**The *e*Sexual Health Clinic System for Sexually Transmitted Infection Management, Prevention and Control: Exploratory studies in people testing for *Chlamydia trachomatis***

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**Word count: 3469**

**Key words:** *e*Health, *e*Prescribing, online clinical care pathway, sexual health, chlamydia trachomatis, sexually transmitted infections, partner notification, surveillance

**ABSTRACT**

**Background:** Self-directed and internet-based care are key elements of *e*Health agendas. We developed a complex online clinical and public health intervention, the *e*Sexual Health Clinic (*e*SHC). Patients with genital chlamydia are diagnosed and medically managed via an automated online clinical consultation, leading to antibiotic collection from a pharmacy. Partner notification, health promotion and surveillance data capture are integral.

**Methods:** We assessed safety and feasibility of the *e*SHC as an alternative to routine care in non-randomised, exploratory proof-of-concept studies, 07/2014-03/2015. Participants were 1) untreated chlamydia-positive Genitourinary Medicine (GUM) clinic patients; 2) untreated chlamydia-positive patients from six National Chlamydia Screening Programme (NCSP) areas’ online postal testing service; 3) chlamydia-negative NCSP postal users. We evaluated proportion treated, safety, time to treatment, partner notification, engagement with telephone support, engagement with health promotion.

**Findings:** GUM: of 197 eligible patients, 161 accessed results online, 116 consented, 97% (112/116, 95%CI 91-99%) received treatment (74 exclusively online, in median 1 day). NCSP: of 146 eligible patients, 134 accessed results online, 105 consented, 89% (93/105, 95%CI 81-94%) received treatment (60 exclusively online in median 1 day). 6% (28/482) sexual partners were managed online. 89% (1776/1936) NCSP chlamydia-negative people accessed results online. No adverse events were recorded.

**Interpretation:** The *e*SHC is safe and feasible for management of chlamydia-positive patients with preliminary evidence of comparable treatment outcomes to traditional services. This innovative *e*Health model could address growing clinical and public health needs. A definitive trial is needed to assess the efficacy, cost-effectiveness and public health impact of this intervention.

**Funding:** UKCRC

**INTRODUCTION**

Solutions to delivering well-evidenced, quality interventions in innovative and efficient ways are needed if we are to meet the growing health needs of the population. Digital technologies provide opportunities for alternative modes of health care delivery and for public health interventions (*e*Health). UK health strategy strongly supports development of *e*Health and self-managed care, with the aim of increasing both quality and accessibility of health care whilst reducing total health expenditure.1,2 However, current *e*Health provision for medical management is mostly limited to monitoring or support for people with chronic conditions which have been diagnosed in traditional care settings.3 Yet the potential impact of *e*Health extends beyond the individual. For example, for infectious diseases, *e*Health interventions could facilitate risk reduction strategies, provide clinical management of cases and interrupt transmission in the population.

*Chlamydia trachomatis*, the most commonly reported bacterial STI in the UK (220,000 reported cases per year in England)4 predominantly affects 16-24 year olds4 – an age group which uses digital technology avidly.5 The National Chlamydia Screening Programme (NCSP) was established in England in 2003, offering opportunistic screening to young sexually-active men and women. Untreated and repeat infections may result in serious and costly reproductive health sequelae.6 Around half of all cases of chlamydia are managed within genito-urinary medicine (GUM) / Sexual Health services, which offer open-access specialist care without the need for general practitioner (GP) referral. In England, data on new diagnoses are submitted to Public Health England (PHE) by the service provider or laboratory for surveillance purposes.Recommended first line antibiotic therapies include azithromycin, given as a single oral dose.7 Uncomplicated chlamydia could therefore be an appropriate candidate for an *e*Health intervention. However, a systematic review of contemporary mobile applications for people seeking information about STIs did not find any apps which provided a diagnosis and clinical care online. 8

As part of the *e*STI2 Consortium ([www.esti2.org.uk)](http://www.esti2.org.uk)), we developed an *e*Sexual Health Clinic System for STI management, prevention and control (*e*SHC) which includes an innovative *Online Chlamydia Pathway* (Figure 1). The *e*SHCenables a user to receive a new medical diagnosis, and follow an automated online clinical consultation, leading to collection of appropriate treatment from a community pharmacy. Care is self-directed and achievable entirely remotely from traditional medical services. Through sexual health promotion, treating cases and partner notification, the *e*SHC System could improve STI control and reduce incidence of *Chlamydia trachomatis*. The greatest impact would occur by targeting young people who (1) engage with new technologies; (2) have the highest STI rates; (3) may not engage with health services; and (4) expect information to be delivered rapidly and in a way that addresses individual need.

The *e*SHC meets legal and regulatory requirements and national standards for medical management,7,9,10 anddata protection.11,12To our knowledge, this is the first of its kind within the NHS and internationally. Here we describe this complex intervention and report on exploratory studies to assess its safety and feasibility in GUM services and within the NCSP, and public health potential.

**METHODS**

Based on the Medical Research Council (MRC) Framework for the development of complex interventions, we conducted extensive multidisciplinary, mixed-methods preliminary work.3,8,13-18 This included in-depth scrutiny of the legal and regulatory requirements of online care, a review of sexual health apps,8 addressing issues in linking online pathways to surveillance,18 and qualitative interviews in young people exploring acceptability13 and user-centred design and interface testing.16 We developed the “*e*Clinical Care Pathway Framework”, a novel structure for creation of online complex clinical care pathways, which we applied to develop the *e*SHC system.15

**Description of the *e*Sexual Health Clinic system and *Online Chlamydia Pathway* (**

The *e*SHC system (Figure 1) consists of a web application with different portals for patients, results administrators, health advisers, and researchers. The patient interface includes a results service, access to health promotion and the *Online Chlamydia Pathway*.

*Online Chlamydia Pathway:* After providing online consent, chlamydia positive patients engage in an automated online consultation (a clinical decision-making tool) (Figure 1). This adheres to national guidance for chlamydia management7 and includes assessment of symptoms, past medical history, medication and allergy history, sexual history and a risk assessment. It encompasses all clinical and public health surveillance data routinely collected in traditional services. If medically appropriate, the patient nominates one of 30 participating community pharmacies from which to collect antibiotic treatment. Treatment is authorised via automated email sent via secure NHS email. Sexual partners of people with chlamydia are recommended to receive treatment7 (partner notification). Index patients may request a unique access code for their sex partners to access care via the *Online Chlamydia Pathway.*

Patients whom the clinical algorithm predicts are inappropriate for online care (e.g. symptoms, allergies, drug interactions) are directed to call the clinical helpline, enabling the health advisers to facilitate face-to-face care.

**Exploratory studies:**

In order to evaluate safety, feasibility and public health potential, we conducted three non-randomised proof-of-concept exploratory studies in different groups of participants across Greater London. GUM clinics and NCSP have different socio-demographic, behavioural and clinical mixes, and different proportions of patients receiving treatment under current routine care. Different effects of the pathway are therefore also expected and thus we do not compare characteristics or outcomes of the two patient populations.

**Participants and settings:**

1) Chlamydia-positive untreated patients from two GUM clinics serving socio-economically deprived, ethnically-diverse local populations and a commuter population. We hypothesised that the *e*SHC could be used to complement face-to-face specialist care by managing uncomplicated cases.

2) Chlamydia-positive patients tested through the “Checkurself” NCSP online postal self-sampling service in six NCSP areas serving South London, where chlamydia prevalence is high. The Checkurself service enables people aged 16-24 years to request a self-sampling kit online. Users post a urine (men) or vulvo-vaginal swab sample (women) back to the laboratory for testing and results are received via SMS, letter or phone. Those with positive test results are managed via traditional services (e.g. GUM clinics, primary care). This study was designed to allow assessment of feasibility in a group of potential users who have already engaged with online care, and where, if successful, there would be the possibility of scale up within the NCSP.

3) Chlamydia-negative users of the Checkurself NCSP postal self-sampling service in the six areas above. This was designed to enable assessment of uptake and timing of use of the *e*SHC to access results and health promotion.

**Recruitment:**

***GUM settings****:* The *e*SHC sent an automated SMS to eligible patients, informing them that their test results were ready and inviting them to follow a link to a password protected web-app, designed specifically for the study, to access their result (online results service), and then online treatment.

***NCSP online postal self-sampling service:*** For chlamydia positive patients, the process was the same as for GUM patients.

Chlamydia negative users received an automated SMS containing a link to the online results service followed by health promotion advice and a short acceptability survey.

**Exclusion criteria** were age under 16 years,co-existing STIs, having already received presumptive treatment for chlamydia, and extra-genital chlamydia.

Research health advisers telephoned all patients two weeks after diagnosis for clinical follow-up, ascertainment of partner notification outcomes and collection of research data.

People who declined study participation were managed according to routine clinical practice.

**Outcome measures**

The primary outcome measure was the proportion of genital chlamydia positive patients who had consented to the *Online Chlamydia Pathway* (index patients) who then received appropriate clinical management7,10 either exclusively through the online element of the *Online Chlamydia Pathway* (“treatment online”) or via a combination of online management and face-to-face care. We were only able to collect demographic data and outcomes on patients who consented to the study. Quantitative secondary outcome measures included: proportion of index patients who received antibiotic treatment *solely* online; time from index patient receiving diagnosis to receiving appropriate treatment; proportion of sex partners treated online. Adverse treatment outcomes were captured.

**Ascertainment of primary outcome**

Treatment outcomes were captured by the *e*SHC system when the community pharmacist confirmed electronically that treatment had been collected. Treatment outcomes for patients who left the *Online Chlamydia Pathway* at any stage were ascertained: 1) at clinical follow-up telephone assessment; 2) from clinical records from participating clinics and NCSP services. Patients uncontactable at telephone follow up and for whom there was no clinical record of treatment were assumed to be untreated.

**Sample size**

We calculated the required sample size, based on the primary outcome measure. We aimed to demonstrate non-inferiority of the *e*SHCi.e. that treatment outcomes for index patients are better or only slightly worse than current routine care, whilst assuming the online pathway would in fact lead to a small improvement in outcomes. We calculated sample sizes separately for the exploratory studies in GUM and NCSP, as the current proportion of GUM patients who receive appropriate treatment is around 98% and for NCSP patients is estimated to be around 88%19. For GUM patients, if the true proportion of index patients receiving appropriate treatment is in fact slightly higher than current care (at 99%), then 121 patients would provide 80% power to demonstrate that the proportion is greater than 94% (i.e. demonstrate non-inferiority assuming a non-inferiority margin of 4%). Assuming that the proportion of index patients treated would be slightly higher than currently in the NCSP (at 90%) 108 patients were needed to show it is greater than 80%, i.e. to demonstrate non-inferiority to current NCSP treatment rates (88%), assuming a non-inferiority margin of 8%. The sample size calculations assume one-sided statistical tests and a 2.5% significance level. The function ‘sampsi’ was used in Stata specifying a single sample, prevalence of 99% in GUM and 90% in NCSP as the alternative hypothesis and 94% for GUM and 80% for NCSP as null hypothesis. A smaller non-inferiority margin was selected for GUM than for NCSP patents because in GUM the treatment rate under current care is higher and therefore any reduction in the rate translates to a higher proportionate increase in the numbers untreated.

**Statistical analyses**

The proportion of index patients achieving the primary outcome is reported for each setting with an exact binomial 95% confidence interval, derived using command ‘cii prop’ in Stata 14. These two-sided 95% confidence intervals provide the basis of assessing non-inferiority in each setting, corresponding to one-sided tests at a 2.5% significance level. We plotted cumulative percentage of time to treatment.

**Ethical approval** was granted by Brighton & Sussex (NHS) Research Ethics Committee, REC reference 13/LO/1111; IRAS project ID: 112513.

**Role of the funding source**

The study sponsors had no role in study design; collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

**RESULTS**

During the study period (21/07/2014 - 13/03/2015), 2340 people entered the *e*SHC (Figure 2). 197 chlamydia-positive patients (70 men, 127 women) were recruited from GUM clinics and 146 (66 men, 80 women) from NCSP areas. Eighty-two percent of GUM patients (161/197 (95% CI: 76-87)) and 92% of NCSP patients (134/146 (95% CI: 87-96)) accessed their results via the online results service within seven days of receiving the SMS. Reporting of further analyses in chlamydia-positive patients is limited to those who consented (72% (116/161) GUM patients and 78% (105/134) NCSP patients).

**Exploratory study 1: Chlamydia-positive GUM patients.**

Participant characteristics are shown in Table 1. Figure 2 shows the flow of GUM patients through the *e*SHC. Eighty-six percent (36/42) of men and 62% (46/74) of women completed the online consultation and had treatment authorised. Of these, 89% (32/36) of men and 91% (42/46) of women collected their treatment from the chosen pharmacy. Of the 34 patients who left the online pathway, 73% (three men, 23 women) reported symptoms and needed assessment as to whether examination, further investigations and treatment for complicated chlamydia were indicated. Thirty out of 34 are known to have received treatment, with four lost to follow-up.

Overall, 97% (112/116, 95%CI 91-99%) of patients are known to have been treated (either via the *e*SHCor through traditional services) (Table 2), with 74 patients (74/116, 64%) completing the online consultation and collecting their treatment at their chosen pharmacy. Three-quarters (54/74, 76%) of the online patients did not contact the clinical helpline. 43% (32/74) of patients accessed their treatment on the same day as receiving the SMS (shortest time from receiving the SMS to collecting treatment from the pharmacy was 32 minutes) (Figure 3). By the end of the following day, 76% (56/74) had accessed their treatment.

Eighty-three out of 116 patients completed the online consultation at least as far as the section requiring reporting sexual partner numbers (one subsequently left the online pathway). They, reported 253 sexual partners within the past six months. 15 sexual partners accessed the *e*SHC (12 collected their treatment from their chosen pharmacy, two were treated elsewhere and one was lost to follow-up).

Twenty-nine percent (34/116) accessed health promotion resources, with 16% (18/116) logging back in to do so, and 32% (11/34) followed links to access further information.

**Exploratory study 2: Chlamydia-positive NCSP patients.**

Demographic and behavioural characteristics of Chlamydia-positive NCSP participants are described in Table 1. 82% (37/45) of men and 53% (32/60) of women completed the online consultation and had treatment authorised (Figure 2). Of these, 89% (33/37) of men and 84% (27/32) of women collected their treatment from the chosen pharmacy. Of the 36 patients who left the online pathway, 78% (25/36) (6 men, 19 women) reported symptoms. 27/36 are known to have received treatment, with nine lost to follow-up.

Overall, 89% (93/105, 95%CI 81-94%) of NCSP patients are known to have been treated (Table 2), with 60 patients (60/105, 57%) completing the online consultation and collecting their treatment at their chosen pharmacy. 83% of these patients accessed treatment completely remotely without using the clinical helpline. 45% (27/60) of patients accessed their treatment on the same day (Figure 3), with 67% (40/60) having accessed their treatment by the end of the following day.

71 patients reported 199 sexual partners online. 13 sexual partners accessed the *e*SHC, of whom seven collected treatment from their chosen pharmacy, two received treatment elsewhere and four have unknown treatment outcomes.

Thirty-one percent (32/105) accessed health promotion resources, with 16.2% (17/105) logging back in to do so, and 28% (9/32) followed links to access further information.

No patients reporting contraindicated health conditions, existing interacting drug therapy, or relevant allergies were prescribed azithromycin via the online pathway. No serious adverse reactions to azithromycin were reported.

**Exploratory study 3: Chlamydia-negative NCSP users.**

Of the 1997 users who tested negative for genital chlamydia, of whom 89% (1776/1997) accessed their test results within seven days, using the online results service. Twenty-four percent (433/1776) accessed health promotion resources, of whom 33% (142/433) followed links to access further information.

**DISCUSSION**

We have rigorously developed, implemented and evaluated a world-first in online medical care, and demonstrated its feasibility and safety and in exploratory studies. Each study provides information that can be used to refine the intervention, and shows how it can be utilised in different settings. The *e*SHCis unique in integrating online results access with an automated e clinical consultation, authorisation of antibiotics, partner notification, routing of patients into traditional care where appropriate, and potential linkage to surveillance (see Box 1 and Panel).

Patient outcomes were comparable to those reported by traditional services. Relative to our pre-specified margins, we demonstrated non-inferiority of the proportion treated by the eSHC relative to current care for NCSP patients but not for GUM patients. While outcomes are encouraging, they should be viewed as preliminary evidence of effectiveness. The target sample size for the primary outcomes in both GUM and NCSP was narrowly missed and the small numbers prohibited sub-analyses.

Around three-quarters of eligible people chose to access the *Online Chlamydia Pathway* and approximately two-thirds of patients managed their care completely remotely, while others moved effectively between online, telephone and clinic-based care. Almost one quarter of patients contacted the clinical helpline at some point, suggesting that provision of telephone support is important. Those who were directed off the online pathway for clinical reasons were for the most part successfully managed in traditional care settings. More women than men reported symptoms suggestive of complicated infection, in line with clinical expectations6 hence the higher proportion of women routed into face-to-face clinical assessment. A small number of patients failed to collect their treatment from the pharmacy but the majority of these accessed treatment elsewhere.

The online consultation facilitated safe prescribing. Integral to the *e*SHC is a sophisticated triage system which allows individuals who need to be seen face-to-face to be fast-tracked to a sexual health clinic or other services.

People with chlamydia require prompt treatment10(at the time of the exploratory studies, the NCSP aims to treat 95% of patients within six weeks20), both to reduce development of sequelae and to limit the infectious period, thereby reducing opportunities for onward transmission of infection. The swift treatment afforded online through the *e*SHC could confer important personal and public health gains, especially in people who report high sexual risk behaviours, such as the participants in our study.  Similarly, the *e*SHC could be advantageous for people requesting internet-based postal self-sampling, as they are more likely to report high risk behaviours compared to other community populations21 and an increasing proportion of chlamydia screening tests are being requested and commissioned via this route.21 Management of exposed sex partners of people with chlamydia is challenging.22,23 We showed proof of concept for partner management online but few partners were managed this way.

In order to interrupt chlamydia transmission there is a need to increase testing in all young people, with a focus on those who are at high risk but are not accessing testing and engaging with care in traditional settings. STIs themselves, and the groups who are more likely to be diagnosed with STIs, are often stigmatised. Assuming a person can take the first step online, the *e*SHC also provides opportunities for people experience barriers to accessing existing services. However, to achieve a reduction in population chlamydia incidence, *e*Health interventions would need to be one of many components of a comprehensive chlamydia control strategy.

The ability to provide automated surveillance information from both community and secondary care settings, and transfer these data to national surveillance systems, is essential for monitoring trends, identifying areas where local delivery needs enhancement and informing public health needs.. In line with the NHS Five Year Forward View24, the NCSP model is based on local delivery and this research demonstrates that the *e*SHC is feasible in this context, using a range of configurations for health service and screening programme delivery. However, it also highlights the complexity of collecting online data for both surveillance and clinical purposes whilst keeping the patient engaged with the pathway. Advances in STI self-testing diagnostics, which enable people to test and be diagnosed completely unlinked to medical care, pose additional challenges for public health surveillance18 and prevention.

Further work is needed before wider implementation of the *e*SHC. The current *e*SHC system is not interoperable with, or directly embedded within, existing health service information technology systems; this will be required for delivery at scale. All aspects of the intervention need refining, including optimising health promotion uptake, partner notification uptake and provision for partner testing, in line with national recommendations. 10. Evaluation in randomised controlled trials25 which include health economic analysis to assess cost-effectiveness is essential; these exploratory studies provide the key information needed for the design and delivery of such RCTs. All aspects of the intervention need refining, including optimising health promotion uptake, partner uptake and provision for partner testing, in line with national recommendations.10 Acceptance from health care professionals and commissioners will underpin adoption into mainstream care. However, despite strong political support, 1,26 the digital infrastructure and regulation of online medical care within the UK’s NHS remains outdated. The potential for *e*Health to improve health outcomes is likely to be limited if these issues are not systematically addressed.26

With modification, this pathway could be used for other bacterial infections for which a standard first line antibiotic is recommended, such as streptococcal pharyngitis. Combined with a home self-test, it may be possible for a person to self-test, self-diagnose and self-manage remote from traditional health services. Rapid progress in home diagnostics for multiple conditions, combined with the ability to inter-weave targeted health promotion, provide opportunities for diverse *e*Health interventions. However, effectiveness of primary prevention activities such as health promotion delivered in this format would need to be evaluated alongside face to face alternatives.

The integrated *e*SHC system, and the promising findings of these exploratory studies, indicate that this is an innovative model that could address growing population health needs. The eSHC’s reach goes beyond sexual health in the UK; it could apply more broadly across infections and non-communicable diseases in both developed and developing countries.

**ACKNOWLEDGEMENTS**

The Electronic Self-Testing Instruments for Sexually Transmitted Infection (*e*STI2) Consortium is funded under the UKCRC Translational Infection Research (TIR) Initiative supported by the Medical Research Council (Grant Number G0901608) with contributions to the Grant from the Biotechnology and Biological Sciences Research Council, the National Institute for Health Research on behalf of the Department of Health, the Chief Scientist Office of the Scottish Government Health Directorates, and the Wellcome Trust.

We are very grateful to the following people and organisations for their helpful contributions to this study: the participants; staff at participating GUM clinics - Barts Health Sexual Health Services, Barts Health NHS Trust, Courtyard Clinic, St George’s Hospital, St George’s Health Care Services (particularly Gordon Proctor, Merle Symonds, Wendy Majewska and Mariam Tarik); NCSP area teams (Bexley, Bromley, Greenwich, Lewisham, Lambeth and Southwark); community pharmacists; The Doctors Laboratory (Annette Wilkinson and Graham Hogan); epiGenesys (software team); Quality and Clinical Standards Team (Celesio UK); PHE (Meroe Bleasdille, Dr Rebecca Howell-Jones, Dr Anthony Nardone, Dr Kevin Dunbar); Dr Samantha Wu; Christine Chow; and Mike Jackson (eSTI2 programme manager, Ixscient Ltd). We would like to acknowledge the support of other members of the eSTI2 Consortium (esti2.org.uk), including Professor Philip Butcher, (SGUL) lead for Translational Microbiology work stream; Professor Wamadeva Balachandran, (Brunel University), lead for Microengineering work stream; and Professor Sanjeev Krishna (SGUL), Chair, and Professor Graham Hart (UCL), Deputy Chair, of the Consortium Management Committee.

**COMPETING INTERESTS:** We have none to declare.

**CONTRIBUTORSHIP**

CSE led the exploratory studies of the *e*SHC with contributions from JG, LJS, VG, LT, KH, CA, CML, EMHE, SE, PO, AS, REA, AJC, STS, and PS. LJS and JG led the design and development of the online chlamydia pathway with contributions from CSE, VG, LT, KH, CA, CML, EMHE, SE, PO, AS, REA, AJC, STS, and PS. CSE wrote the first draft, JG did the analysis, with further contributions from all authors. LT was the lead research health adviser. LJS was exploratory studies manager. STS was Principal Investigator and CSE, KH, CML, PO, AS, and PS were applicants on the *e*STI2 Consortium grant. CSE, KH, CML, PO, AS, STS and PS wrote the initial Clinical, Public Health and Economics work stream protocol with contributions from CA. All authors read and approved the final manuscript.

**RESEARCH IN CONTEXT PANEL:**

1. **Evidence before this study**

Within contemporary sexual health services in the UK, some digital technologies, such as text (SMS) messaging of STI test results and postal self-sampling, are already well-established. However face-to-face contact with a clinician is still required for assessment and treatment of people with diagnosed infections. A recent Californian study explored the acceptability and feasibility of an online system for integrated STI care in women.27 However, only eight participants were diagnosed with an STI and a clinician was required to fax an individualised prescription to a pharmacy. A systematic review of contemporary mobile applications for people seeking information about STIs did not find any apps which provided clinical care online.8 Some NCSP areas now offer an online results service,20 a feature that was not available at the time of our study and which has not been formerly evaluated elsewhere.

**Added value of this study**

We have shown safety, feasibility, preliminary evidence of effectiveness and public health utility of a complex online clinical and public health intervention integrated within traditional sexual health services, The eSexual Health Clinic System for Sexually Transmitted Infection Management, Prevention and Control (*e*SHC). Online clinical and public health systems of this complexity have not been previously reported. Our study demonstrates that the *e*SHC can be integrated with existing GUM clinical care pathways and internet-based self-sampling services, to provide management of both chlamydia negative and uncomplicated chlamydia positive patients wholly remotely from traditional services.

1. **Implications of all available evidence**

The eSHC offers a paradigm shift in provision of care by managing a subsection of people with uncomplicated chlamydial infection with an automated online clinical care pathway – this is a major departure from any method of care delivery in current practice. This rigorously developed, remote online automated approach to clinical care and public health provision is applicable to many medical conditions.

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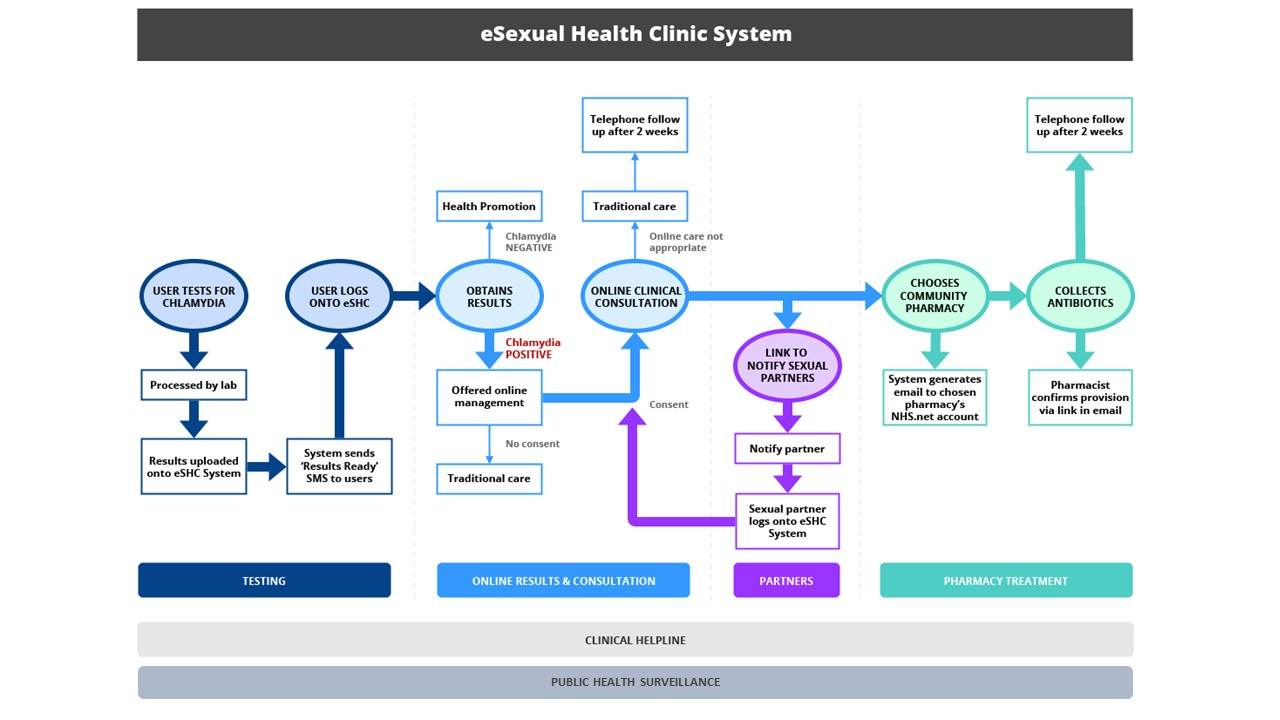
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FIGURE 1: *e*Sexual Health Clinic System with the *Online Chlamydia Pathway*



**Legend:**

The *e*Sexual Health Clinic System is an online sexual health service. It includes all aspects of the patient journey, the telephone clinical helpline (see below), health promotion and all communication between different components. The *Online Chlamydia Pathway* sits within the *e*Sexual Health Clinic and encompasses the multiple pathways that patients can follow from receiving a text allowing them to access their result to the two week health adviser follow-up. The online clinical consultation is an “automated medical assessment” within the *Online Chlamydia Pathway* in which the patient is asked clinical and behavioural questions to determine whether it is safe to proceed to remote treatment, to collect partner notification information, and to conduct a risk assessment and identify other health needs.

For the exploratory studies, a clinical helpline supported the *e*Sexual Health Clinic 9am-5pm weekdays, staffed by research health advisers. Health advisers are a professional group within sexual health clinics responsible for working with individuals and groups affected by issues related to sexual health. Key roles include partner notification (identifying and contacting sexual partners of those with STIs to facilitate testing and treatment) and sexual health promotion.10

Those people who did not access their results within 7 days of their results being ready, and patients testing positive who did not consent within 7 days, were passed back to the original testing site (clinic or NCSP) to be managed via traditional care pathways.

**Figure 2: Adapted consort diagram of people in the exploratory studies**



**Table 1: Characteristics of chlamydia-positive patients who consented to online management**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **GUM, n (%)** | | |  | **NCSP, n (%)** | | |
| **Total (*N*=116)** | **Men**  **(*N*=42)** | **Women**  **(*N*=74)** |  | **Total (*N*=105)** | **Men**  **(*N*=45)** | **Women**  **(*N*=60)** |
| **Median age (IQR)** | 25  (23-28) | 26  (23-29) | 25  (22-28) |  | 22  (20-23) | 22  (20-24) | 22  (20-23) |
| **Ethnicity** |  |  |  |  |  |  |  |
| White British | 37 (35·6) | 15 (40·5) | 22 (32·8) |  | 67 (71·3) | 28 (66·7) | 39 (75·0) |
| White Other | 29 (27·9) | 8 (21·6) | 21 (31·3) |  | 5 (5·3) | 3 (7·1) | 2 (3·8) |
| Black | 17 (16·3) | 5 (13·5) | 12 (17·9) |  | 12 (12·8) | 6 (14·3) | 6 (11·5) |
| Asian/Mixed/Other | 21 (20·2) | 9 (24·3) | 12 (17·9) |  | 10 (10·6) | 5 (11·9) | 5 (9·6) |
| **Number of sexual partners**  **In last 6 months** |  |  |  |  |  |  |  |
| 0-1 | 20 (24·1) | 7 (19·4) | 13 (27·7) |  | 21 (29·6) | 11 (29·7) | 10 (29·4) |
| 2-5 | 54 (65·1) | 21 (58·3) | 33 (70·2) |  | 42 (59·2) | 20 (54·1) | 22 (64·7) |
| 6+ | 9 (10·8) | 8 (22·2) | 1 (2·1) |  | 8 (11·3) | 6 (16·2) | 2 (5·9) |
| **Previous chlamydia** |  |  |  |  |  |  |  |
| Yes | 25 (29·8) | 8 (21·6) | 17 (36·2) |  | 27 (37·5) | 7 (18·4) | 20 (58·8) |
| No | 59 (70·2) | 29 (78·4) | 30 (63·8) |  | 45 (62·5) | 31 (81·6) | 14 (41·2) |
| **Sexual partner from outside UK or Ireland a** |  |  |  |  |  |  |  |
| Yes | 34 (40·5) | 14 (37·8) | 20 (42·6) |  | 15 (20·8) | 12 (31·6) | 3 (8·8) |
| No | 50 (59·5) | 23 (62·2) | 27 (57·4) |  | 57 (79·2) | 24 (68·4) | 31 (91·2) |
| **Same sex partner in past six months ab** |  |  |  |  |  |  |  |
| Yes | 1 (1·0) | 1 (2·9) | 0 (0) |  | 4 (5·6) | 3 (8·3) | 1 (2·9) |
| No | 81 (99·0) | 34 (97·1) | 47 (100) |  | 67 (94·4) | 33 (91·7) | 34 (97·1) |
| **Ever had sex with a man abc** |  |  |  |  |  |  |  |
| Yes | - | 0 (0) | - |  | - | 1 (3·0) | - |
| No | - | 34 (100) | - |  | - | 33 (97·1) | - |
| **Ever paid for, or been paid for, sex** |  |  |  |  |  |  |  |
| Yes | 2 (2·4) | 2 (5·6) | 0 (0) |  | 3 (4·2) | 3 (8·3) | 0 (0) |
| No | 81 (97·6) | 34 (94·4) | 47 (100) |  | 68 (9·6) | 33 (91·7) | 35 (100) |

**Legend:**

Not completed, missing or left online pathway: ethnicity: GUM n=12, NCSP n=11; number of sexual partners: GUM n=33, NCSP n=34; previous chlamydia: GUM n=32, NCSP n=33; sexual partner from outside UK or Ireland: GUM n=32, NCSP n=33; same sex partner in past six months: GUM n=34, NCSP n=34; ever had sex with a man (MSW (men who have sex with women) only): GUM n= 7, NCSP n=8; ever paid for or been paid for sex: GUM n=33, NCSP = 34.

a routinely collected marker of risk for STIs

b Those patients who progressed that far online, were initially asked if they had had sex with a partner/s of the opposite sex, same sex or both sexes in the preceding six months; those men who reported only having sex with women in the past 6 months were then asked if they had ever had sexual contact with a man.

C Men who have sex with women only

No patients reported having injected drugs.

**Table 2: Treatment outcomes a in GUM and NCSP patients**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Number of patients treated**  **n (%)** | **Number of patients treated solely online b**  **n (%)** | |
| Total | Without helpline contact c |
| **GUM** |  |  |  |
| Total (n=116) | 112 (96·6%)  (95%CI=91-99%) | 74 (63·8%) (95%CI=55·0-72·5%) | 56 (75·7%)  (95%CI=64.3-84.9) |
| Male (n= 42) | 41 (97·6%) | 32 (78·0%) | 23 (71·9%) |
| Female (n= 74) | 71 (95·9%) | 42 (59·2%) | 33 (78·6%) |
| **NCSP** |  |  |  |
| Total (n=105) | 93 (88·6%)  (95%CI=81-94%) | 60 (57·1%) (95%CI=47·7-66·6%) | 50 (83·3%)  (95%CI=71.5-91.7%) |
| Male (n=45) | 41 (91·1%) | 33 (80·5%) | 29 (87·9%) |
| Female (n=60) | 52 (86·7%) | 27 (51·9%) | 21 (77·8%) |

**Legend**

**a** Index patients only

b patients who managed all their care online and collected treatment from community pharmacy

c patients who managed all their care online and collected treatment from community pharmacy without the need for any telephone support

**Figure 3a: Time to treatment for GUM patients accessing treatment via the online chlamydia pathway (n=74)**

Range 0 (same day) -14 days. Median time to treatment = 1 day (IQR 0-1)

**Figure 3b: Time to treatment for NCSP patients accessing treatment via the online chlamydia pathway (n=60)**

Range 0 (same day)-24 days. Median time to treatment = 1 day (IQR 0-4)

**BOX 1:** **Public Health potential of the eSHC:**

***Primary prevention:*** Health promotion is included at various stages of the care pathway. This is tailored for individuals with chlamydia as well as those testing negative, providing opportunities to link to a number of health promotion and risk reduction websites.

***Secondary prevention:*** STIs, including chlamydia,are frequently asymptomatic. The *e*SHC has the potential to enable individuals (especially those with high-risk behaviours) to be tested regularly to ensure early identification and treatment. Partner notification (PN) is an essential component of STI control; the *e*SHC facilitates PN, giving individuals with chlamydia the opportunity to discreetly inform their partners so that they too can obtain treatment online if desired, breaking the chain of transmission.

***Tertiary prevention:*** Treating people with chlamydia reduces the incidence of complications, including pelvic inflammatory disease, infertility and ectopic pregnancy. This has implications for the individual, and for health care resources.

***Surveillance:*** the *e*SHC System collects data required for and has systems to ensure that people diagnosed using self-tests in the future are included in national statistics.