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

**Authors:**

Victoria Tittle, Chelsea and Westminster NHS Trust

Sara Day, Chelsea and Westminster NHS Trust and SHL

Anna Tostevin, University College London

Adrian Kelly, City of London, SHL

Jonathan Spate, Preventx, SHL

Fiona Burns, University College London

Jo Gibbs, University College London

Alison Howarth, University College London

Ann Sullivan, Chelsea and Westminster NHS Trust

**Abstract**

**Objectives**

Since 2018 Sexual Health London (SHL) has provided remote sexually transmitted infection (STI) testing services to London residents over 16 years old. SHL was an asymptomatic screening service. In 2020, SHL widened access to non-urgent symptomatic testing. We have undertaken a four-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 8th January 2018 to 31st 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 consultation information, SHL uptake and chlamydia and gonorrhoea NAAT results (negative or positive).

**Results**

Number of orders in the evaluation period was 1,476,187, 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% for HIV. There were increased odds of a positive chlamydia and gonorrhoea NAAT result in non cis 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 (smartkit).

**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.

**Word count** 3378

## INTRODUCTION

From 2021 to 2022 sexually transmission infections (STI) testing in London increased by 16% and the number of new STI diagnoses rose by 21% [1]. Nationally, the proportion of consultations completed via online postal self-sampling (OPSS) services compared to face-to-face or phone consultations increased from 21% in 2019 to 53% in 2022 [1]. There have been an increasing number of OPSS services commissioned across the UK by Local Authorities (LA) and the National Health Service (NHS) over the last ten years [2-4]. However, the literature of UK OPSS evaluations report service outcomes over short evaluation time periods (less than one year [2-5]. As OPSS become increasingly embedded into sexual health services over time (representing half of sexual health consultations) and STI rates rise more evaluation data on their performance and utility is required.

There are several novel steps in the OPSS continuum compared to clinic-based services; reliance on users to register online, completion of a consultation form, ordering the STI test kit, sampling their own blood, returning an STI test kit, and linking into treatment pathways for *Chlamydia trachomatis* (chlamydia) and oral contraception via online or clinic-based pharmacies. Evaluation data from UK-based OPSS have largely focused on return rates and associations with users who do not return samples. A recent scoping review of OPSS services found return rates of samples to vary (ranging from 48.3% to 78.4%), but there are limited data on blood borne virus outcomes and treatment uptake [5]. Furthermore, there is little data on OPSS users who have never used sexual health services previously. Understanding how online service users engage and uptake of these novel aspects of OPSS services is key for future service planning. We address these gaps by providing uptake for each stage of the OPSS continuum for London's largest provider, Sexual Health London (SHL), and provide STI testing outcomes.

SHL has been providing LA commissioned OPSS services across London since January 2018 [6]. SHL is a collaboration of services, involving Preventx, Chelsea and Westminster NHS Trust and LloydsPharmacy Online Doctor (LPOD). SHL operates alongside clinic-based sexual health services to provide sexual health testing and remote chlamydia treatment and oral contraception, with signposting and linkages to other services where necessary [6]. We present an evaluation of SHL's service data, including the uptake of each stage of the SHL OPSS clinical pathway.

### Setting

SHL provides 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. During the first 12 months of roll-out (from January 2018), 27 of 33 London boroughs had a

staggered initiation of SHL services in their area. By 2020, 30 boroughs provided SHL services to their residents, and three boroughs provided alternative online STI services [6]. Prior to COVID-19, three boroughs limited the number of test kits available to order in their region, but this cap was removed in March 2020, with the number of STI test kits capped at four per a year per a user for all boroughs.

Users need to register with SHL via the online webpage. To obtain an STI test kit, the user must complete an online consultation form. This consultation form will cover demographics, sexual history and STI risk (for example, to determine hepatitis C testing), and safeguarding questions. Consultation forms can triage users into appropriateness for remote STI testing pathways (for example if users had symptoms prior to the Covid-19 pandemic then were redirected to clinic based services, please see table 1 for more information). Once the user has completed the consultation form they order an STI kit and can collect the STI testing kit from a clinic-based SH service (smartkit) or request postal delivery (postal kit). The only other way of obtaining an STI test kit from SHL is via a direct order. A direct order is an STI test kit not associated with consultation form because they only occur in specific situations (e.g. repeat blood samples when samples cannot be tested due to haemolysis or an insufficient sample, or there is an equivocal HIV test result). In these cases, a repeat STI test kit is offered without having to repeat the consultation. A direct order STI test kit is made available to user via specific weblink or directly by SHL staff following discussion with user. Direct orders are a minority of SHL's STI test kits orders. 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.

Blood testing uses Roche Elecsys Duo fifth generation HIV test from self-obtained finger-prick sampling into a microtube vial (400-600 microlitres capillary blood required). Chlamydia and gonorrhoea nucleic acid amplification (NAAT) testing uses Roche Cobas from self-sampled urine, vaginal, anal throat specimens (as applicable). HIV screening is provided by SHL and confirmation testing is encouraged at clinic-based services. Syphilis and hepatitis B and C testing was excluded from this analysis. Results are communicated via an online web portal and by text message and/or email (depending on service user preferences) and by phone for reactive blood test results.

Eligible service users with a positive chlamydia result receive a unique online link on how to access postal chlamydia treatment through LloydsPharmacy Online Doctor. Referral to clinic-based services for chlamydia treatment was required for extra-genital infection sites and service users with symptoms until March 2020, and afterwards those with only those urgent symptoms and/or more than one STI were referred to clinic-based services. Oral contraception was not included in this analysis. Those who require gonorrhoea treatment are referred to clinic based services.

**METHODOLOGY**

This is a service evaluation of routinely collected SHL clinical service data from 8th January 2018 to 31st March 2022 of all completed consultation forms and STI test kit orders. This analysis focuses on HIV, chlamydia and gonorrhoea test outcomes. Direct orders were excluded due to lack of consultation information for these testing episodes. However, HIV test results from 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 test episode to maximise HIV testing information. This analysis was deemed a service evaluation and ethics was not required.

**Variables**

Table 1 details the data management of variables impacted by changes to the consultation forms since 2019. Single STI test kit orders were defined as users with one ordered STI test kit in the

evaluation time period. Repeat OPSS orders were grouped into those who had ordered STI test kits i) two to four times, ii) five to eight, and iii) nine or more times during the analysis period. Date of STI kit order, date of returned samples, date of test results, along with sufficient blood and NAAT samples, was provided. Time periods for test STI kit order are detailed in supplementary table 4.

NAAT test results for chlamydia, gonorrhoea and HIV serology were included. Positive chlamydia or gonorrhoea results refer to a positive NAAT at any of the genital and/or extragenital sites. HIV test outcomes were negative, reactive, insufficient (including haemolysed, out of protocol, out of validation, insufficient samples), equivocal or no sample returned. Where HIV direct order results were appended, this overrode the initial HIV testing result. HIV confirmation test results were not available for this analysis.

Chlamydia treatment outcomes were obtained from LPOD dispensing data, with date of treatment either posted to the user or collected from a pharmacy.

**Table 1. Details of SHL service changes and data management of variables due to changes to the triage form during the analysis period.**

| Variables | 8th January 2018-31st March 2019 | 1st April 2019-31st March 2020 | 1st April 2020- 31st March 2021 | 1st April 2021-31st March 2022 | Data management notes |
|---|---|---|---|---|---|
| Year STI test kit ordered (and triage form completed) | The implementation year of SHL for asymptomatic users and the original triage form. Number of test kits per a year per a user was limited to four. | The period of embedding OPSS into routine practice. Updates to the SHL triage 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 PrEP users. | |
| Gender | Female | Female | Female | Female | Trans category from January 2018 to March 2019 were re-categorised into the other category as unable to determine if trans female or trans male |
| | Male | Male | Male | Male | |
| | Trans | Trans female | Trans female | Trans female | |
| | | Trans male | Trans male | Trans male | |
| | | Non-binary | Non-binary | Non-binary | |
| | | Other | Other | Other | |
| Type of service user | Not available | Yes, within the last year | Yes, within the last year | Clinic and OPSS | Merged 'yes, within a year' and 'yes, over a year' |
| | | Yes, over a year ago | Yes, over a year ago | | |

| | | | | | |
|---|---|---|---|---|---|
| | | No, never | No, never | OPSS only | into 'Clinic and OPSS' group |
| Sexual orientation | Data was provided by SHL | | | | |

**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 OPSS user consultation information and chlamydia and gonorrhoea NAAT results (negative or positive). Insufficient samples and orders without a returned test kit were excluded from the logistic regression model. Crude odds ratio (ORs) and adjusted odds rations (aORs) are provided. Descriptive HIV test outcomes are provided. Analysis was performed on STATA v17.

**RESULTS**

During the evaluation period 1,476,187 orders were completed by 670,293 unique users. Median time to return of STI kits was 9 days (interquartile range, IQR 6-15 days), and median time from returned sample date to processing sample and result was 2 days (IQR 1-2 days). Median time to chlamydia treatment being posted to user, or collected from pharmacy, from STI kit order date was 11 days (IQR 8-18 days) and median time to chlamydia treatment being posted to user from the date the STI kit was received was 2 days (IQR 1-3 days) (missing 331 postal treatment dates).

Table 2 provides descriptive outcomes of the clinical care continuum for HIV, chlamydia, and gonorrhoea pathways. Table 3 and 4 show the associations between user demographics and OPSS service use for chlamydia and gonorrhoea outcomes, respectively.

Chlamydia and gonorrhoea positivity was 4.5% and 1.6%, respectively. Chlamydia positivity was highest in 16–20 year-olds (9.7%) compared to older ages, transwomen (7.6%) compared to other genders, black ethnicities (6%) compared to white/mixed/Asian/other ethnicities, the most deprived IMD (5.1%), same sex partners (6.4%) compared to other sexual orientations, and those who collected smartkits (6%) compared to postal kits. Whereas gonorrhoea positivity was highest in those 41 years old and older (2.8%) compared to younger ages, transwomen (8.1%) compared to other genders, and same-sex genders (6.4%) compared to other sexual orientations.

**Table 2. Uptake of SHL's clinical care continuum**

| | | Number of 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 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 results from a 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=868998) | Negative | 865,245/868,998 | 99.6 |
| | | Reactive | 2,716/868,998 | 0.3 |
| | | Equivocal | 1,037/868,998 | 0.1 |
| Of those with positive chlamydia results (n=52,076) | | | | |
| Postal treatment offered | | | 45,082/52,076 | 86.6 |
| Postal treatment dispensed via SHL services | | | 29,645/52,076 | 56.9 |
| Chlamydia treatment completed via another health care service or pathway | | | 20,661/52,076 | 39.7 |
| Unknown outcome (i.e. 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

**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 †(aOR, 95% CI)** | **p value** |
|---|---|---|---|---|---|---|
| **Age (years old)** | 16-20 | 7,930 (9.7) | 1 | | 1 | |
| | 21-25 | 17,741 (5.2) | 0.51 (0.50-0.53) | - | 0.51 (0.50-0.53) | - |
| | 26-30 | 13,066 (3.7) | 0.36 (0.35-0.37) | - | 0.34 (0.33-0.36) | - |
| | 31-35 | 6,450 (3.4) | 0.32 (0.31-0.33) | - | 0.29 (0.28-0.30) | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 36-40 | 3,200 (3.4) | 0.33 (0.31-0.34) | - | 0.28 (0.27-0.29) | - |
| | >=41 years old | 3,689 (3.8) | 0.36 (0.35-0.38) | - | 0.29 (0.28-0.30) | - |
| **Gender** | Cis female | 25,796 (3.9) | 1 | | 1 | |
| | Cis male | 25,851 (5.3) | 1.38 (1.35-1.40) | - | 1.31 (1.28-1.34) | - |
| | Trans female | 73 (7.6) | 2.03 (1.60-2.58) | - | 2.63 (2.00-3.47) | - |
| | Trans male | 40 (6.8) | 1.79 (1.30-2.47) | - | 1.97 (1.39-2.79) | - |
| | Non-binary | 186 (4.5) | 1.17 (1.01-1.36) | 0.034 | 1.39 (1.14-1.69) | 0.001 |
| | Other* | 130 (5.6) | 1.47 (1.23-1.75) | - | 1.70 (1.39-2.09) | - |
| **Ethnicity** | White | 29,662 (3.9) | 1 | | 1 | |
| | Black | 11,840 (6) | 1.57 (1.53-1.60) | - | 1.46 (1.43-1.49) | - |
| | Mixed | 7,728 (5.3) | 1.36 (1.33-1.40) | - | 1.26 (1.23-1.30) | - |
| | Asian | 1,275 (3.5) | 0.89 (0.84-0.94) | - | 0.92 (0.87-0.98) | 0.005 |
| | Other | 1,571 (5.4) | 1.40 (1.33-1.48) | - | 1.27 (1.20-1.34) | - |
| **IMD** | 1 – most deprived | 11,456 (5.1) | 1 | | 1 | |
| | 2 | 20,395 (4.7) | 0.91 (0.89-0.93) | - | 0.95 (0.92-0.97) | - |
| | 3 | 10,904 (4.2) | 0.81 (0.79-0.83) | - | 0.88 (0.86-0.91) | - |
| | 4 | 6,169 (3.9) | 0.75 (0.73-0.77) | - | 0.85 (0.82-0.87) | - |
| | 5 – least deprived | 2,933 (3.6) | 0.69 (0.66-0.72) | - | 0.79 (0.76-0.83) | - |
| **Sexual orientation** | Straight/ Heterosexual | 36,459 (4.1) | 1 | | 1 | |
| | Gay/ same-sex partners | 11,972 (6.4) | 1.60 (1.56-1.63) | - | 1.59 (1.54-1.63) | - |
| | Bisexual | 3,089 (4) | 0.96 (0.92-1.00) | 0.034 | 0.92 (0.89-0.96) | - |
| | Other | 556 (4.6) | 1.11 (1.02-1.21) | 0.017 | 0.83 (0.73-0.96) | 0.009 |
| **UK born** | Yes | 38,711 (4.3) | 1 | | 1 | |
| | No | 13,365 (5) | 1.15 (1.13-1.17) | - | 1.20 (1.17-1.22) | - |
| **Year STI test kit ordered (and consultation form completed)** | Jan 2018 – March 2019 (Implementation year) | 6,274 (4.3) | 1 | | 1 | |
| | April 2019 – March 2020 (Embedding year) | 10,332 (4.4) | 1.02 (0.99-1.05) | 0.231 | 1.04 (0.95-1.12) | 0.403 |
| | April 2020 – March 2021 (During COVID-19 pandemic) | 17,206 (4.8) | 1.11 (1.08-1.15) | - | 1.15 (1.05-1.25) | 0.002 |
| | April 2021 – March 2022 (post COVID-19 pandemic/recovery) | 18,264 (4.3) | 0.99 (0.96-1.02) | 0.615 | 1.04 (0.96-1.13) | 0.354 |
| **Type of access** | Postal | 46,741 (4.4) | 1 | | 1 | |
| | Smartkit | 5,335 (6) | 1.40 (1.36-1.44) | - | 1.37 (1.33-1.41) | - |
| **Type of service user** | Clinic and OPSS | 35,573 (4.4) | 1 | | 1 | |
| | OPSS only | 9,536 (4.9) | 1.12 (1.10-1.15) | - | 1.11 (1.08-1.13) | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Missing data | 6,967 (4.4) | 0.99 (0.96-1.01) | 0.387 | 1.05 (0.97-1.14) | 0.189 |
| **Single vs repeated OPSS STI test kit orders** | Single order | 11,167 (3.5) | 1 | | 1 | |
| | 2-4 orders | 21,640 (4.7) | 1.34 (1.31-1.37) | - | 1.37 (1.34-1.41) | - |
| | 5-8 orders | 12,984 (5.0) | 1.45 (1.42-1.49) | - | 1.46 (1.42-1.50) | - |
| | 9 or more orders | 6,285 (5,3) | 1.53 (1.49-1.58) | - | 1.49 (1.44-1.54) | - |

^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) cis-male, 16.3% (n=1988) cis female, 14.2% (n=1729) other gender, 7.8% (n=950) trans female, 4.7% (n=569) trans male

**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 † (aOR, 95% CI)** | **p value** |
|---|---|---|---|---|---|---|
| **Age (years old)** | 16-20 | 1,644 (2.0) | 1 | | 1 | |
| | 21-25 | 4,223 (1.2) | 0.61 (0.58-0.65) | - | 0.50 (0.48-0.54) | - |
| | 26-30 | 4,812 (1.4) | 0.67 (0.64-0.71) | - | 0.43 (0.41-0.46) | - |
| | 31-35 | 3,415 (1.8) | 0.88 (0.83-0.94) | - | 0.44 (0.41-0.47) | - |
| | 36-40 | 2,071 (2.2) | 1.10 (1.03-1.17) | 0.005 | 0.44 (0.41-0.47) | - |
| | >=41 | 2,728 (2.8) | 1.40 (1.32-1.49) | - | 0.42 (0.40-0.45) | - |
| **Gender** | Cis female | 3,973 (0.6) | 1 | | 1 | |
| | Cis male | 14,622 (3) | 5.14 (4.96-5.32) | - | 1.99 (1.90-2.07) | - |
| | Trans female | 77 (8.1) | 14.6 (11.54-18.47) | - | 4.30 (3.24-5.71) | - |
| | Trans male | 24 (4.1) | 7.11 (4.72-10.71) | - | 2.30 (1.32-3.17) | 0.001 |
| | Non-binary | 144 (3.5) | 6.09 (5.14-7.21) | - | 1.72 (1.37-2.16) | - |
| | Other* | 53 (2.3) | 3.90 (2.97-5.13) | - | 1.38 (1.02-1.87) | 0.038 |
| **Ethnicity** | White | 12,453 (1.7) | 1 | | 1 | |
| | Black | 2,719 (1.4) | 0.83 (0.80-0.87) | - | 1.37 (1.31-1.44) | - |
| | Mixed | 2,670 (1.8) | 1.10 (1.06-1.15) | - | 1.21 (1.15-1.26) | - |
| | Asian | 479 (1.3) | 0.80 (0.73-0.87) | - | 0.99 (0.90-1.08) | 0.760 |
| | Other | 572 (2) | 1.20 (1.10-1.31) | - | 0.97 (0.89-1.06) | 0.484 |
| **IMD** | 1 – most deprived | 4,030 (1.8) | 1 | | 1 | |
| | 2 | 7,921 (1.8) | 1.01 (0.97-1.05) | 0.749 | 0.95 (0.92-0.99) | 0.020 |
| | 3 | 4,023 (1.6) | 0.85 (0.82-0.89) | - | 0.87 (0.83-0.91) | - |
| | 4 | 2,031 (1.3) | 0.71 (0.67-0.75) | - | 0.77 (0.73-0.82) | - |
| | 5 – least deprived | 786 (1) | 0.53 (0.49-0.57) | - | 0.64 (0.59-0.69) | - |
| **Sexual orientation** | Straight/Heterosexual | 5,046 (0.6) | 1 | | 1 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Gay/same-sex partners | 11,733 (6.4) | 11.89 (11.49-12.26) | - | 7.83 (7.50-8.17) | - |
| | Bisexual | 1,680 (2.2) | 3.86 (3.65-4.08) | - | 3.50 (3.30-3.70) | - |
| | Other | 434 (3.6) | 6.47 (5.86-7.15) | - | 4.47 (3.81-5.25) | - |
| **UK born** | Yes | 12,686 (1.4) | | 1 | 1 | |
| | No | 6,207 (2.3) | 1.64 (1.59-1.69) | - | 1.16 (1.12-1.20) | - |
| **Year STI test kit ordered (and consultation form completed)** | Jan 2018 – March 2019 (Implementation year) | 1,729 (1.2) | 1 | | 1 | |
| | April 2019 – March 2020 (Embedding year) | 3,434 (1.5) | 1.23 (1.163-1.31) | - | 1.09 (0.94-1.26) | 0.272 |
| | April 2020 – March 2021 (During COVID-19 pandemic) | 6,466 (1.8) | 1.52 (1.44-1.60) | - | 1.30 (1.11-1.51) | 0.001 |
| | April 2021 – March 2022 (post COVID-19 pandemic/recovery) | 7,264 (1.7) | 1.44 (1.37-1.52) | - | 1.24 (1.06-1.44) | 0.007 |
| **Type of access** | Postal | 16,946 (1.6) | 1 | | 1 | |
| | Smartkit | 1,947 (2.2) | 1.40 (1.33-1.46) | - | 1.44 (1.37-1.52) | - |
| **Type of service user** | Clinic and OPSS | 15,200 (1.9) | 1 | - | 1 | - |
| | OPSS only | 1,756 (0.9) | 0.48 (0.45-0.50) | - | 0.71 (0.67-0.75) | - |
| | Missing | 1,937 (1.2) | 0.64 (0.61-0.67) | - | 0.91 (0.79-1.05) | 0.208 |
| **Single vs repeated OPSS STI test kit orders** | Single order | 2,754 (0.87) | 1 | | | |
| | 2-4 orders | 6,555 (1.4) | 1.64 (1.57-1.71) | - | 1.34 (1.28-1.41) | - |
| | 5-8 orders | 5,900 (2.3) | 2.68 (2.56-2.81) | - | 1.69 (1.61-1.77) | - |
| | 9 or more orders | 3,684 (3.2) | 3.72 (3.54-3.91) | - | 1.89 (1.79-1.99) | - |

^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) cis-male, 16.4% (n=1981) cis female, 14.2% (n=1717) other gender, 7.8% (n=939) trans female, 4.6% (n=562) trans male

**DISCUSSION**

To date this is the largest UK analysis of OPSS with nearly 1.5 million test orders across London, over a four year evaluation period, with a high proportion of positive chlamydia NAATs amongst 16-20 year olds at 9.7%, reflecting the 10% of positivity rates seen in the nationally chlamydia screening programme in the UK for 15-24 year olds [7]. In 2018 SHL found STI positivity to be 15.2-16.4% in those aged 16 and 17 years old, suggesting positive engagement of OPSS services with young people [8].

**Return rates and sufficient sampling**

The 79.5% return rate of chlamydia and gonorrhoea NAATs is higher than reported return rates in a recent scoping review (between 48.3%–78.4%) [5]. Processable NAATs ('sufficient samples') of returned STI test kits was 98.7-99%. The high return rate may be related to how SHL services have been embedded in sexual health care pathways over the last four 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, including restrictions in attending clinic-based services [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 all STI kit orders and this compares to 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, taking into account appended HIV 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 six month evaluation period in 2017 and therefore we need to cautious in comparing these figures. Reasons for not returning kits may reflect 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 had a recent STI test with SHL or elsewhere. Triangulation of online STI testing data with clinic-based SH 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. Whilst SHL has the highest return rates, up to 32.3% of blood testing kits and 20.5% of NAATs are not being utilised. However, this needs to be balanced by the benefits of OPSS, with UKHSA's national online HIV testing service testing 26% of OPSS users who had not previously tested for HIV and 19.4% of users in this evaluation with chlamydia and 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 SH services (10.3%– 14.4%) [5]. SHL was an asymptomatic testing service prior to the COVID-19 pandemic and users with symptoms were redirected to clinic-based services. During the COVID-19 pandemic urgent symptoms were still redirected to clinic-based services and these factors may contribute to a lower positivity rate.

Both chlamydia and gonorrhoea NAAT positivity was associated with an increased adjusted odds for those who were non cis women, black and mixed ethnicities, same-sex sexual orientation, non-UK born, testing during the first year of COVID-19, smartkit users, and repeat OPSS users. The 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 has 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 to 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 if OPSS is preferred by these populations possibly due to concerns of trust and stigma in clinic-based services. However, the absolute numbers are small in comparison to cis women and cis men 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 high risk behaviours seeking care from a clinic-based SH service before being redirected to OPSS. Increased adjusted odds for chlamydia and gonorrhoea positivity was observed with increased test orders. This might be related to 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 whether people used OPSS-only or both clinic-based and OPSS. Whilst there was increased chlamydia positivity (aOR 1.1;95% CI 1-1.13) in OPSS-only users there was reduced gonorrhoea positivity (aOR 0.71; 95% CI 0.67-0.75) suggesting possible differences in symptom profile of users and triage pathways for these infections.

Some major limitations to the logistic regression model include the lack of data on number of sexual partners, PrEP use, symptoms and condomless sex. Also, non-UK born doesn't account for difference in Anglosphere countries as the SHL website is only available in English, but this 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 blood borne virus (BBV) outcomes from OPSS would help our understanding of how best to utilise OPSS BBV testing.

**Treatment**

Treatment outcomes demonstrate a high uptake of remote chlamydia treatment compared to other OPSS services (56.7% with SHL vs 46% in Birmingham) [2]. Follow-up of positive chlamydia cases found a further 39.7% had accessed chlamydia treatment elsewhere, meaning 96.6% of SHL users had chlamydia treatment outcomes, compared to 82% of chlamydia positive service users in Birmingham [2]. This could be due to a number of factors, including the need for remote health care 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, which may have influenced treatment uptake, including widening of treatment for positive chlamydia results at extra-genital sites and treatment of some symptomatic service users. However, it would be helpful to have further descriptive details on the operational pathways of OPSS services for better comparison, for example, SHL allow changes to delivery address for medication, but it is not clear if this possible with other OPSS. Time to dispatch of treatment from order of testing kit was 11 days, but only 2 days once the test kit was returned, but time to users taking treatment, taking into account postal delivery times, is unknown.

**Limitations**

This is a retrospective evaluation of service data, over a four-year period. The service has undergone several changes during this evaluation period, ranging from changes to the consultation questions, widening of access (for example increasing the number of test kit orders available in some boroughs, unlimited test kit orders for those taking PrEP, and widening accessing to symptomatic users and STI contacts), the development of new services (such as contraception, but not included in this review) which may have influenced service use. Whilst 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, this evaluation did not review the user demographics of non-returned or insufficient samples, and did not include user perspectives, as this was outside the scope of this evaluation.

The Genitourinary Medicine Clinic Activity Dataset (GUMCAD) codes, used for national surveillance, were not provided for this evaluation, but regardless of the lack of GUMCAD data there are limitations in the lack of standardised data definitions for process outcomes in OPSS evaluations [20]. The OPSS clinical care pathway has additional steps to traditional consultation styles. Each of these steps should have standardised definitions in regards to completeness (e.g. drop off rates of consultation form, STI test kit orders) and return rates (e.g. return of samples, sufficient samples for testing) to support future evaluation work. Lastly, we were unable to compare to clinic-based data. However, there are difficulties in comparing to clinic-based data because different patient identifiers are used and therefore, we are unable to track users between clinic-based and OPSS services.

**NEXT STEPS AND CONCLUSION**

Our evaluation has highlighted areas for SHL to review. More needs to be done to improve equity of access particularly in deprived IMD areas and for different ethnicities. Blood return rates remain low with OPSS and methods to optimise this should be reviewed. Improved data definitions for OPSS service outcomes would support future evaluation work and lastly, further work is needed to combine clinic-based services with OPSS to truly understand STI testing uptake in London.

This is the largest analysis of OPSS outcomes in UK sexual health testing services for chlamydia, gonorrhoea, and HIV, over a long evaluation period. These data also demonstrate the occurrence of STI testing in populations who have not previously accessed sexual health services and granular data on the increased odds of chlamydia and gonorrhoea in those who are non cis gendered.

**Key Messages**

1. The number of online postal sexual health screening services in the UK has increased over the last ten years - this is the largest service evaluation to date, including 1,476,187 STI completed test kit orders and 670,293 unique users.
2. We found an increased likelihood of positive chlamydia and gonorrhoea in all gender groups compared to cis women, and we are the first to report STI associations in non-binary groups.
3. Chlamydia test positivity amongst 16-20 year olds was 9.7%, reflecting national chlamydia screening data of 10% in 15-24 year olds.

**COMPETING INTERESTS**

VT received supplementary funding from City of London to undertake the analysis. However, City of London had no role in the design of the evaluation. No other competing interests were declared.

**FUNDING**

VT received partial funding from City of London to support her work on this analysis.

**CONTRIBUTIONS**

VT designed, supported data acquisition, analysed, and drafted the manuscript. JS, AT led on the data acquisition. SD and AK supported data acquisition. SD, AT, AH, JG, FB, AS supported the design, analysis and drafting of the manuscript. AS conceived the evaluation. All authors supported revision of the manuscript.

**ETHICS**

This project was seemed a service evaluation and has been registered with Chelsea and Westminster NHS Foundation Trust.

**REFERENCES**

1) Spotlight on sexually transmitted infections in London: 2022 data. (website accessed 01/06/2024 https://www.gov.uk/government/publications/sexually-transmitted-infections-london-data/spotlight-on-sexually-transmitted-infections-in-london-2022-data)
2) Banerjee P, Thorley N, Radcliffe. 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(10):974-079.
3) Barnard S, Free C, Bakolis I, Turner KME, Looker KJ, Baraitser P. Comparing the characteristics of users of an online service for STI self-sampling with clinic service users: a cross-sectional analysis. Sex Transm Infect. 2018 Feb 7
4) Syred J, Holdsworth G, Howroyd C, Spelman K, Baraitser P. Choose to test: self-selected testing for sexually transmitted infections within an online service. Sex Transm Infect. 2019; 95(3):171-174
5) Sumray K, Lloyd K, Estcourt CS, Burns F, Gibbs J. Access to, usage and clinic outcomes of, online postal sexually transmitted infection services: a scoping review Sex Transm Infect. 2022 Jun 14;98(7):528-535
6) SHL. Sexual Health London. SHL. [online] 01 June 2020 https://www.shl.uk/
7) PHE. Sexually transmitted infections and screening for chlamydia in England, 2019. 2020. (website accessed 13/01/2024 Sexually transmitted infections and screening for chlamydia in England, 2019 (publishing.service.gov.uk))
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;98:346–352.
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. 10.1136/sextrans-2020-054768 - DOI - PubMed
11) PHE. National HIV self-sampling service – two year service report. November 2015-October 2017. 2018
12) Elliot E, Rossi M, McCormack S, McOwan A. Identifying undiagnosed HIV in men who have sex men (MSM) by offering HIV home sampling via online gay social media: a service evaluation. Sex Transm Infect. 2016 Sep;92(6):470-3

13) PHE. National HIV self-sampling service – two year service report. November 2015-October 2019. 2020
14) Ayinde O, Jackson L, Phattey, Ross JDC. STI testing and subsequent clinic attendance amongst test negative asymptomatic users of an internet STI testing service; one-year retrospective study. PLoS One. 2023 Feb 8;18(2).
15) Banerjee P, Madhwapthi V, Thorley N, Radcliffe K. 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(7) 613-618.
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, Vol. 0(0) 1–7.
17) UKSHA. Official statistics. Sexually transmitted infections and screening for chlamydia in England:2022 report [online] 15 November 2023 Sexually transmitted infections and screening for chlamydia in England: 2022 report - GOV.UK (www.gov.uk)]
18) Day S, Khan K, Kelly A, Jones S, Kinsella R. Characteristics of newly diagnosed HIV-positive service users using a pan-London e-sexually transmitted infection screening service. Int J STD AIDS. 2021 Oct;32(11):1036-1042
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 14(12):e1002479
20) UKSHA. GUMCAD data specification and technical guidance.GOV.UK [online] 03 March 2022 https://assets.publishing.service.gov.uk/media/618d304d8fa8f50381640238/GUMCAD_data_specification_and_technical_guidance_2021.pdf]