	Mycoplasma hominis L	Ureaplasmas	Gardnerella (as indicator of bacterial vaginosis)	Haemophilus ducreyi	Human papillomavirus	Yeasts
BASHH recom	mendation	V (female), U (male), C if clinician collected	V (female), U (male)	S	B or lesion swab	B		- S O	Lesion swab or B	۲, UŞ U	U (male and female), V/C (female)— symptomatic only	Not advised for 1 routine testing r	Not advised for routine testing	Not recommended as an indicator of bacterial vaginosis	Lesion swab— symptomatic only	Lesion swab— symptomatic only (screening uses C which are clinician collected)	V— symptomatic only
Self-test	-					8										l	
	2	U/C/US	C/US		В					>							
	e	U/C/US	C/US		В	B		8									
	4	U															
	5	S	S							>							
	9	U/C/US	ż		В	B/0 B		8									
	7									>							
	œ	2	S		в				~								
	6	>															
	10	U															
	11					8											
	12					8											
	13									2				2			2
Self-sample	14	U/V	NN	S	в	8		B	SIVIC	U/V	U/V (Sp?)		NI	NN		>	
	15	U/V	NN	S	В	В		B L	SIVIC	U/V	U/V (Sp?)		NU	NN		>	
	16	NN	NN	S	В	8				NN							
	17†	N/N	NN	S	В	8											
	18	N/N	NN	S	В	8		8									
	19†	N/N	NN	S	В	В		8									
	20	*0	*1	S	В	8		8	3/S/U	D	U (Sp?)		D	5		>	
	21	N/N	NN	S	В	8			~	2	2	2	~		2	>	
	22	Л			ć	3 E		B	8	П	2		2	2		>	
	23	N/N	NN	S	B/S	В		В	3/S/U	U/V	U/V	_	NN	NN		>	^
	24	Э	n	S	в	B		В	3/U	D	U (Sp?)		D	D			
	25†	NN	NN	S	В	8											
	26†	N/N	NN	S	в	8											
	27	N/N	NN		в	8		B	N/C	U/V	U/V (Sp?)		NN	NN			
	28	n	П		В	В		В	0	2	2		~	2		>	
	29	n	D														
	30	N/N	NN	S	в	B		B	N	NN	N/N		NN	NN			
	31†	N/N	NN	S	В	В		B									
A full list of gu This reflects wh	here a provider	red against is ave explicitly states v	ailable in online su what sample is use	Ipplemental table d. This is often no	3. tincluded on	ı package	tests, so may	not reflect all t	ests offered	Ŧ							
Thindicates a fre	quested urifie, t ee service that i:	s commissioned	by the National He	eparatery. Salth Service.													
7, specimen ur.	nclear, B, blood;	0, oral transudat	te; S, swab; Sp?, sp	ecies unclear; U, L	Irine; US, ure)	thral swab	; V, vaginal sv	vab.									

Original research

visit a general practitioner. Partner notification was often mentioned non-specifically and may instead have been discussed postdiagnosis. Exact treatment options were unclear, however one private self-sample provider offered an oral course of azithromycin and cefixime for gonorrhoea which was easy to purchase online, instead of the recommended first-line treatment of intramuscular ceftriaxone.²¹

Accreditation

Although the standards do not refer to accreditation for selftests, it is recommended that they hold the CE-mark.^{5 8} Eleven self-test providers had at least one of their tests CE-marked, two claimed WHO approval and one claimed Food and Drug Administration accreditation. One self-test provider marked their chlamydia and gonorrhoea self-tests with an NHS logo, describing themselves as an NHS provider, but whether that product had received NHS endorsement was unclear. For self-sample providers, United Kingdom Accreditation Service (UKAS) accreditation was claimed, however, it was often used as a blanket term for the laboratory without details of the specific service that had received accreditation.²³ UKAS accreditation was present for the two main laboratory providers identified, however it may not have covered all tests that were being offered. Care Quality Commission accreditation was present for 12 self-sample providers (both private and NHS-commissioned), although mostly only for laboratories used, as opposed to the providers themselves.

DISCUSSION

This study identified and analysed 31 providers of online tests in the UK. We found significant areas of suboptimal service for both self-test and self-sample providers that often conflicted with national guidelines on STI diagnostics and management. These included a lack of health promotion information, lack of triage, use of tests licensed for professional-use only marketed for self-testing, inappropriate infections tested for and incorrect specimen type used. As a result, users are at risk of taking unnecessary tests, with poor performance, that could lead to incorrect results, inappropriate management and receiving inadequate clinical information and support.

This study had limitations. Questionnaire response rate was low, despite a follow-up in 2021 following the BASHH position statement publication,¹² meaning that not all aspects of care could be evaluated. Data considered missing in our analysis may have been available once the user had bought the test. Furthermore, data were extracted from websites in July 2020 but providers may have subsequently updated their websites. Although our internet search was comprehensive, it is not possible to identify all online STI test providers, and these change on a regular basis in this rapidly evolving field. The sample analysed here may therefore not be fully representative of all providers. This lack of representativeness may be further compounded by the small number of providers who responded to the survey and for whom we therefore have more extensive data. However, the low response rate we observed has been seen in similar studies where providers were contacted for information.^{24 25} In addition, as our study was unfunded, tests could not be purchased to identify whether information was available postpurchase. This also meant we were unable to test the services independently, either from a user perspective through a 'mystery shopper' exercise, or from a diagnostic accuracy perspective by independently assessing test performance claims. We also could not assess all parts of the standards as they referred to aspects not available

for public access. These are next steps for future work, as well as assessing other factors such as triage questionnaire content and accessibility, and comparing against new guidelines as they are developed.²⁶ Despite this, we were able to collect large amounts of information from provider websites, giving an accurate perspective of what a consumer would experience when choosing to use an online testing service.

While it was difficult to assess test performance in the identified providers due to lack of available information and inability to perform independent evaluations, it is expected that test performance was suboptimal in at least some instances.²⁵ BASHH guidelines note that chlamydia and gonorrhoea tests should be NAAT-based.^{20 21} However, many non-NAAT chlamydia and gonorrhoea self-tests were available. These tests should be 'used with extreme caution' due to possible poor performance.⁷ Although many products had CE-marks, as noted by BASHH,¹² this is easily obtainable and tests may not have been adequately validated. Using incorrect sample types, or being sold tests approved for professional-use only, as seen in our evaluation, may exacerbate poor test performance and add to this issue.^{20–22}

The lack of appropriate health information given by selfsample providers poses a risk to users on multiple levels. Access to healthcare professionals as part of online STI services is recognised as important for offering information, technical assistance and support.²⁷ Receiving accurate information regarding appropriate services and tests is critical to providing appropriate patient care, ensuring that patients receive the correct tests relevant to their situation. In contradiction to this, we found that several online providers specifically targeted patients with severe symptoms, as well as not signposting users to vital services such as PEP for HIV.⁷ Patients were also frequently offered testing for commensal Mycoplasmas and Ureaplasmas,¹⁴ which could lead to unnecessary costs, treatments and results of uncertain significance,^{15 28} resulting in emotional distress and poor antimicrobial stewardship. These additional tests were only found in private services, suggesting that they may be more motivated by profit than by high-quality healthcare provision.²⁹ It would be important to understand why individuals choose > to pay for testing rather than opting for free services, to ensure patients are offered the best possible care.

While this is the first assessment of UK online STI testing providers to our knowledge, studies in other countries externally assessing online test providers have reported similar results. A 2010 study of online tests in America performed independent assessments of online STI test providers, finding that they were hard to contact, and although self-tests had poor performance, self-sample tests had high accuracy.²⁵ Providers of chlamydia online tests in The Netherlands were found to often not meet quality indicators regarding health promotion or follow-up (especially self-tests), but the process of an evaluation taking place did provide providers to of an evaluation taking place did provoke providers to improve their service.²⁴ Similarly, an Australian study of HIV self-tests showed that none conformed to national product guidelines, and often had inadequate pretest information and linkage to care.³⁰ These studies demonstrate that suboptimal online testing service provision is a problem across the world. Actions such as publications highlighting short-falls and position statements with recommendations may create short-term impacts. However, if there are no mechanisms to maintain improved practice and prevent providers from, for example, appearing under a different name,³¹ these efforts are of little long-term benefit. For there to be sustained

improvements in patient care, regulatory change is needed so that providers are regularly monitored and can be held to account. Although the UK's Medicines and Healthcare products Regulatory Agency does have a #FakeMeds campaign, this is clearly not sufficient for ensuring appropriate patient care. Services need to be frequently evaluated against national guidelines, which must also be continually updated to adapt to evolving service provision.⁸ ¹²

CONCLUSION

Online testing is a welcome addition to STI diagnostics, offering a convenient and flexible option for users. However, the proliferation of providers that do not follow guidelines, in particular for-profit sites, jeopardises these advantages and puts users at risk. If current trends continue, online testing usage will increase, resulting in more online providers as demand rises. Regulatory change is required to ensure that the standard of care received online meets national guidelines to protect patients and the wider population from the repercussions of underperforming or inappropriate tests. If we do not act now, patients will continue to receive suboptimal care with potentially significant adverse personal, clinical and public health implications.

Key messages

- ⇒ Online providers help overcome many barriers to STI testing and are increasingly popular, but quality of services is not assured.
- ⇒ Many online testing services, particularly for-profit providers, did not comply with national guidelines.
- ⇒ Regulatory change is required to ensure online providers comply with national guidelines and are held to account if they do not.

Handling editor Claudia S Estcourt

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Acknowledgements We thank all providers who responded to the questionnaire. We would also like to thank the BASHH Bacterial Special Interest Group (BSIG) members for reviewing the manuscript. EMH-E would like to thank Julius Schachter who set the challenge to address this issue at the eighth Meeting of the European Society for Chlamydia Research, September 2016, Oxford, UK. It is not yet the outcome you hoped for, but progress is slowly being made.

Contributors EMH-E conceived the concept, supervised the project, advised on methods and supported drafting the manuscript. EC developed the methods, performed data collection and analysis and wrote the manuscript with support from EMH-E. PJH, PM and KMET helped supervise the project, assisted in analysis and provided feedback on manuscript drafts. All authors provided approval of the final version for publication. EMH-E is responsible for the overall content as guarantor.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval Ethical approval was granted by the MSc Research Ethics Committee of the London School of Hygiene & Tropical Medicine (22195). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. The majority of data are included in the supplementary table. Confidentiality of providers would have to be considered, in-line with the study ethics and consent procedures, for requests of any additional data.

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REFERENCES

- 1 WHO. Global health sector strategy on sexually transmitted infections 2016-2021, 2016. Available: https://www.who.int/reproductivehealth/publications/rtis/ghss-stis/ en/ [Accessed Jun 2021].
- 2 Public Health England. Sexually transmitted infections and screening for Chlamydia in England, 2019, 2020. Available: https://assets.publishing.service.gov.uk/government/ uploads/system/uploads/attachment_data/file/914249/STI_NCSP_report_2019.pdf [Accessed Jun 2021].
- 3 Public Health England. The impact of the COVID-19 pandemic on prevention, testing, diagnosis and care for sexually transmitted infections, HIV and viral hepatitis in England, 2020. Available: https://assets.publishing.service.gov.uk/government/ uploads/system/uploads/attachment_data/file/943657/Impact_of_COVID-19_Report_ 2020.pdf [Accessed Jun 2021].
- 4 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:e041340..
- 5 Public Health England. HIV testing and Self-Testing: information, 2015. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/ attachment_data/file/769460/HIV_Self-Testing_PHE_Position_v13_-_Nov_15_ updated.pdf [Accessed Jun 2021].
- 6 Cannon CA, Piraino AK, Golden MR, et al. Sexually transmitted infection testing using online companies: benefits, drawbacks, and call for official guidance. Sex Transm Dis 2021;48:e168–70.
- 7 British Association for Sexual Health and HIV. BASHH standards for the management of sexually transmitted infections (STIs), 2019. Available: https://bashh.org/aboutbashh/publications/standards-for-the-management-of-stis/ [Accessed Jun 2021].
- 8 British association for sexual health and HIV/The faculty of sexual and reproductive healthcare. standards for online and remote providers of sexual and reproductive health services, 2020. Available: https://www.fsrh.org/standards-and-guidance/ documents/fsrhbashh-standards-for-online-and-remote-providers-of-sexual/ [Accessed Jun 2021].
- 9 Public Health England. National Chlamydia screening programme audit report: Internet-based Chlamydia testing, 2013. Available: https://assets.publishing.service. gov.uk/government/uploads/system/uploads/attachment_data/file/736125/NCSPInte rnetTestingSept2013_final.pdf [Accessed Jun 2021].
- Harding-Esch E, Nardone A, Gibbs J, et al. Can remote STI/HIV testing and eClinical Care be compatible with robust public health surveillance? DH15 2015:129–30.
- 11 Department for Business Energy & Industrial Strategy. Guidance: CE marking. Available: https://www.gov.uk/guidance/ce-marking [Accessed Jan 2021].
- 12 British Association for Sexual Health and HIV. BASHH position statement on the Innapropriate use of multiplex testing platforms, and suboptimal antibiotic treatment regimens for bacterial sexually transmitted infections, 2021. Available: https:// www.bashh.org/news/news/bashh-position-statement-on-the-inappropriate-useof-multiplex-testing-platforms-and-suboptimal-antibiotic-treatment-regimens-forbacterial-sexually-transmitted-infections-1/ [Accessed Jun 2021].
- 13 Price MJ, Ades AE, Soldan K, *et al.* The natural history of Chlamydia trachomatis infection in women: a multi-parameter evidence synthesis. *Health Technol Assess* 2016;20:1–250.
- 14 Horner P, Donders G, Cusini M, et al. Should we be testing for urogenital Mycoplasma hominis, Ureaplasma parvum and Ureaplasma urealyticum in men and women? - a position statement from the European STI Guidelines Editorial Board. J Eur Acad Dermatol Venereol 2018;32:1845–51.
- 15 Taylor-Robinson D, Horner P, Pallecaros A. Diagnosis of some genital-tract infections: Part 2. Molecular tests and the new challenges. *Int J STD AIDS* 2020;31:198–207.
- 16 British Association for Sexual Health and HIV. BASHH guidelines. Available: https:// www.bashh.org/guidelines [Accessed Jun 2020].
- 17 Loiz D. How many clicks does each SERP get? Google organic Click-Through rate study 2014. advanced web ranking, 2014. Available: https://www. advancedwebranking.com/blog/google-organic-click-through-rates-2014/ [Accessed Jan 2022].
- 18 British Association for Sexual Health and HIV. Pandemic COVID 19: contingency planning for out-patient genitourinary medicine, contraception and sexual health services (including online) and HIV services (November 2020 update), 2020. Available: https://members.bashh.org/resources/Documents/Covid-19/Pandemic%20COVID-

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Original research

19%20Sexual%20Health%20Services%20Priorities%20v0.8%20BASHH%20% 28November%202020%29.pdf [Accessed Jan 2022].

- 19 British Association for Sexual Health and HIV. UK national guideline for the management of bacterial vaginosis 2012, 2012. Available: https://www. bashhguidelines.org/media/1041/bv-2012.pdf [Accessed Jun 2021].
- 20 Nwokolo NC, Dragovic B, Patel S, *et al.* 2015 UK national guideline for the management of infection with *Chlamydia trachomatis*. *Int J STD AIDS* 2016;27:251–67.
- 21 Fifer H, Saunders J, Soni S, *et al.* 2018 UK national guideline for the management of infection with *Neisseria gonorrhoeae*. *Int J STD AIDS* 2020;31:4–15.
- 22 Patel R, Green J, Clarke E, *et al.* 2014 UK national guideline for the management of anogenital herpes. *Int J STD AIDS* 2015;26:763–76.
- 23 United Kingdom Accreditation Service. Reference to accreditation for laboratories, 2018. Available: https://www.ukas.com/wp-content/uploads/filebase/publications/ publications-relating-to-laboratory-accreditation/LAB-1-Edition-6-October-2018.pdf [Accessed Jun 2021].
- 24 den Daas C, Sukel B, Bos H, et al. Evaluation and enumeration of online test providers for sexually transmitted infections, specifically Chlamydia, in the Netherlands. Sex Transm Infect 2019;95:380–5.

- 25 Owens SL, Arora N, Quinn N, et al. Utilising the Internet to test for sexually transmitted infections: results of a survey and accuracy testing. Sex Transm Infect 2010;86:112–6.
- 26 British Association for Sexual Health and HIV. BASHH Recommendations for Self-Sampling Processes 16.02.2021., 2021. Available: https://www.bashhguidelines.org/ media/1275/revised-recommendations-for-self-sampling-kits-v2-february-2021.pdf [Accessed Jan 2022].
- 27 Aicken CRH, Sutcliffe LJ, Gibbs J, *et al.* Using the eSexual health clinic to access Chlamydia treatment and care via the Internet: a qualitative interview study. *Sex Transm Infect* 2018;94:241–7.
- 28 Plummer EL, Vodstrcil LA, Bodiyabadu K, et al. Are Mycoplasma hominis, Ureaplasma urealyticum and Ureaplasma parvum associated with specific genital symptoms and clinical signs in nonpregnant women? Clin Infect Dis 2021;73:659–68.
- 29 Minichiello V, Rahman S, Dune T, et al. E-Health: potential benefits and challenges in providing and accessing sexual health services. BMC Public Health 2013;13:790.
- 30 Williams OD, Dean JA, Harting K, et al. Implications of the on-line market for regulation and uptake of HIV self-testing in Australia. AIDS Care 2017;29:112–7.
- 31 Schachter J. Point-of-care tests using enzyme detection to diagnose Chlamydia trachomatis infection do not work. but when they fail in clinical trials, they reappear under different names. Sex Transm Infect 2016;92:406–7.

Supplementary Table 1: Search strategy used in Google. SS = self-sample provider, ST = self-test provider. For each search (1-5) the search terms for each concept were combined with the Boolean operator AND. When the acronyms STI (sexually transmitted infection) and STD (sexually transmitted disease) were included in their full form, results were mainly educational or medical, so they were not included in the search. The results for each were listed and pooled to produce a final list of providers. Amazon search terms were similar, but searches were run individually without Boolean operators. The first 5 pages of Google were searched. The search was run on 27/06/2020.

Supplementary Table 1

Search Number	Se	earch Concepts (combined with A	ND)	Number of Providers
	Online	STI	Test	Identified by Google
1	home OR online OR instant OR rapid	sti OR std	test	20 (15 SS, 5 ST)
2	home OR online OR instant OR rapid	chlamydia OR gonorrhoea OR syphilis OR hiv OR herpes	test	16 (11 SS, 5 ST)
3	home OR online OR instant OR rapid	sti OR std	test OR diagnosis OR diagnostic	19 (15 SS, 4 ST)
4	home OR online OR instant OR rapid	chlamydia OR gonorrhoea OR syphilis OR hiv OR herpes	test OR diagnosis OR diagnostic	16 (11 SS, 5 ST)
5	home OR online OR instant OR rapid	sti OR std OR chlamydia OR gonorrhoea OR syphilis OR hiv OR herpes	test OR diagnosis OR diagnostic	13 (11 SS, 2 ST)

Questionnaires were adapted to each provider, depending on the tests they provide and the information already available. For questions pertaining to specific test details, and where providers had more than one test, all tests were listed where the template specifies [Test Name/Pathogen]. All questionnaires included the following consent statement:

Dear Sir/Madam,

Thank you for taking part. The information collected during this survey will be used in a research project investigating the quality and availability of online tests for sexually transmitted infections (STIs), taking place at the London School of Hygiene & Tropical Medicine.

This survey is in reference to your diagnostic test [test description and website link]. By providing information, you are consenting to have that information included in this project. No identifying information such as the company name will be included in any published work, and any information collected will be securely stored by the study team. If you wish to withdraw consent at any time after completing the survey, please e-mail [e-mail address] (study lead).

The survey is separated into three parts, 1) pre-test information 2) test performance and 3) post-test information. All questions are optional.

You may also reply in email or document form to [e-mail address] if you would prefer, and do not hesitate to email any questions about the survey or the project.

2a: Self-Test Provider Questionnaire

	Question Text	Answer Ontions
1	Is the [test details]	
	suitable for	
	someone who has	
	symptoms of an STI?	LOther (Please Specify)
2	Is the [test details] suitable for home use by someone	□Yes
	who is not a clinical professional?	□No
3	What window period (time between being	Window Period (days)
	infected and the infection being detectable by the test) do you advise before using the [test detail]	[Test Free text Name/Pathogen]
4	What accreditation does your test have (e.g. CE mark, ISO)?	Free text

5			I lain a		Ma alla al	O a maile al	Disad	Lineting	Others
5	does your test		(male)	Urine (female)	Vaginai Swab	Swab	BIOOD	Orethrai Swab	Other
	require? (Tick all that apply)	[Test Name/Pathogen]							Free
6	Please describe		What is t	he diagnostic targ	et for this	What is the r	nechanism of	this tost? (o c	
0	the target and		pathoge	n in vour test? e a	antigen	flow immuno	chromatogran	hic assav)	. ומנטימו
	mechanism used		antibody	ini your toot. o.g.	antigon,		omornatograp	nie deedy)	
	for your diagnostic		u						
	test	Test	Free tex	t		Free text			
-		Name/Pathogen]				0 10 11			
1	Please provide		Sample	Sensitivity (%)	Sensitivity	Specificity	Specificity	Reference	e lest
	anonificity and		туре		Calculation	(%)	Calculation		
	specificity and	$ $ \times							
	test and how it								
	was calculated								
	For reference:	ITeet	Eroo	Fron toyt	Erec toyt	Eroo toyt	Eroo toxt	Eroo toxt	
	Sensitivity = true	Name/Pathogen]	tovt	Fiee lext	FIEE lext	FIEE lexi	FIEE lexi	FIEE lexi	
	positives/true	Name/r amoyenj	ισλί						
	positives + false								
	negatives								
	Specificity = true								
	negatives/true								
	negatives + false								
	positives il you do								
	to this information								
	please discuss it								
	with someone								
	who does, or								
	provide their								
	details and we								
	can contact them								
	directly. If it is								
	easier to provide								
	form ploase email								
	it to [student email								
	address								
	,								
8	Please provide	Free text							
	details of any								
	publications or								
	describing the								
	test's use and/or								
	performance:								
9	What advice is	Free text							
	given to the user								
	after a negative								
10	test result?								
10	IT a test is positive,	⊢ree text							
	what advice is								
	for the next stage								
	of care? (e d								
	confirmatory tests								
	treatment options.								
	follow up with								
	medical								
	professional)								
11	If a diagnosis is	Free text							
	positive, what								
	advice is given in								
	negaro lo partner								
L	notification								

	Suppleme	intary material
	(including look back period)?	
12	Is any other advice is given after a positive test result?	Free text
13	Is there any other information you would like to include?	Free text

2b: Self-Sample Provider Questionnaire

	Question Text	Answer Options					
1	Are any checks of	□Yes					
	eligibility done	□No					
	before providing a	If yes, please prov	vide details:				
	test to ensure the	Free text					
	test is appropriate						
	to the user (e.g. a						
	patient						
	questionnaire						
	relating to						
	symptoms, risk						
	behaviours or						
	previous						
	diagnoses)?						
2	Is your service	□Yes					
	suitable for users						
	that have						
	symptoms of an	□No					
	STI?						
3	What national	Free text					
	guidelines do you						
	follow for running						
	your service (e.g.						
	BASHH)?		/				
4	What window	\sim	Window Period	(days)			
	period (time						
	between being						
	infected and the						
	infection being	[lest	Free text				
	detectable by the	Name/Pathogenj					
	test) do you						
	advise before						
	dotoill						
Б	What laboratory	Fron toyt					
5	do you uso for	FIEE lext					
	vour diagnostic						
	tests and what						
	accreditations do						
	they have (e.g.						
	LIKAS ISO)?						
6	Which of the	Myconlasma	Myconlasma	Ureanlasma	Ureanlasma	l Ireanlasma (not	Other
Ŭ	following species	hominis	genitalium	narvum	urealvticum	species specific)	Calor
	of Mycoplasma		-				
	and Ureaplasma						Free text
	do you test for?						
L							
7	Do any of your	□ Yes					
	tests include						
	antimicrobial						

	Suppleme	ntary Material									
	susceptibility testing?	If yes, please provid	e details:	Free text							
8	What samples do you use to test for the following pathogens in the		Urine (male)	Urine (female)	Oral Swab	Rectal Swab	Vaginal Swab	Cervical Swab	Blood	Urethral Swab	Other
	[lest package name]? Tick all that apply.	[Test Name/Pathogen]									Free text
9	Please describe the target and platform/assay used for your		What is t e.g. antib	he diagnos oody, nucle	tic target ic acid	for this pa	thogen?	What platfo this test?	orm or as	say is used :	to run
	diagnostic tests. If any tests are done in combination, or if there are multiple tests used, please include that in the details. If you do not have access to this information, please discuss it with someone who does or provide their details and we can contact them directly. For HIV, please also specify the generation of test if applicable.	[Test Name/Pathogen]	Free text					Free text			
10	Please provide information on the specificity and sensitivity of your		Sample Type	Sensitivit	y (%)	Sensitivit Calculation	:y on	Specificit y (%)	Specific y Calcula on	cit Refere Test ti	nce
	test and how it was calculated. For reference: Sensitivity = true positives/true positives + false negatives Specificity = true negatives/true negatives/true negatives + false positives If you do not have access to this information please discuss it with someone who does, or provide their details and we can contact them directly. If it is easier to provide this in document form, please email it to [student email address]	[Test Name/Pathogen]	Free text	Free text		Free text		Free text	Free te	xt Free te	ext

	Suppleme	ntary Material		
11	Please provide details of any publications or other literature	Free text		
	test's use and/or performance:			
12	What advice is given to the user after a negative test result?	Free text		
13	What is the next stage of care when the user		Next stage of care	Advice/recommendations about partner notification
	the infections listed below (e.g. treatment is provided online, user is referred to a sexual health clinic, confirmatory testing is required), and what advice about partner notification is given (including look back period)?	[Test Name/Pathogen]	Free text	Free text
14	Do you recommend any tests be repeated	Yes No		
	at a later date?	If yes, please provide details of what	recommendations are made: Free text	
15	If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)?	Free text		
16	Please describe any other advice given after a positive diagnosis from any of your tests:	Free text		
17	Do you report your results to any external body			
	(e.g. Public Health England) for			
	surveillance purposes?	If yes, please provide details: Free te	ext	
18	Is there any other information you would like to include?	Free text		

Providers were compared to pathogen specific guidelines where available, and other literature where guidelines have not been published: chlamydia[1], gonorrhoea,[2] syphilis,[3] HIV,[4] hepatitis,[5] herpes,[6] trichomoniasis,[7] Mycoplasma genitalium,[8] Mycoplasma hominis,[9,10] Ureaplasmas,[9,10] Gardnerella,[11] chancroid,[12] human papillomavirus,[13,14] yeasts.[15].

Supplementary Table 3a: Description of the characteristics of self-test kits for sexually transmitted infections found available online. All products were paid for. In total, 9 providers were identified by Amazon search and 4 were identified by both Google and Amazon search.

Provider	Source	Infection	Sample Type Requested	Positive Diagnosis Advice	Professional Use Only?	Accreditation	Sensitivity (sample type)	Specificity (sample type)	Reference Test
1*	В	HIV	Blood	Consult a doctor for confirmatory testing	No	CE, WHO approved	100% (Blood)	99.8% (Blood)	PCR
		Chlamydia	Cervical/urethral swab/Urine		Yes	CE	91.3% (Swab/Urine)	98.1% (Swab/Urine)	PCR
2*	A	Gonorrhoea	Cervical/urethral swab	Seek confirmatory testing and treatment for you and your partner	Yes	CE	97% (Swab)	96% (Swab)	Culture
		Trichomonia sis	Vaginal		Yes	CE	85.7% (Swab)	97.5% (Swab)	Another rapid test (Unnamed)
		Syphilis	Blood		Yes	CE	99.7% (Blood)	>99.9% (Blood)	ТРРА
		Chlamydia	Cervical/urethral swab/urine		Yes	CE	90% (Cervical Swab) 80.9% (Male Urethral Swab) 92.3% (Male Urine)	96.5% (Cervical Swab) 94.3% (Male Urethral Swab) >99.9% (Male Urine)	PCR
		Syphilis	Blood		Yes	CE	>99.9% (Whole Blood)	99.7% (Whole Blood)	/
3	В	Gonorrhoea	Cervical/urethral swab	/	Yes	CE	90.9% (Cervical Swab) 90% (Male Urethral Swab)	96.4% (Cervical Swab) 96.8% (Male Urethral Swab)	Culture
		Hepatitis B Surface Antigen	Blood		Yes	/	>99.9% (Whole Blood)	99.3% (Whole Blood)	/
		Hepatitis C	Blood		/	/	99.1% (Whole Blood)	99.5% (Whole Blood)	/

Provider	Source	Infection	Sample Type Requested	Positive Diagnosis Advice	Professional Use Only?	Accreditation	Sensitivity (sample type)	Specificity (sample type)	Reference Test
		HIV Antigen/antib ody	Blood		Yes	/	>99.9%	99.5%	/
4	В	Chlamydia	Cervical Swab (advertised as vaginal)	See a health professional	No	CE	85.7% (Cervical Swab)	98.3% (Cervical Swab)	PCR
		Chlamydia	Swab (source unclear)		Yes	CE, FDA	98.5%	"accurate"	/
		Gonorrhoea	Swab (source unclear)		Yes	CE, FDA	98.5%	"accurate"	/
5	А	Genital Herpes (HSV2)	Blood	professional	Yes	CE, FDA	99% "	accurate"	/
		Oral Herpes (HSV1)	Blood		Yes	CE, FDA	99% "	accurate"	/
_		Trichomonia sis	Vaginal swab		Yes	CE, FDA	98.5%	"accurate"	/
		Chlamydia	Cervical/urethral swab/urine		Yes	CE	/	/	/
		Gonorrhoea	/		Yes	CE	/	/	/
		Syphilis	Blood		Yes	CE	/	/	/
		HIV (Blood)	Blood		Yes	WHO Prequalified	/	/	/
6	А	HIV (Oral)	Oral transudate	/	Yes	/	/	/	/
		Hepatitis B Surface Antibody	Blood		Yes	/	97.30%	99.20%	/
		Surface Antigen	Blood		Yes	/	/	/	/
		Hepatitis C	Blood		Yes	/	99%	99.80%	/
7*	А	Trichomonia sis	Vaginal swab	See a health professional	No	CE	99%	100%	Culture
9		Chlamydia	/	1	No	CE	/	/	/
0	А	Syphilis	Blood	1	No	/	/	/	/

Provider	Source	Infection	Sample Type Requested	Positive Diagnosis Advice	Professional Use Only?	Accreditation	Sensitivity (sample type)	Specificity (sample type)	Reference Test
		Gonorrhoea	Swab (source unclear)		Yes	CE	/	/	/
		HSV1	Blood		Yes	CE	/	/	/
		HSV2	Blood		Yes	CE	/	/	/
9	А	Chlamydia	Vaginal swab	1	No	/	98.3%	1	/
10*	А	Chlamydia	Cervical Swab (advertised as vaginal)	See a health professional	No	CE	85.7 % (Cervical Swab)	98.3 % (Cervical Swab)	PCR
11	A	HIV	Blood	See a health professional for confirmatory tests	No	CE	99.6% (Blood)	/	/
12	A	HIV	Blood	See a health professional for confirmatory tests	No	CE	99.7% (Blood)	99.9% (Blood)	Enzyme immunoassa y and western blot
		Gardnerella	/		No	/	98.5%	98.6%	PCR
13	В	Trichomonia sis	1	/	No	/	100%	99%	Wet mount microscopy and culture
		Candida Albicans	/		No	/	95.5%	98.4%	Wet mount microscopy and culture

/ Indicates the information was not stated or unclear. HSV = herpes simplex virus, TPPA = Treponema pallidum particle agglutination assay, FDA = food and drug administration, WHO = World Health Organisation. * Indicates the provider responded to the survey. Source indicates Amazon (A), Google (G) or both (B). Accreditation may have been present but the documents not immediately available to us

Supplementary Table 3b: Description of the characteristics of self-sample provider websites and services. In total, 17 providers were identified by Google search and one was identified by both Google and Amazon search. All free providers were commissioned by the National Health Service

Provider	Source	Window Period Stated	Advised for symptomatic users?	Pre-test Screen	Symptom Information	Transmission Information	Health Protection Information	HIV PEP signpost	Positive Result Guidance	Accreditations	Price Range
14	G	Yes	Unclear	No	Yes	Inconsistently	Condoms mentioned on two test pages, not all	Yes	Treat online or arrange a consultation	CQC	£29-£244
15	G	Yes	Unclear	No	Yes	Inconsistently	Thorough description on one test page but not all	Yes	Treat online or arrange a consultation	CQC	£27.99- £225.99
16	G	Yes	No	Yes	Yes, not on the test page	Yes, not on the test page	Yes, not on the test page	Yes	Treat online or referral	Unclear	£27.99-£99.95
17*	G	Yes	No	Yes	Yes	Yes	Yes	Yes	Refer to treatment	CQC, Claims a UKAS Accredited Laboratory	Free
18	G	Yes	No	Yes	Yes	Yes	Yes	Yes	Treat online/referral	Unclear	£28-£128
19	G	Yes	No	Yes	Yes	Yes	Yes	Yes	Treat online/referral	CQC, UKAS accredited laboratory	Free
20	G	Yes	Unclear	No	Yes, not on the test page	Yes, not on the test page	Condoms mentioned on one test page, not all	No	Treat online, consultation or referral	Unclear – UKAS badge given for quality management service, not tests provided	£35-£299
21	G	No	No	No	Yes, not for all pathogens	Yes, not for all pathogens	Links to Wikipedia	No	Signpost to local services	CQC, UKAS accredited laboratory but not accredited for all pathogens tested for	£19.99- £114.99

Provider	Source	Window Period Stated	Advised for symptomatic users?	Pre-test Screen	Symptom Information	Transmission Information	Health Protection Information	HIV PEP signpost	Positive Result Guidance	Accreditations	Price Range
22	G	Yes	Yes	No	No	No	No	No	Results will be discussed with the user	Unclear	£49-£209
23	G	Yes, not for all pathogens	Yes	No	Yes, not on the test page	Yes, not on the test page and not for all pathogens	No	No	Treat online or a consultation or referral	CQC	£29.95- £299.95
24	G	Yes, not for all pathogens	Unclear	Limited	Yes, not for all pathogens and not always on the test page	Yes, not for all pathogens and not always on the test page	Condoms and safe toy use mentioned on each STI info page	No	Phone consultation	Claim they use a UKAS accredited laboratory but no further details to verify this	£95-£239
25*	G	Yes	Yes (survey), No (website)	Yes	Yes	Yes	Yes	Yes	Consultation	Unclear	Free
26	G	Yes, not for all pathogens	Unclear	No	Yes	Yes	No	No	Unclear	CQC, UKAS accredited laboratory	Free
27	В	No	Unclear	No	Yes, not for all pathogens	Yes, not for all pathogens	No	No	Consultation	CQC	£34-£225
28	G	Yes, not for all pathogens	Yes	No	Yes, not for all pathogens	Yes, not for all pathogens	No	No	Advised to see your doctor, states they will not diagnose or consult	CQC, claims UKAS laboratory however this lab is not accredited for all STIs. May be accredited for other services they provide	£37-£251
29	G	Yes	Unclear	No	Yes, not for all pathogens	No	Condoms advised	N/A (no HIV test)	Treat online/referral	CQC	£35

Provider	Source	Window Period Stated	Advised for symptomatic users?	Pre-test Screen	Symptom Information	Transmission Information	Health Protection Information	HIV PEP signpost	Positive Result Guidance	Accreditations	Price Range
30	G	Yes	Unclear	No	Inconsistently	Yes, not for all pathogens	Condoms and safe toy usage mentioned on some pages but not all	Yes	Treat online/referral	CQC	£32-£200
31*	G	Yes	No	Yes	Yes	Yes	Yes	Yes	Treat online/referral	CQC, UKAS Accredited Laboratory	Free

CQC = care quality commission, PEP = post-exposure prophylaxis, ISO = international organisation for standardization, UKAS = United Kingdom Accreditation Service. * indicates that the provider responded to the survey. Source indicates Amazon (A), Google (G) or both (B). Accreditation may have been present but the documents not immediately available to us

- Nwokolo NC, Dragovic B, Patel S, et al. 2015 UK national guideline for the management of infection with Chlamydia trachomatis. Int J STD AIDS 2015;27:251– 67. doi:10.1177/0956462415615443 Available at: https://pubmed.ncbi.nlm.nih.gov/26538553/
- Fifer H, Saunders J, Soni S, et al. 2018 UK national guideline for the management of infection with Neisseria gonorrhoeae. Int J STD AIDS 2019;31:4–15. doi:10.1177/0956462419886775 Available at: https://pubmed.ncbi.nlm.nih.gov/31870237/
- 3 Kingston M, French P, Higgins S, *et al.* UK national guidelines on the management of syphilis 2015. *Int J STD AIDS* 2015;27:421–46. doi:10.1177/0956462415624059 Available at: https://pubmed.ncbi.nlm.nih.gov/26721608/
- 4 Palfreeman A, Sullivan A, Rayment M, et al. British HIV Association/British Association for Sexual Health and HIV/British Infection Association adult HIV testing guidelines 2020. HIV Med 2020;21 Suppl 6:1–26. doi:10.1111/hiv.13015 Available at: https://pubmed.ncbi.nlm.nih.gov/33333625/
- 5 British Association for Sexual Health and HIV. 2017 Interim Update of the 2015 BASHH National Guidelines for the Management of Viral Hepatitides. 2017. Available at: https://www.bashhguidelines.org/media/1161/viral-hepatitides-2017-update-18-12-17.pdf (Accessed June 2021)
- 6 Patel R, Green J, Clarke E, *et al.* 2014 UK national guideline for the management of anogenital herpes. *Int J STD AIDS* 2015;26:763–76. doi:10.1177/0956462415580512 Available at: https://pubmed.ncbi.nlm.nih.gov/25861804/
- 7 Sherrard J, Ison C, Moody J, et al. United Kingdom National Guideline on the Management of Trichomonas vaginalis 2014. Int J STD AIDS 2014;25:541–9. doi:10.1177/0956462414525947 Available at: https://pubmed.ncbi.nlm.nih.gov/24616117/
- 8 Soni S, Horner P, Rayment M, *et al.* British Association for Sexual Health and HIV national guideline for the management of infection with Mycoplasma genitalium (2018). *Int J STD AIDS* 2019;30:938–50. doi:10.1177/0956462419825948 Available at: https://pubmed.ncbi.nlm.nih.gov/31280688/
- 9 Horner P, Donders G, Cusini M, et al. Should we be testing for urogenital Mycoplasma hominis, Ureaplasma parvum and Ureaplasma urealyticum in men and women? – a position statement from the European STI Guidelines Editorial Board. J Eur Acad Dermatology Venereol 2018;32:1845–51. doi:10.1111/jdv.15146 Available at: https://pubmed.ncbi.nlm.nih.gov/29924422/
- 10 Taylor-Robinson D, Horner P, Pallecaros A. Diagnosis of some genital-tract infections: part 2. Molecular tests and the new challenges. *Int J STD AIDS* 2020;31:198–207. doi:10.1177/0956462419890526 Available at: https://pubmed.ncbi.nlm.nih.gov/32009570/
- 11 British Association for Sexual Health and HIV. UK National Guideline for the Management of Bacterial Vaginosis 2012. 2012. Available at: https://www.bashhguidelines.org/media/1041/bv-2012.pdf (Accessed June 2021)
- 12 Lautenschlager S, Kemp M, Christensen JJ, *et al.* 2017 European guideline for the management of chancroid. *Int J STD AIDS* 2017;28:324–9.

doi:10.1177/0956462416687913 Available at: https://pubmed.ncbi.nlm.nih.gov/28081686/

- 13 British Association for Sexual Health and HIV. UK National Guidelines on the Management of Anogenital Warts 2015. 2015. Available at: https://www.bashhguidelines.org/media/1075/uk-national-guideline-on-warts-2015final.pdf (Accessed June 2021)
- 14 Public Health England. Cervical screening: programme overview. 2021. Available at: https://www.gov.uk/guidance/cervical-screening-programme-overview (Accessed June 2021)
- 15 Saxon C, Edwards A, Rautemaa-Richardson R, *et al.* British Association for Sexual Health and HIV national guideline for the management of vulvovaginal candidiasis (2019). *Int J STD AIDS* 2020;31:1124–44. doi:10.1177/0956462420943034 Available at: https://pubmed.ncbi.nlm.nih.gov/32883171/

Supplementary Table 1: Search strategy used in Google. SS = self-sample provider, ST = self-test provider. For each search (1-5) the search terms for each concept were combined with the Boolean operator AND. When the acronyms STI (sexually transmitted infection) and STD (sexually transmitted disease) were included in their full form, results were mainly educational or medical, so they were not included in the search. The results for each were listed and pooled to produce a final list of providers. Amazon search terms were similar, but searches were run individually without Boolean operators. The first 5 pages of Google were searched. The search was run on 27/06/2020.

Supplementary Table 1

Search Number	Se	earch Concepts (combined with A	ND)	Number of Providers
	Online	STI	Test	Identified by Google
1	home OR online OR instant OR rapid	sti OR std	test	20 (15 SS, 5 ST)
2	home OR online OR instant OR rapid	chlamydia OR gonorrhoea OR syphilis OR hiv OR herpes	test	16 (11 SS, 5 ST)
3	home OR online OR instant OR rapid	sti OR std	test OR diagnosis OR diagnostic	19 (15 SS, 4 ST)
4	home OR online OR instant OR rapid	chlamydia OR gonorrhoea OR syphilis OR hiv OR herpes	test OR diagnosis OR diagnostic	16 (11 SS, 5 ST)
5	home OR online OR instant OR rapid	sti OR std OR chlamydia OR gonorrhoea OR syphilis OR hiv OR herpes	test OR diagnosis OR diagnostic	13 (11 SS, 2 ST)

Questionnaires were adapted to each provider, depending on the tests they provide and the information already available. For questions pertaining to specific test details, and where providers had more than one test, all tests were listed where the template specifies [Test Name/Pathogen]. All questionnaires included the following consent statement:

Dear Sir/Madam,

Thank you for taking part. The information collected during this survey will be used in a research project investigating the quality and availability of online tests for sexually transmitted infections (STIs), taking place at the London School of Hygiene & Tropical Medicine.

This survey is in reference to your diagnostic test [test description and website link]. By providing information, you are consenting to have that information included in this project. No identifying information such as the company name will be included in any published work, and any information collected will be securely stored by the study team. If you wish to withdraw consent at any time after completing the survey, please e-mail [e-mail address] (study lead).

The survey is separated into three parts, 1) pre-test information 2) test performance and 3) post-test information. All questions are optional.

You may also reply in email or document form to [e-mail address] if you would prefer, and do not hesitate to email any questions about the survey or the project.

2a: Self-Test Provider Questionnaire

	Question Text	Answer Ontions
1	Is the [test details]	
	suitable for	
	someone who has	
	symptoms of an STI?	LOther (Please Specify)
2	Is the [test details] suitable for home use by someone	□Yes
	who is not a clinical professional?	□No
3	What window period (time between being	Window Period (days)
	infected and the infection being detectable by the test) do you advise before using the [test detail]	[Test Free text Name/Pathogen]
4	What accreditation does your test have (e.g. CE mark, ISO)?	Free text

5			I lain a		Ma alla al	O a maile al	Disad	Lineting	Others
5	does your test		(male)	Urine (female)	Vaginai Swab	Swab	BIOOD	Orethrai Swab	Other
	require? (Tick all that apply)	[Test Name/Pathogen]							Free
6	Please describe		What is t	he diagnostic targ	et for this	What is the r	nechanism of	this tost? (o c	
0	the target and		pathoge	n in vour test? e a	antigen	flow immuno	chromatogran	hic assav)	. ומנטימו
	mechanism used		antibody	ini your toot. o.g.	antigon,		omornatograp	nie deedy)	
	for your diagnostic		u						
	test	Test	Free tex	t		Free text			
-		Name/Pathogen]				0 10 11			
1	Please provide		Sample	Sensitivity (%)	Sensitivity	Specificity	Specificity	Reference	e lest
	anonificity and		туре		Calculation	(%)	Calculation		
	specificity and	$ $ \times							
	test and how it								
	was calculated								
	For reference:	ITeet	Eroo	Fron toyt	Erec toyt	Eroo toyt	Eroo toxt	Eroo toxt	
	Sensitivity = true	Name/Pathogen]	tovt	Fiee lext	FIEE lext	FIEE lexi	FIEE lexi	FIEE lexi	
	positives/true	Name/r amoyenj	ισλί						
	positives + false								
	negatives								
	Specificity = true								
	negatives/true								
	negatives + false								
	positives il you do								
	to this information								
	please discuss it								
	with someone								
	who does, or								
	provide their								
	details and we								
	can contact them								
	directly. If it is								
	easier to provide								
	form ploase email								
	it to [student email								
	address								
	,								
8	Please provide	Free text							
	details of any								
	publications or								
	describing the								
	test's use and/or								
	performance:								
9	What advice is	Free text							
	given to the user								
	after a negative								
10	test result?								
10	IT a test is positive,	⊢ree text							
	what advice is								
	for the next stage								
	of care? (e d								
	confirmatory tests								
	treatment options.								
	follow up with								
	medical								
	professional)								
11	If a diagnosis is	Free text							
	positive, what								
	advice is given in								
	negaro lo partner								
L	notification								

	Suppleme	intary material
	(including look back period)?	
12	Is any other advice is given after a positive test result?	Free text
13	Is there any other information you would like to include?	Free text

2b: Self-Sample Provider Questionnaire

	Question Text	Answer Options					
1	Are any checks of	□Yes					
	eligibility done	□No					
	before providing a	If yes, please prov	vide details:				
	test to ensure the	Free text					
	test is appropriate						
	to the user (e.g. a						
	patient						
	questionnaire						
	relating to						
	symptoms, risk						
	benaviours or						
	previous						
0	diagnoses)?						
2	IS your service	Lires					
	that have						
	symptoms of an	□No					
	STI?						
3	What national	Free text					
	guidelines do you						
	follow for running						
4	What window		Window Period	(days)			
-	period (time		Window F chied	(ddyd)			
	between being						
	infected and the						
	infection being	[Test	Free text				
	detectable by the	Name/Pathogen]					
	test) do you						
	advise before						
	using the [test						
-	detail	<u> </u>					
5	What laboratory	Free text					
	your diagnostic						
	tests and what						
	accreditations do						
	they have (e.g.						
	UKAS, ISO)?						
6	Which of the	Mycoplasma	Mycoplasma	Ureaplasma	Ureaplasma	Ureaplasma (not	Other
	following species	hominis	genitalium	parvum	urealyticum	species specific)	
	of Mycoplasma						Free text
	and Ureaplasma	_					TTOO TOXE
	do you test for?						
7	Do any of your	□ Yes					
	tests include						
	antimicrobial	LI No					

	Suppleme	ntary Material									
	susceptibility testing?	If yes, please provid	e details:	Free text							
8	What samples do you use to test for the following pathogens in the		Urine (male)	Urine (female)	Oral Swab	Rectal Swab	Vaginal Swab	Cervical Swab	Blood	Urethral Swab	Other
	[lest package name]? Tick all that apply.	[Test Name/Pathogen]									Free text
9	Please describe the target and platform/assay used for your		What is t e.g. antib	he diagnos oody, nucle	tic target ic acid	for this pa	thogen?	What platfo this test?	orm or as	say is used :	to run
	diagnostic tests. If any tests are done in combination, or if there are multiple tests used, please include that in the details. If you do not have access to this information, please discuss it with someone who does or provide their details and we can contact them directly. For HIV, please also specify the generation of test if applicable.	[Test Name/Pathogen]	Free text					Free text			
10	Please provide information on the specificity and sensitivity of your		Sample Type	Sensitivit	y (%)	Sensitivit Calculation	:y on	Specificit y (%)	Specific y Calcula on	cit Refere Test ti	nce
	test and how it was calculated. For reference: Sensitivity = true positives/true positives + false negatives Specificity = true negatives/true negatives/true negatives + false positives If you do not have access to this information please discuss it with someone who does, or provide their details and we can contact them directly. If it is easier to provide this in document form, please email it to [student email address]	[Test Name/Pathogen]	Free text	Free text		Free text		Free text	Free te	xt Free te	ext

	Suppleme	ntary Material		
11	Please provide	Free text		
	details of any			
	publications or			
	other literature			
	describing the			
	test's use and/or			
	performance:			
12	What advice is	Free text		
	given to the user			
	after a negative			
	test result?			
13	What is the next		Next stage of care	Advice/recommendations about
	stage of care			partner notification
	when the user			
	tests positive for			
	the infections	[Test Name/Pathogen]	Free text	Free text
	listed below (e.g.			
	treatment is			
	provided online,			
	user is referred to			
	a sexual health			
	clinic,			
	confirmatory			
	testing is			
	required), and			
	what advice about			
	partner notification			
	is given (including			
	look back period)?			
14	Do you	□ Yes		
14	Do you recommend any		•	
14	Do you recommend any tests be repeated	Yes No		
14	Do you recommend any tests be repeated at a later date?	Yes No If yes, please provide details of what	recommendations are made: Free text	
14	Do you recommend any tests be repeated at a later date? If a chlamydia test	Ves No If yes, please provide details of what Free text	recommendations are made: Free text	
14 15	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is	Ves No If yes, please provide details of what Free text	recommendations are made: Free text	
14 15	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the	Ves No If yes, please provide details of what Free text	recommendations are made: Free text	
14	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding	Ves No If yes, please provide details of what Free text	recommendations are made: Free text	
14	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for	Ves No If yes, please provide details of what Free text	recommendations are made: Free text	
14	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma	Ves No If yes, please provide details of what Free text	recommendations are made: Free text	
14	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)?	Ves No If yes, please provide details of what Free text	recommendations are made: Free text	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe	Yes No If yes, please provide details of what <i>Free text Free text</i>	recommendations are made: Free text	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice	Yes No If yes, please provide details of what <i>Free text Free text</i>	recommendations are made: Free text	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a	Yes No If yes, please provide details of what <i>Free text Free text</i>	recommendations are made: <i>Free text</i>	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis	Yes No If yes, please provide details of what <i>Free text Free text</i>	recommendations are made: <i>Free text</i>	
14	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests.	Yes No If yes, please provide details of what <i>Free text Free text</i>	recommendations are made: <i>Free text</i>	
14	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report	Ves No If yes, please provide details of what Free text Free text Vec	recommendations are made: <i>Free text</i>	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report	Yes No If yes, please provide details of what <i>Free text Free text</i> Yes	recommendations are made: <i>Free text</i>	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any avternal body	Yes No If yes, please provide details of what <i>Free text Free text</i> Use	recommendations are made: Free text	
14 15 16 17	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any external body (a g. Public Health	Yes No If yes, please provide details of what <i>Free text Free text</i> □ Yes □ No	recommendations are made: Free text	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any external body (e.g. Public Health England) for	Yes No If yes, please provide details of what <i>Free text Free text</i> • Yes • No	recommendations are made: Free text	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any external body (e.g. Public Health England) for surveillance	 □ Yes □ No If yes, please provide details of what <i>Free text</i> <i>Free text</i> □ Yes □ No If yes, please provide details: <i>Free text</i> 	recommendations are made: <i>Free text</i>	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any external body (e.g. Public Health England) for surveillance purposes?	 □ Yes □ No If yes, please provide details of what <i>Free text</i> <i>Free text</i> □ Yes □ No If yes, please provide details: <i>Free text</i> 	recommendations are made: Free text	
14 15 16	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any external body (e.g. Public Health England) for surveillance purposes?	Yes No If yes, please provide details of what <i>Free text Free text</i> Ves No If yes, please provide details: <i>Free text</i>	recommendations are made: <i>Free text</i>	
14 15 16 17	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any external body (e.g. Public Health England) for surveillance purposes?	 □ Yes □ No If yes, please provide details of what <i>Free text</i> <i>Free text</i> □ Yes □ No If yes, please provide details: <i>Free text</i> 	recommendations are made: <i>Free text</i>	
14 15 16 17 18	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any external body (e.g. Public Health England) for surveillance purposes? Is there any other information you	 □ Yes □ No If yes, please provide details of what <i>Free text</i> <i>Free text</i> □ Yes □ No If yes, please provide details: <i>Free text</i> <i>Free text</i> 	recommendations are made: Free text	
14 15 16 17	Do you recommend any tests be repeated at a later date? If a chlamydia test is positive, what is your advice to the user regarding testing for lymphogranuloma venereum (LGV)? Please describe any other advice given after a positive diagnosis from any of your tests: Do you report your results to any external body (e.g. Public Health England) for surveillance purposes? Is there any other information you would like to	 □ Yes □ No If yes, please provide details of what <i>Free text</i> <i>Free text</i> □ Yes □ No If yes, please provide details: <i>Free text</i> <i>Free text</i> 	recommendations are made: Free text	

Providers were compared to pathogen specific guidelines where available, and other literature where guidelines have not been published: chlamydia[1], gonorrhoea,[2] syphilis,[3] HIV,[4] hepatitis,[5] herpes,[6] trichomoniasis,[7] Mycoplasma genitalium,[8] Mycoplasma hominis,[9,10] Ureaplasmas,[9,10] Gardnerella,[11] chancroid,[12] human papillomavirus,[13,14] yeasts.[15].

Supplementary Table 3a: Description of the characteristics of self-test kits for sexually transmitted infections found available online. All products were paid for. In total, 9 providers were identified by Amazon search and 4 were identified by both Google and Amazon search.

Provider	Source	Infection	Sample Type Requested	Positive Diagnosis Advice	Professional Use Only?	Accreditation	Sensitivity (sample type)	Specificity (sample type)	Reference Test
1*	В	HIV	Blood	Consult a doctor for confirmatory testing	No	CE, WHO approved	100% (Blood)	99.8% (Blood)	PCR
		Chlamydia	Cervical/urethral swab/Urine		Yes	CE	91.3% (Swab/Urine)	98.1% (Swab/Urine)	PCR
2*	A	Gonorrhoea	Cervical/urethral swab	Seek confirmatory testing and treatment for you and your partner	Yes	CE	97% (Swab)	96% (Swab)	Culture
		Trichomonia sis	Vaginal		Yes	CE	85.7% (Swab)	97.5% (Swab)	Another rapid test (Unnamed)
		Syphilis	Blood		Yes	CE	99.7% (Blood)	>99.9% (Blood)	ТРРА
		Chlamydia	Cervical/urethral swab/urine		Yes	CE	90% (Cervical Swab) 80.9% (Male Urethral Swab) 92.3% (Male Urine)	96.5% (Cervical Swab) 94.3% (Male Urethral Swab) >99.9% (Male Urine)	PCR
		Syphilis	Blood		Yes	CE	>99.9% (Whole Blood)	99.7% (Whole Blood)	/
3	В	Gonorrhoea	Cervical/urethral swab	/	Yes	CE	90.9% (Cervical Swab) 90% (Male Urethral Swab)	96.4% (Cervical Swab) 96.8% (Male Urethral Swab)	Culture
		Hepatitis B Surface Antigen	Blood		Yes	/	>99.9% (Whole Blood)	99.3% (Whole Blood)	/
		Hepatitis C	Blood		/	/	99.1% (Whole Blood)	99.5% (Whole Blood)	/

Provider	Source	Infection	Sample Type Requested	Positive Diagnosis Advice	Professional Use Only?	Accreditation	Sensitivity (sample type)	Specificity (sample type)	Reference Test
		HIV Antigen/antib ody	Blood		Yes	/	>99.9%	99.5%	/
4	В	Chlamydia	Cervical Swab (advertised as vaginal)	See a health professional	No	CE	85.7% (Cervical Swab)	98.3% (Cervical Swab)	PCR
		Chlamydia	Swab (source unclear)		Yes	CE, FDA	98.5%	"accurate"	/
		Gonorrhoea	Swab (source unclear)		Yes	CE, FDA	98.5%	"accurate"	/
5	А	Genital Herpes (HSV2)	Blood	professional	Yes	CE, FDA	99% "	accurate"	/
		Oral Herpes (HSV1)	Blood		Yes	CE, FDA	99% "	accurate"	/
		Trichomonia sis	Vaginal swab		Yes	CE, FDA	98.5%	"accurate"	/
		Chlamydia	Cervical/urethral swab/urine		Yes	CE	/	/	/
		Gonorrhoea	/		Yes	CE	/	/	/
		Syphilis	Blood		Yes	CE	/	/	/
		HIV (Blood)	Blood		Yes	WHO Prequalified	/	/	/
6	Α	HIV (Oral)	Oral transudate	/	Yes	/	/	/	/
		Hepatitis B Surface Antibody	Blood		Yes	/	97.30%	99.20%	/
		Surface Antigen	Blood		Yes	/	/	/	/
		Hepatitis C	Blood		Yes	/	99%	99.80%	/
7*	А	Trichomonia sis	Vaginal swab	See a health professional	No	CE	99%	100%	Culture
8		Chlamydia	/	1	No	CE	/	/	/
J	А	Syphilis	Blood		No	/	/	/	/

Provider	Source	Infection	Sample Type Requested	Positive Diagnosis Advice	Professional Use Only?	Accreditation	Sensitivity (sample type)	Specificity (sample type)	Reference Test
		Gonorrhoea	Swab (source unclear)		Yes	CE	/	/	/
		HSV1	Blood		Yes	CE	/	/	/
		HSV2	Blood		Yes	CE	/	/	/
9	А	Chlamydia	Vaginal swab	/	No	/	98.3%	1	/
10*	А	Chlamydia	Cervical Swab (advertised as vaginal)	See a health professional	No	CE	85.7 % (Cervical Swab)	98.3 % (Cervical Swab)	PCR
11	A	HIV	Blood	See a health professional for confirmatory tests	No	CE	99.6% (Blood)	/	/
12	A	HIV	Blood	See a health professional for confirmatory tests	No	CE	99.7% (Blood)	99.9% (Blood)	Enzyme immunoassa y and western blot
		Gardnerella /	/		No	/	98.5%	98.6%	PCR
13	В	Trichomonia sis	/	/	No	/	100%	99%	Wet mount microscopy and culture
		Candida Albicans	/		No	/	95.5%	98.4%	Wet mount microscopy and culture

/ Indicates the information was not stated or unclear. HSV = herpes simplex virus, TPPA = Treponema pallidum particle agglutination assay, FDA = food and drug administration, WHO = World Health Organisation. * Indicates the provider responded to the survey. Source indicates Amazon (A), Google (G) or both (B). Accreditation may have been present but the documents not immediately available to us

Supplementary Table 3b: Description of the characteristics of self-sample provider websites and services. In total, 17 providers were identified by Google search and one was identified by both Google and Amazon search. All free providers were commissioned by the National Health Service

Provider	Source	Window Period Stated	Advised for symptomatic users?	Pre-test Screen	Symptom Information	Transmission Information	Health Protection Information	HIV PEP signpost	Positive Result Guidance	Accreditations	Price Range
14	G	Yes	Unclear	No	Yes	Inconsistently	Condoms mentioned on two test pages, not all	Yes	Treat online or arrange a consultation	CQC	£29-£244
15	G	Yes	Unclear	No	Yes	Inconsistently	Thorough description on one test page but not all	Yes	Treat online or arrange a consultation	CQC	£27.99- £225.99
16	G	Yes	No	Yes	Yes, not on the test page	Yes, not on the test page	Yes, not on the test page	Yes	Treat online or referral	Unclear	£27.99-£99.95
17*	G	Yes	No	Yes	Yes	Yes	Yes	Yes	Refer to treatment	CQC, Claims a UKAS Accredited Laboratory	Free
18	G	Yes	No	Yes	Yes	Yes	Yes	Yes	Treat online/referral	Unclear	£28-£128
19	G	Yes	No	Yes	Yes	Yes	Yes	Yes	Treat online/referral	CQC, UKAS accredited laboratory	Free
20	G	Yes	Unclear	No	Yes, not on the test page	Yes, not on the test page	Condoms mentioned on one test page, not all	No	Treat online, consultation or referral	Unclear – UKAS badge given for quality management service, not tests provided	£35-£299
21	G	No	No	No	Yes, not for all pathogens	Yes, not for all pathogens	Links to Wikipedia	No	Signpost to local services	CQC, UKAS accredited laboratory but not accredited for all pathogens tested for	£19.99- £114.99

Provider	Source	Window Period Stated	Advised for symptomatic users?	Pre-test Screen	Symptom Information	Transmission Information	Health Protection Information	HIV PEP signpost	Positive Result Guidance	Accreditations	Price Range
22	G	Yes	Yes	No	No	No	No	No	Results will be discussed with the user	Unclear	£49-£209
23	G	Yes, not for all pathogens	Yes	No	Yes, not on the test page	Yes, not on the test page and not for all pathogens	No	No	Treat online or a consultation or referral	CQC	£29.95- £299.95
24	G	Yes, not for all pathogens	Unclear	Limited	Yes, not for all pathogens and not always on the test page	Yes, not for all pathogens and not always on the test page	Condoms and safe toy use mentioned on each STI info page	No	Phone consultation	Claim they use a UKAS accredited laboratory but no further details to verify this	£95-£239
25*	G	Yes	Yes (survey), No (website)	Yes	Yes	Yes	Yes	Yes	Consultation	Unclear	Free
26	G	Yes, not for all pathogens	Unclear	No	Yes	Yes	No	No	Unclear	CQC, UKAS accredited laboratory	Free
27	В	No	Unclear	No	Yes, not for all pathogens	Yes, not for all pathogens	No	No	Consultation	CQC	£34-£225
28	G	Yes, not for all pathogens	Yes	No	Yes, not for all pathogens	Yes, not for all pathogens	No	No	Advised to see your doctor, states they will not diagnose or consult	CQC, claims UKAS laboratory however this lab is not accredited for all STIs. May be accredited for other services they provide	£37-£251
29	G	Yes	Unclear	No	Yes, not for all pathogens	No	Condoms advised	N/A (no HIV test)	Treat online/referral	CQC	£35

Provider	Source	Window Period Stated	Advised for symptomatic users?	Pre-test Screen	Symptom Information	Transmission Information	Health Protection Information	HIV PEP signpost	Positive Result Guidance	Accreditations	Price Range
30	G	Yes	Unclear	No	Inconsistently	Yes, not for all pathogens	Condoms and safe toy usage mentioned on some pages but not all	Yes	Treat online/referral	CQC	£32-£200
31*	G	Yes	No	Yes	Yes	Yes	Yes	Yes	Treat online/referral	CQC, UKAS Accredited Laboratory	Free

CQC = care quality commission, PEP = post-exposure prophylaxis, ISO = international organisation for standardization, UKAS = United Kingdom Accreditation Service. * indicates that the provider responded to the survey. Source indicates Amazon (A), Google (G) or both (B). Accreditation may have been present but the documents not immediately available to us

- Nwokolo NC, Dragovic B, Patel S, et al. 2015 UK national guideline for the management of infection with Chlamydia trachomatis. Int J STD AIDS 2015;27:251– 67. doi:10.1177/0956462415615443 Available at: https://pubmed.ncbi.nlm.nih.gov/26538553/
- Fifer H, Saunders J, Soni S, et al. 2018 UK national guideline for the management of infection with Neisseria gonorrhoeae. Int J STD AIDS 2019;31:4–15. doi:10.1177/0956462419886775 Available at: https://pubmed.ncbi.nlm.nih.gov/31870237/
- 3 Kingston M, French P, Higgins S, *et al.* UK national guidelines on the management of syphilis 2015. *Int J STD AIDS* 2015;27:421–46. doi:10.1177/0956462415624059 Available at: https://pubmed.ncbi.nlm.nih.gov/26721608/
- 4 Palfreeman A, Sullivan A, Rayment M, et al. British HIV Association/British Association for Sexual Health and HIV/British Infection Association adult HIV testing guidelines 2020. *HIV Med* 2020;21 Suppl 6:1–26. doi:10.1111/hiv.13015 Available at: https://pubmed.ncbi.nlm.nih.gov/33333625/
- 5 British Association for Sexual Health and HIV. 2017 Interim Update of the 2015 BASHH National Guidelines for the Management of Viral Hepatitides. 2017. Available at: https://www.bashhguidelines.org/media/1161/viral-hepatitides-2017-update-18-12-17.pdf (Accessed June 2021)
- 6 Patel R, Green J, Clarke E, *et al.* 2014 UK national guideline for the management of anogenital herpes. *Int J STD AIDS* 2015;26:763–76. doi:10.1177/0956462415580512 Available at: https://pubmed.ncbi.nlm.nih.gov/25861804/
- 7 Sherrard J, Ison C, Moody J, et al. United Kingdom National Guideline on the Management of Trichomonas vaginalis 2014. Int J STD AIDS 2014;25:541–9. doi:10.1177/0956462414525947 Available at: https://pubmed.ncbi.nlm.nih.gov/24616117/
- 8 Soni S, Horner P, Rayment M, *et al.* British Association for Sexual Health and HIV national guideline for the management of infection with Mycoplasma genitalium (2018). *Int J STD AIDS* 2019;30:938–50. doi:10.1177/0956462419825948 Available at: https://pubmed.ncbi.nlm.nih.gov/31280688/
- 9 Horner P, Donders G, Cusini M, et al. Should we be testing for urogenital Mycoplasma hominis, Ureaplasma parvum and Ureaplasma urealyticum in men and women? – a position statement from the European STI Guidelines Editorial Board. J Eur Acad Dermatology Venereol 2018;32:1845–51. doi:10.1111/jdv.15146 Available at: https://pubmed.ncbi.nlm.nih.gov/29924422/
- 10 Taylor-Robinson D, Horner P, Pallecaros A. Diagnosis of some genital-tract infections: part 2. Molecular tests and the new challenges. *Int J STD AIDS* 2020;31:198–207. doi:10.1177/0956462419890526 Available at: https://pubmed.ncbi.nlm.nih.gov/32009570/
- 11 British Association for Sexual Health and HIV. UK National Guideline for the Management of Bacterial Vaginosis 2012. 2012. Available at: https://www.bashhguidelines.org/media/1041/bv-2012.pdf (Accessed June 2021)
- 12 Lautenschlager S, Kemp M, Christensen JJ, *et al.* 2017 European guideline for the management of chancroid. *Int J STD AIDS* 2017;28:324–9.

doi:10.1177/0956462416687913 Available at: https://pubmed.ncbi.nlm.nih.gov/28081686/

- 13 British Association for Sexual Health and HIV. UK National Guidelines on the Management of Anogenital Warts 2015. 2015. Available at: https://www.bashhguidelines.org/media/1075/uk-national-guideline-on-warts-2015final.pdf (Accessed June 2021)
- 14 Public Health England. Cervical screening: programme overview. 2021. Available at: https://www.gov.uk/guidance/cervical-screening-programme-overview (Accessed June 2021)
- 15 Saxon C, Edwards A, Rautemaa-Richardson R, *et al.* British Association for Sexual Health and HIV national guideline for the management of vulvovaginal candidiasis (2019). *Int J STD AIDS* 2020;31:1124–44. doi:10.1177/0956462420943034 Available at: https://pubmed.ncbi.nlm.nih.gov/32883171/