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An evaluation of an online STI service across London: reviewing uptake, utility and outcomes over a 4-year period

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ABSTRACT

Objectives Since 2018, Sexual Health London (SHL) has provided remote sexually transmitted infection (STI) testing services to London residents over 16 years of age. SHL was an asymptomatic screening service. In 2020, SHL widened access to non-urgent symptomatic testing. We undertook a 4-year evaluation on the uptake of SHL's online testing pathway and outcomes, including the association of positive chlamydia and gonorrhoea nucleic acid amplification test (NAAT) outcomes with user demographics and user utility.

Methods This is a retrospective data analysis of routine SHL clinical data from 8 January 2018 to 31 March 2022 of all STI test kit orders, focusing on HIV, chlamydia and gonorrhoea outcomes. Descriptive analysis on uptake of each stage of SHL's clinical care pathway is provided, including HIV testing outcomes. Binary logistic regression was used to examine the association between SHL user-completed online consultation information, SHL uptake and chlamydia and gonorrhoea NAAT results (negative or positive).

Results During the evaluation period, there were 1 476 187 orders made by 670 293 unique users. The return rate for chlamydia and gonorrhoea NAATs was 79.5% and 67.6% for HIV blood samples. The positivity rate from sufficient samples was 4.5% for chlamydia, 1.6% for gonorrhoea and 0.3% reactivity for HIV. There were increased odds of a positive chlamydia and gonorrhoea NAAT result in non-cisgender women, those with a high number of STI orders, non-UK born and those who collected an STI test kit from a clinic-based service.

Conclusions To date, this is the largest number of orders in an evaluation of online postal sexual health infection testing in the UK, and highest return rate of samples, suggesting acceptability of SHL for STI testing. Positivity rates for chlamydia and gonorrhoea NAAT tests are lower than national figures, which may reflect asymptomatic screening prior to 2020 and testing of non-urgent symptoms since 2020.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Online postal self-sampling (OPSS) services have been increasingly commissioned in the UK over the last 10 years with evaluation data focusing on return rate of samples, over relatively short evaluation periods.
⇒ As OPSS become embedded into sexual health services in the UK, more evaluation data are needed on bloodborne virus outcomes, clinical care continuum uptake and sexually transmitted infection (STI) treatment uptake.
⇒ We present the largest UK OPSS evaluation for STI testing, which includes 1 476 187 STI completed test kit orders from 670 293 unique users, as well as data on treatment and HIV testing outcomes.

WHAT THIS STUDY ADDS

⇒ We found an increased likelihood of positive nucleic acid amplification test results for chlamydia and gonorrhoea in all gender groups compared with cisgender women, and we are the first to report STI associations in non-binary groups.
⇒ Chlamydia test positivity among those aged 16–20 years was 9.7%, reflecting national chlamydia screening programme of 10% in those aged 15–24 years.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ There needs to be further work to understand uptake of HIV testing of unique users, with triangulation of data between services.
⇒ To support future evaluation work, standardised data definitions would support the novel aspects of OPSS compared with clinic-based services.

INTRODUCTION

From 2021 to 2022, testing for sexually transmitted infections (STIs) in London increased by 16% and new STI diagnoses rose by 21%.[1] Nationally, the proportion of consultations completed via online postal self-sampling (OPSS) services compared with face-to-face or phone consultations increased from 21% in 2019 to 53% in 2022.[1] Numbers of OPSS services commissioned across the UK by local authorities (LA) and the National Health Service (NHS) have increased over the last 10 years.[2–4] However, the literature reports OPSS service evaluations in the UK over short time periods (<1 year).[2–5] As OPSS has become increasingly embedded into sexual health services (representing half of sexual health consultations in 2022) and STI rates have risen, more evaluation data on their performance and utility are required.

Evaluation data from UK-based OPSS services have focused on return rates and characteristics of

users. A recent scoping review of OPSS services found variable return rates of samples (ranging from 48.3% to 78.4%), but there are limited data on bloodborne virus (BBV) outcomes and treatment uptake.[5] Furthermore, there are little data on OPSS users who have never used clinic-based sexual health services. Understanding how online service users engage with OPSS is necessary for future service planning.

We address these gaps by examining the uptake of each stage of the OPSS continuum for London's largest OPSS provider, Sexual Health London (SHL), and providing STI testing outcomes. SHL is a collaboration of services, involving Preventx, Chelsea and Westminster NHS Trust and LloydsPharmacy Online Doctor (LPOD), commissioned by LA. SHL operates alongside clinic-based sexual health services to provide sexual health testing and remote chlamydia treatment, with signposting and linkages to other services where necessary.[6]

Setting

SHL provides *Chlamydia trachomatis* (chlamydia), *Neisseria gonorrhoea* (gonorrhoea), HIV and *Treponema pallidum* (syphilis) testing to all users, and hepatitis B and C testing based on risk, to London residents aged 16 years or older.

Users register with SHL via a webpage. To obtain an STI test kit, the user completes an online consultation form covering demographics, sexual history, sexual behaviour, lifestyle and safeguarding questions. Consultation forms determine appropriateness for remote STI testing pathways. For example, if users had symptoms prior to the COVID-19 pandemic, they were redirected to clinic-based services. Once the user has completed the consultation form, they order an STI test kit and can collect it from a clinic-based sexual health service (a 'smartkit') or request postal delivery (postal kit).

The SHL consultation form and clinical service have evolved during the analysis period. Major changes were introduced in April 2019, March 2020 and March 2021 and details related to this analysis are in table 1 and the online supplemental appendix.

Chlamydia and gonorrhoea nucleic acid amplification test (NAAT) uses Roche Cobas from self-sampled urine, vaginal, anal and/or throat specimens. Blood testing uses Roche Elecsys Duo fifth-generation HIV test from self-obtained finger-prick sampling into a microtube vial (400–600 μL capillary blood required). HIV screening is provided by SHL and confirmation testing is referred to clinic-based services. Therefore, only reactive HIV test outcomes are reported in this analysis. If a HIV test result was inconclusive (eg, insufficient or equivocal), a second blood HIV test kit would be offered and dispatched to the user via a specific weblink. This is known as a HIV direct order. Syphilis and hepatitis B and C testing was excluded from this analysis. Results are communicated via an online web portal, text message and/or email (depending on service user preferences) and by phone for reactive blood test results, with linkage into clinic-based services depending on the user preference.

Eligible service users with a positive chlamydia result receive a unique online link to access postal chlamydia treatment through LPOD. Referral to clinic-based services for chlamydia treatment was required for extragenital infection and service users with symptoms until March 2020; subsequently, only those with urgent symptoms and/or more than one STI were referred to clinic-based services. Those who require gonorrhoea treatment are referred to clinic-based services and therefore gonorrhoea treatment outcomes are not available for this analysis.

METHODOLOGY

This is a service evaluation of routinely collected SHL clinical service data from 8 January 2018 to 31 March 2022, including completed consultation forms and STI test kit orders. This analysis focuses on HIV, chlamydia and gonorrhoea test outcomes. Table 1 details the data management of variables impacted by changes to the consultation forms since 2019 and provides variable definitions. Positive NAAT result refers to positivity at any of the genital and/or extragenital sites. Chlamydia treatment outcomes were obtained from LPOD prescription data, with date of prescription being used for treatment date in this analysis. As a service evaluation ethical approval was not required.

Table 1 SHL service changes and data management of variables

Variables	8 January 2018–31 March 2019	1 April 2019–31 March 2020	1 April 2020–31 March 2021	1 April 2021–31 March 2022	Data management notes
Year STI test kit ordered (and consultation form completed)	The implementation year of SHL for asymptomatic users and the original consultation form. Number of test kits per year per user was limited to four.	The period of embedding OPSS into routine practice. Updates to the SHL consultation form and demographic profile.	Health services impacted by COVID-19 pandemic. SHL expanded testing to users with minor symptoms, contacts of STIs and those completing a gonorrhoea test of cure following treatment from a clinic-based service.	Start of the post-COVID-19 recovery for sexual health services. SHL offered unlimited STI kit orders for pre-exposure prophylaxis users.	
Gender	Female	Female	Female	Female/Woman	Trans category from January 2018 to March 2019 were recategorised into the other category as unable to determine if trans female or trans male.
	Male	Male	Male	Male/Man	
	Trans	Trans female	Trans female	Trans female/Trans woman	
		Trans male	Trans male	Trans male/Trans man	
		Non-binary	Non-binary	Non-binary	
		Other	Other	Other	
Type of service user ('Have you visited a sexual health clinic?')	Not available	Yes, within the last year	Yes, within the last year	Yes, within the last year	Merged 'yes, within a year' and 'yes, over a year' into 'clinic and OPSS' group. 'No, never' cateogorised into 'OPSS only'.
		Yes, over a year ago	Yes, over a year ago	Yes, over a year ago	
		No, never	No, never	No, never	
Sexual orientation	Data were provided by SHL based on user-reported gender identity and gender identity of sexual partners.				
HIV test results	HIV testing results from HIV direct orders within 14 days of a previous HIV result, or within 14 days of a previous STI test kit order date with no HIV result, were appended to the previous consultation information and over-rode the initial HIV testing result. HIV confirmation test results were not available for this analysis.				

OPSS, online postal self-sampling; SHL, Sexual Health London; STI, sexually transmitted infection.

Table 2 Uptake of SHL's clinical care continuum

			STI kit orders (n=1 476 187) (numerator/denominator)	%
Returned samples	Chlamydia NAAT		1 172 855/1 476 187	79.5
	Gonorrhoea NAAT		1 172 839/1 476 187	79.5
	HIV blood sample		984 725/1 455 953*	67.6
	HIV blood sample with HIV direct orders appended		985 090/1 455 953*	67.7
Sufficient sample	Chlamydia NAAT		1 161 692/1 476 187	78.7
	Gonorrhoea NAAT		1 157 780/1 476 187	78.4
	HIV blood sample from initial test kit order		863 392/1 455 953*	59.0
	HIV blood samples including appended results from a HIV direct order (received within 14 days of previous order or previous HIV test result)		868 998/1 455 953*	59.7
Of sufficient samples:				
Results	Chlamydia result (n=1 161 692)	Negative	1 109 616/1 161 692	95.5
		Positive	52 076/1 161 692	4.5
	Gonorrhoea result (n=1 157 780)	Negative	1 138 887/1 157 780	98.4
		Positive	18 893/1 157 780	1.6
	HIV reactivity result (with direct orders) (n=868 998)	Negative	865 245/868 998*	99.6
		Reactive	2716/868 998*	0.3
		Equivocal	1037/868 998*	0.1
Of those with positive chlamydia results (n=52 076)				
SHL postal treatment offered			45 082/52 076	86.6
Postal treatment prescribed via SHL services			29 645/52 076	56.9
Chlamydia treatment via another healthcare service or pathway			20 661/52 076	39.7
Unknown outcome (ie, no outcome documented, service user declined follow-up or no action required was noted by health advisors)			1730/52 076	3.3
User unaware of result			40/52 076	0.1

*Excluding those known to living with HIV from consultation information.
NAAT, nucleic acid amplification test; SHL, Sexual Health London; STI, sexually transmitted infection.

Analysis

Descriptive analysis is provided for the uptake of each stage of SHL's clinical care pathway. Binary logistic regression was used to examine the association between explanatory variables and chlamydia and gonorrhoea NAAT results. Insufficient samples and orders without a returned test kit were excluded from the model. Crude ORs and adjusted ORs (aORs) for explanatory variables are provided. Descriptive HIV test outcomes are provided. Analysis was performed on STATA V.17.

RESULTS

During the evaluation period, 1 476 187 orders were completed by 670 293 unique users. Median time for the return of STI kits was 9 days (IQR 6–15 days), and median time from returned sample date to sample processing and result was 2 days (IQR 1–2 days). Median time from STI kit order date to chlamydia treatment prescription was 11 days (IQR 8–18 days); median time from receipt of STI test kit to chlamydia treatment prescription was 2 days (IQR 1–3 days) (missing 331 postal treatment prescription dates). Proportion of returned chlamydia and gonorrhoea NAATs was 79.5% and 67.6% for HIV samples, of all STI kit orders. Proportion of processable NAAT samples ('sufficient samples') of returned NAATs was 99% and 98.7% for chlamydia and gonorrhoea, respectively, and 88.2% of returned bloods samples were sufficient for HIV testing (with appended orders). Table 2 provides descriptive outcomes of the clinical care continuum for HIV, chlamydia and gonorrhoea pathways.

Chlamydia and gonorrhoea NAAT positivity was 4.5% and 1.6%, respectively. Chlamydia NAAT positivity was highest in those aged 16–20 years (9.7%) compared with older ages, trans women (7.6%) compared with other genders, black ethnicities (6%) compared with white/mixed/Asian/other ethnicities, the most deprived Index of Multiple Deprivation (IMD) (5.1%), same sex partners (6.4%) and those who collected smartkits (6%) compared with postal kits. Whereas gonorrhoea NAAT positivity was highest in those aged 41 years and older (2.8%) compared with younger ages, trans women (8.1%) vs other gender identities and people with same-sex partners (6.4%).

After adjustment, those with a positive chlamydia test result were: more likely to be cisgender men (aOR 1.31 (95% CI 1.28 to 1.34), p≤0.001), trans women (aOR 2.63 (2.00 to 3.47), p≤0.001), trans men (aOR 1.97 (1.39 to 2.79), p≤0.001), non-binary (aOR 1.39 (1.14 to 1.69), p=0.001) and other gender (aOR 1.70 (1.39 to 2.09), p=≤0.001) compared with cisgender women; more likely to be black (aOR 1.46 (1.43 to 1.49), p≤0.001), mixed (aOR 1.26 (1.23 to 1.30), p≤0.001) and other ethnicities (aOR 1.27 (1.20 to 1.34), p≤0.001) compared with white ethnicity; more likely to have same-sex partners (aOR 1.59 (1.54 to 1.63), p≤0.001) compared with opposite sex partners; more likely born outside the UK (aOR 1.20 (1.17 to 1.22), p≤0.001) and more likely to collect a smartkit compared with postal kit (aOR 1.37 (1.33 to 1.41), p≤0.001) (table 3).

After adjustment, those testing positive for gonorrhoea were more likely to be cisgender men (aOR 1.99 (95% CI 1.90 to 2.07), p≤0.001), trans women (aOR 4.30 (3.24 to 5.71), p≤0.001), trans men (aOR 2.30 (1.32 to 3.17), p=0.001), non-binary (aOR 1.72 (1.37 to 2.16), p=≤0.001) and other gender (aOR 1.38 (1.02 to 1.87), p=0.038) compared with cisgender women; more likely to be black (1.37 (1.31 to 1.44), p≤0.001) and mixed ethnicity (aOR 1.21 (1.15 to 1.26), p≤0.001) compared with white ethnicity; less likely to have only opposite sex partners compared with only

Table 3 Association between user demographics and OPSS service use and chlamydia outcomes (univariate variate and adjusted logistic regression model, n=1 161 692)

Explanatory variables	Categories	Chlamydia NAAT-positive result (n=52 076) (%, by row)	Crude OR (95% CI)	P value*	Adjusted OR† (95% CI)	P value*
Age (years)	16–20	7930 (9.7)	1		1	
	21–25	17 741 (5.2)	0.51 (0.50 to 0.53)	–	0.51 (0.50 to 0.53)	–
	26–30	13 066 (3.7)	0.36 (0.35 to 0.37)	–	0.34 (0.33 to 0.36)	–
	31–35	6450 (3.4)	0.32 (0.31 to 0.33)	–	0.29 (0.28 to 0.30)	–
	36–40	3200 (3.4)	0.33 (0.31 to 0.34)	–	0.28 (0.27 to 0.29)	–
	≥41 years	3689 (3.8)	0.36 (0.35 to 0.38)	–	0.29 (0.28 to 0.30)	–
Gender	Cisgender women	25 796 (3.9)	1		1	
	Cisgender men	25 851 (5.3)	1.38 (1.35 to 1.40)	–	1.31 (1.28 to 1.34)	–
	Trans women	73 (7.6)	2.03 (1.60 to 2.58)	–	2.63 (2.00 to 3.47)	–
	Trans men	40 (6.8)	1.79 (1.30 to 2.47)	–	1.97 (1.39 to 2.79)	–
	Non-binary	186 (4.5)	1.17 (1.01 to 1.36)	0.034	1.39 (1.14 to 1.69)	0.001
	Other	130 (5.6)	1.47 (1.23 to 1.75)	–	1.70 (1.39 to 2.09)	–
Ethnicity	White	29 662 (3.9)	1		1	
	Black	11 840 (6)	1.57 (1.53 to 1.60)	–	1.46 (1.43 to 1.49)	–
	Mixed	7728 (5.3)	1.36 (1.33 to 1.40)	–	1.26 (1.23 to 1.30)	–
	Asian	1275 (3.5)	0.89 (0.84 to 0.94)	–	0.92 (0.87 to 0.98)	0.005
	Other	1571 (5.4)	1.40 (1.33 to 1.48)	–	1.27 (1.20 to 1.34)	–
IMD	1—most deprived	11 456 (5.1)	1		1	
	2	20 395 (4.7)	0.91 (0.89 to 0.93)	–	0.95 (0.92 to 0.97)	–
	3	10 904 (4.2)	0.81 (0.79 to 0.83)	–	0.88 (0.86 to 0.91)	–
	4	6169 (3.9)	0.75 (0.73 to 0.77)	–	0.85 (0.82 to 0.87)	–
	5—least deprived	2933 (3.6)	0.69 (0.66 to 0.72)	–	0.79 (0.76 to 0.83)	–
Sexual orientation	Straight/Opposite sex partners	36 459 (4.1)	1		1	
	Gay/Same-sex partners	11 972 (6.4)	1.60 (1.56 to 1.63)	–	1.59 (1.54 to 1.63)	–
	Bisexual	3089 (4)	0.96 (0.92 to 1.00)	0.034	0.92 (0.89 to 0.96)	–
	Other‡	556 (4.6)	1.11 (1.02 to 1.21)	0.017	0.83 (0.73 to 0.96)	0.009
UK born	Yes	38 711 (4.3)	1		1	
	No	13 365 (5)	1.15 (1.13 to 1.17)	–	1.20 (1.17 to 1.22)	–
Year STI test kit ordered (and consultation form completed)	January 2018–March 2019 (implementation year)	6274 (4.3)	1		1	
	April 2019–March 2020 (embedding year)	10 332 (4.4)	1.02 (0.99 to 1.05)	0.231	1.04 (0.95 to 1.12)	0.403
	April 2020–March 2021 (during COVID-19 pandemic)	17 206 (4.8)	1.11 (1.08 to 1.15)	–	1.15 (1.05 to 1.25)	0.002
	April 2021–March 2022 (post-COVID-19 pandemic/recovery)	18 264 (4.3)	0.99 (0.96 to 1.02)	0.615	1.04 (0.96 to 1.13)	0.354
Type of access	Postal	46 741 (4.4)	1		1	
	Smartkit	5335 (6)	1.40 (1.36 to 1.44)	–	1.37 (1.33 to 1.41)	–
Type of service user	Clinic and OPSS	35 573 (4.4)	1		1	
	OPSS only	9536 (4.9)	1.12 (1.10 to 1.15)	–	1.11 (1.08 to 1.13)	–
	Missing data	6967 (4.4)	0.99 (0.96 to 1.01)	0.387	1.05 (0.97 to 1.14)	0.189
Single versus repeated OPSS STI test kit orders	Single order	11 167 (3.5)	1		1	
	2–4 orders	21 640 (4.7)	1.34 (1.31 to 1.37)	–	1.37 (1.34 to 1.41)	–
	5–8 orders	12 984 (5.0)	1.45 (1.42 to 1.49)	–	1.46 (1.42 to 1.50)	–
	9 or more orders	6285 (5.3)	1.53 (1.49 to 1.58)	–	1.49 (1.44 to 1.54)	–

*All p values are <0.001, unless otherwise stated.
†Adjusting for all variables listed in the table.
‡Other=32.7% (n=4001) non-binary, 24.4% (n=2980) cisgender men, 16.3% (n=1988) cisgender women, 14.2% (n=1729) other gender, 7.8% (n=950) trans women, 4.7% (n=569) trans men were the gender identities.
IMD, Index of Multiple Deprivation; NAAT, nucleic acid amplification test; OPSS, online postal self-sampling; STI, sexually transmitted infection.

same-sex partners (aOR 7.83 (7.50 to 8.17), p≤0.001), both (aOR 3.50 (3.30 to 3.70), p≤0.001) and other partners (aOR 4.47 (3.81 to 5.25), p≤0.001); more likely born outside of the UK (aOR 1.16 (1.12 to 1.20), p≤0.001) and more likely to collect a smartkit compared with postal kit (aOR 1.44 (1.37 to 1.52), p≤0.001) (table 4).

DISCUSSION

This is the largest UK analysis of OPSS with nearly 1.5 million test orders across London, over a 4-year evaluation period, with a high proportion of positive chlamydia NAATs among those aged 16–20 years at 9.7%, reflecting the 10% positivity rates seen in the UK national chlamydia screening programme for

Table 4 Association between user demographics and OPSS service use and gonorrhoea outcomes (univariate variate and adjusted logistic regression model, n=1 157 780)

Explanatory variables	Categories	Gonorrhoea NAAT-positive result (n=18 893) (%, by row)	Crude OR (95% CI)	P value*	Adjusted OR† (95% CI)	P value*
Age (years)	16–20	1644 (2.0)	1		1	
	21–25	4223 (1.2)	0.61 (0.58 to 0.65)	–	0.50 (0.48 to 0.54)	–
	26–30	4812 (1.4)	0.67 (0.64 to 0.71)	–	0.43 (0.41 to 0.46)	–
	31–35	3415 (1.8)	0.88 (0.83 to 0.94)	–	0.44 (0.41 to 0.47)	–
	36–40	2071 (2.2)	1.10 (1.03 to 1.17)	0.005	0.44 (0.41 to 0.47)	–
	≥41	2728 (2.8)	1.40 (1.32 to 1.49)	–	0.42 (0.40 to 0.45)	–
Gender	Cisgender women	3973 (0.6)	1		1	
	Cisgender men	14 622 (3)	5.14 (4.96 to 5.32)	–	1.99 (1.90 to 2.07)	–
	Trans women	77 (8.1)	14.6 (11.54 to 18.47)	–	4.30 (3.24 to 5.71)	–
	Trans men	24 (4.1)	7.11 (4.72 to 10.71)	–	2.30 (1.32 to 3.17)	0.001
	Non-binary	144 (3.5)	6.09 (5.14 to 7.21)	–	1.72 (1.37 to 2.16)	–
	Other	53 (2.3)	3.90 (2.97 to 5.13)	–	1.38 (1.02 to 1.87)	0.038
Ethnicity	White	12 453 (1.7)	1		1	
	Black	2719 (1.4)	0.83 (0.80 to 0.87)	–	1.37 (1.31 to 1.44)	–
	Mixed	2670 (1.8)	1.10 (1.06 to 1.15)	–	1.21 (1.15 to 1.26)	–
	Asian	479 (1.3)	0.80 (0.73 to 0.87)	–	0.99 (0.90 to 1.08)	0.760
	Other	572 (2)	1.20 (1.10 to 1.31)	–	0.97 (0.89 to 1.06)	0.484
IMD	1—most deprived	4030 (1.8)	1		1	
	2	7921 (1.8)	1.01 (0.97 to 1.05)	0.749	0.95 (0.92 to 0.99)	0.020
	3	4023 (1.6)	0.85 (0.82 to 0.89)	–	0.87 (0.83 to 0.91)	–
	4	2031 (1.3)	0.71 (0.67 to 0.75)	–	0.77 (0.73 to 0.82)	–
	5—least deprived	786 (1)	0.53 (0.49 to 0.57)	–	0.64 (0.59 to 0.69)	–
Sexual orientation	Straight/Opposite sex partners	5046 (0.6)	1		1	
	Gay/Same-sex partners	11 733 (6.4)	11.89 (11.49 to 12.26)	–	7.83 (7.50 to 8.17)	–
	Bisexual	1680 (2.2)	3.86 (3.65 to 4.08)	–	3.50 (3.30 to 3.70)	–
	Other‡	434 (3.6)	6.47 (5.86 to 7.15)	–	4.47 (3.81 to 5.25)	–
UK born	Yes	12 686 (1.4)	1		1	
	No	6207 (2.3)	1.64 (1.59 to 1.69)	–	1.16 (1.12 to 1.20)	–
Year STI test kit ordered (and consultation form completed)	January 2018–March 2019 (implementation year)	1729 (1.2)	1		1	
	April 2019–March 2020 (embedding year)	3434 (1.5)	1.23 (1.163 to 1.31)	–	1.09 (0.94 to 1.26)	0.272
	April 2020–March 2021 (during COVID-19 pandemic)	6466 (1.8)	1.52 (1.44 to 1.60)	–	1.30 (1.11 to 1.51)	0.001
	April 2021–March 2022 (post-COVID-19 pandemic/recovery)	7264 (1.7)	1.44 (1.37 to 1.52)	–	1.24 (1.06 to 1.44)	0.007
Type of access	Postal	16 946 (1.6)	1		1	
	Smartkit	1947 (2.2)	1.40 (1.33 to 1.46)	–	1.44 (1.37 to 1.52)	–
Type of service user	Clinic and OPSS	15 200 (1.9)	1		1	
	OPSS only	1756 (0.9)	0.48 (0.45 to 0.50)	–	0.71 (0.67 to 0.75)	–
	Missing	1937 (1.2)	0.64 (0.61 to 0.67)	–	0.91 (0.79 to 1.05)	0.208
Single versus repeated OPSS STI test kit orders	Single order	2754 (0.87)	1		1	
	2–4 orders	6555 (1.4)	1.64 (1.57 to 1.71)	–	1.34 (1.28 to 1.41)	–
	5–8 orders	5900 (2.3)	2.68 (2.56 to 2.81)	–	1.69 (1.61 to 1.77)	–
	9 or more orders	3684 (3.2)	3.72 (3.54 to 3.91)	–	1.89 (1.79 to 1.99)	–

*All p values are <0.001, unless otherwise stated.
†Adjusting for all variables listed in the table.
‡Other=32.7% (n=3966) non-binary, 24.4% (n=2951) cisgender men, 16.4% (n=1981) cisgender women, 14.2% (n=1717) other gender, 7.8% (n=939) trans women, 4.6% (n=562) trans men were the gender identities.
IMD, Index of Multiple Deprivation; NAAT, nucleic acid amplification test; OPSS, online postal self-sampling; STI, sexually transmitted infection.

those aged 15–24 years.[7] In 2018, SHL found STI positivity to be 15.2%–16.4% in those aged 16 and 17 years, suggesting positive engagement of OPSS with young people.[8]

Return rates and sufficient sampling

The 79.5% return rate of chlamydia and gonorrhoea NAATs is higher than those reported in a recent scoping review (between 48.3% and 78.4%).[5] The inclusion of processable NAATs with returned STI test kits was 98.7%–99%. The high return rate may be related to how SHL services have been embedded in sexual healthcare pathways over the last 4 years, with clinic-based services actively encouraging asymptomatic sexual health screens via OPSS and service changes during the COVID-19 pandemic influencing health-seeking behaviours.[9 10] Preventx have also

previously worked with other sexual health testing services and developed methods to encourage return of STI test kits.[11]

The HIV blood test return rate was 67.6% of STI kit orders and this compares with a HIV sample return rate from all kit orders of 55.7%–60.4% from the national HIV testing service and 55.2% at 56 Dean Street.[11–13] In our analysis, 88.2% of returned blood samples and 59.7% of all STI kit orders were sufficient for HIV testing, with appended HIV direct orders. In Birmingham, the return rate of blood samples was 54%; 55% of these returned blood samples were sufficient for HIV testing.[14 15] However, Banerjee *et al* only included the first test kit order per unique user during their 6-month evaluation period in 2017, which limits direct comparison of these figures. Reasons for not returning kits may include difficulty in obtaining sufficient finger prick samples, declining to test or lack of perceived risk.[15]

Return rates are reported for each testing episode, but the testing pattern for unique users is not considered in these outcomes. For example, SHL users may have tested recently with SHL or elsewhere for HIV and could explain why return rates for HIV blood samples are not as high as chlamydia and gonorrhoea NAATs. Triangulation of online STI testing data with clinic-based sexual health service data and unique users is needed to better understand HIV and STI testing patterns. It is important for future planning of OPSS services to consider the wastage of non-returned blood and NAATs kits. While SHL has the highest return rates, up to 32.3% of blood testing kits and 20.5% of NAATs are not being used. However, this needs to be balanced against the benefits of OPSS. For instance, 26% of users of the UK Health Security Agency's (UKHSA) national online HIV testing service had never previously tested for HIV, and 19.4% of users in our evaluation with either chlamydia or gonorrhoea negative or positive results had only used OPSS services.[11]

Test result outcomes and associations with positive chlamydia and gonorrhoea test results

SHL positivity rates of 4.5% and 1.6% for chlamydia and gonorrhoea, respectively, are lower than other UK OPSS services (4.4%–8.1%) and clinic-based sexual health services (10.3%–14.4%).[5] SHL was an asymptomatic testing service prior to the COVID-19 pandemic and during the COVID-19 pandemic urgent symptoms were still redirected to clinic-based services. These factors may contribute to a lower positivity rate.

High aORs for chlamydia and gonorrhoea positivity in trans women, trans men and non-binary groups in this analysis provide valuable understanding of online STI positivity rates in these groups. To our knowledge, this is the first time STI data have been reported for non-binary people in sexual health testing outcomes in the UK. Previous data from SHL in 2019 found a lower positivity rate for chlamydia (4.8%) and gonorrhoea (3.4%) when trans women, trans men and non-binary groups were grouped together, but this was during the early years of SHL.[16] Comparisons with clinic-based sexual health services and other health services would be helpful to understand if higher aOR are due to increased incidence in these groups, or possibly concerns regarding confidentiality and stigma in clinic-based services. However, the absolute numbers are small and therefore caution is required when interpreting these results. Adjusted odds showed a reduced odds of chlamydia and gonorrhoea positivity with increasing age, and those from less deprived IMD areas, the latter reflecting chlamydia positivity association with deprivation in England.[17]

A higher positivity rate in those taking smartkits may be related to symptoms or behaviours leading to seeking care from a clinic-based sexual health service before being redirected to OPSS. Increased adjusted odds for chlamydia and gonorrhoea positivity were observed with a higher number of test orders. This might be related to pre-exposure prophylaxis (PrEP) users having unlimited access to STI kit orders since March 2021, but a limitation of this data is not having PrEP history available. Triangulation with data on PrEP use and OPSS would be helpful to better understand this relationship.

The odds of test positivity varied according to use of OPSS-only or both clinic-based and OPSS. Gonorrhoea positivity was lower in those only using OPSS (aOR 0.71; 95% CI 0.67 to 0.75) compared with both OPSS and clinic-based services, which may reflect how symptoms are triaged in OPSS and clinic-based services.

Some major limitations to the logistic regression model include the lack of data on sexual partner number, PrEP use, symptoms and condomless sex. Also, non-UK born does not account for difference in Anglosphere countries as the SHL website is only available in English, but these data may also reflect difficulty in those non-UK born in accessing clinic-based health services or fear in doing so.

HIV testing results

HIV reactivity at 0.3% is lower than the national HIV self-sampling service (0.8%–1.05%), using the same laboratory services (Preventx) from 2015 to 2019.[11 13] However, the national HIV self-sampling service targeted high-risk groups. False positives are likely to be present in lower prevalent populations, but confirmatory outcomes were not available for this analysis. Previously, SHL reported a HIV reactivity rate of 0.97% for unique users from 2018 to 2019, but reactivity by STI test kit orders and testing episodes was not available for comparison.[18] Birmingham's OPSS found a reactivity rate of 1.5% and a positivity rate of 0.02% from sufficient HIV samples returned from first STI test kit orders from unique users during their analysis period in 2017.[15] In a randomised controlled trial of OPSS services, there were no HIV confirmations and reactivity was not reported.[19] More data on BBV outcomes from OPSS would enhance our understanding of how to best use OPSS BBV testing.

Treatment

Treatment outcomes demonstrate a high uptake of remote chlamydia prescribing compared with other OPSS services (56.7% with SHL vs 46% in Birmingham).[2] Follow-up of positive chlamydia cases found 39.7% had accessed chlamydia treatment elsewhere, meaning 96.6% of SHL users had chlamydia treatment outcomes, compared with 82% of chlamydia test positive service users in Birmingham.[2] This could be due to several factors; the need for remote healthcare access during the COVID-19 pandemic and digital tracking of SHL service users who are seen in routine sexual health services in London for treatment. There have also been changes to the criteria for those eligible for remote treatment over time; inclusion of treatment for extragenital chlamydia and treatment of some symptomatic service users. Time from test kit order to prescription was 11 days, but only 2 days from when the test kit was returned. However, the time taken for users to start treatment, taking into

account postal delivery times, is unknown and represents a limitation.

Further limitations

This is a retrospective evaluation of service data, over a 4-year period. The service has undergone several changes during this evaluation period, including changes to the consultation questions, expanded access (eg, increasing the number of test kit orders available in some boroughs, unlimited test kit orders for those taking PrEP and widening access to symptomatic users and STI contacts) and the introduction of novel services (eg, contraception provision, not included in this review). These changes may have influenced service use. While we adjusted the model for major service changes, this analysis does not review STI testing rates over time to determine the impact of these service changes. Also, it was outside the scope of this evaluation to review the user demographics of non-returned or insufficient samples. Comparisons with other UK OPSS are limited due to the lack of evaluation data and differences in populations and services. Therefore, caution is needed when comparing service outcome data.

The Genitourinary Medicine Clinic Activity Dataset (GUMCAD) codes, used for national surveillance, were not provided for this evaluation. Despite the absence of GUMCAD data, there are limitations due to the lack of standardised data definitions for process outcomes in OPSS evaluations.[20] For example, this includes drop-off rates for consultation forms and STI test kit orders, return rates and sufficient samples for testing. Lastly, we were unable to compare the data with clinic-based services. Difficulties arise due to the use of different patient identifiers, which prevents us from tracking users between clinic-based and OPSS services.

NEXT STEPS AND CONCLUSION

Our evaluation has highlighted several areas for SHL to address. There is a need to improve equity of access across ethnicities. Additionally, it is important to review the lower positivity rates and low blood sample return rates. Improved data definitions for OPSS service outcomes would support future evaluations. Lastly, further work is needed to combine clinic-based services with OPSS data to truly understand STI testing uptake in London.

This is the largest analysis of OPSS outcomes in UK STI testing services for chlamydia, gonorrhoea and HIV, covering an extended evaluation period. These data demonstrate the occurrence of STI testing in populations who have not previously accessed clinic-based sexual health services and provide detailed information on the increased odds of chlamydia and gonorrhoea positivity among trans or non-binary individuals.

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REFERENCES

1 Spotlight on sexually transmitted infections in London: 2022 data. Available: https://www.gov.uk/government/publications/sexually-transmitted-infections-london-data/spotlight-on-sexually-transmitted-infections-in-london-2022-data) [Accessed 01 Jun 2024].
2 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. *Int J STD AIDS* 2018;29:974–9.
3 Barnard S, Free C, Bakolis I, *et al*. Comparing the characteristics of users of an online service for STI self-sampling with clinic service users: a cross-sectional analysis. *Sex Transm Infect* 2018;94:377–83.
4 Syred J, Holdsworth G, Howroyd C, *et al*. Choose to test: self-selected testing for sexually transmitted infections within an online service. *Sex Transm Infect* 2019;95:171–4.
5 Sumray K, Lloyd KC, Estcourt CS, *et al*. Access to, usage and clinic outcomes of, online postal sexually transmitted infection services: a scoping review. *Sex Transm Infect* 2022;98:528–35.
6 SHL. Sexual health London. 2020. Available: https://www.shl.uk/
7 PHE. 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
8 Day S, Kinsella R, Jones S, *et al*. Safeguarding outcomes of 16 and 17-year-old service users of Sexual Health London (SHL.uk), a pan-London online sexual health service. *Int J STD AIDS* 2020;31:1373–9.
9 Howarth AR, Saunders J, Reid D, *et al*. "Stay at home …": exploring the impact of the COVID-19 public health response on sexual behaviour and health service use among men who have sex with men: findings from a large online survey in the UK. *Sex Transm Infect* 2022;98:346–52.
10 Hyndman I, Nugent D, Whitlock GG, *et al*. COVID-19 restrictions and changing sexual behaviours in HIV-negative MSM at high risk of HIV infection in London, UK. *Sex Transm Infect* 2021;97:521–4.
11 PHE. National hiv self-sampling service – two year service report. November 2015-October 2017. 2018.
12 Elliot E, Rossi M, McCormack S, *et al*. Identifying undiagnosed HIV in men who have sex with men (MSM) by offering HIV home sampling via online gay social media: a service evaluation. *Sex Transm Infect* 2016;92:470–3.
13 PHE. National HIV self-sampling service – two year service report. November 2015-October 2019. 2020.
14 Ayinde O, Jackson L, Phattey J, *et al*. STI testing and subsequent clinic attendance amongst test negative asymptomatic users of an internet STI testing service; one-year retrospective study. *PLoS ONE* 2023;18:e0281359.
15 Banerjee P, Madhwapathi V, Thorley N, *et al*. A service evaluation comparing home-based testing to clinic-based testing for HIV, syphilis and hepatitis B in Birmingham and Solihull. *Int J STD AIDS* 2020;31:613–8.

16 Day S, Smith J, Perera S, *et al*. Beyond the binary: sexual health outcomes of transgender and non-binary service users of an online sexual health service. *Int J STD AIDS* 2021;32:896–902.
17 UKSHA. Official statistics. Sexually transmitted infections and screening for chlamydia in England: 2022 report. 2023. Available: https://www.gov.uk/government/statistics/sexually-transmitted-infections-stis-annual-data-tables/sexually-transmitted-infections-and-screening-for-chlamydia-in-england-2022-report
18 Day S, Khan K, Kelly AM, *et al*. Characteristics of newly diagnosed HIV-positive service users using a pan-London e-sexually transmitted infection screening service. *Int J STD AIDS* 2021;32:1036–42.
19 Wilson E, Free C, Morris TP, *et al*. Internet-accessed sexually transmitted infection (e-STI) testing and results service: A randomised, single-blind, controlled trial. *PLoS Med* 2017;14:e1002479.
20 UKSHA. GUMCAD data specification and technical guidance. 2022. Available: https://assets.publishing.service.gov.uk/media/618d304d8fa8f50381640238/GUMCAD_data_specification_and_technical_guidance_2021.pdf