

**The acceptability of remote prescribing and postal delivery services for contraceptive pills and treatment of uncomplicated *Chlamydia trachomatis***

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## Abstract

**Objectives:** The digitalisation of sexual and reproductive health (SRH) services offer valuable opportunities to deliver contraceptive pills and Chlamydia treatment by post. We aimed to examine the acceptability of remote prescribing and “medication-by-post” in SRH.

**Study design:** An online survey assessing attitudes towards remote management was distributed in three UK SRH clinics and via an integrated sexually transmitted infection (STI) postal self-sampling service. Logistic regressions were performed to identify potential correlates.

**Results:** There were 1281 participants (74% female and 49% <25 years old). Eight per cent reported having received medication via post and 83% were willing to receive Chlamydia treatment and contraceptive pills by post. Lower acceptability was observed among participants who were: >45 years old OR:0.43(0.23-0.81), screened for STIs less than once annually OR:0.63(0.42-0.93), concerned about confidentiality OR:0.21(0.90-0.50), concerned about absence during delivery OR:0.09(0.02-0.32), unwilling to provide blood pressure readings OR:0.22(0.04-0.97). Higher acceptability was observed among participants who reported: previously receiving medication by post OR:4.63(1.44-14.8), preference for home delivery over clinic collection OR:24.1(11.1-51.9), preference for home STI testing OR:10.3(6.16-17.4), ability to communicate with health advisors OR:4.01(1.03-15.6), and willingness to: register their real name OR:3.09(1.43-10.6), complete online health questionnaires OR:3.09(1.43-10.6), and use generic contraceptive pills OR:2.88(1.21-6.83).

**Conclusion:** Postal treatment and entering information online to allow remote prescribing were acceptable methods for SRH services and should be considered alongside medication collection in pharmacies. These methods could be particularly useful for patients facing barriers in accessing SRH. The cost-effectiveness and implementation of these novel methods of service delivery should be further investigated.

**Keywords:** e-prescribing, remote, medication by post, click and collect, pharmacy, eHealth, mHealth

**Competing Interest:** None declared.

**Contributorship:** TN, YS and RC designed the study. All co-authors contributed to the analyses and the interpretation of findings as well as the drafting of the manuscript and approved the final version of the manuscript.

**Data sharing/Data availability:** Data are available upon reasonable request

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Key messages
<ul style="list-style-type: none"><li>• The majority (83%) of sexual health service users would be willing to receive contraceptive pills and Chlamydia treatment via post. While 1 in 5 would prefer to receive medication directly from the doctor.</li><li>• Remote prescribing, postal delivery (medication-by-post) and click-and-collect services are highly acceptable in sexual and reproductive health</li><li>• However, those above the age of 45 years, first time or infrequent service attenders, those who do not use online health services and are concerned about their confidentiality were less likely to accept remote prescribing.</li></ul>

## Introduction

Every day, about one million people acquire a sexually transmitted infection (STI), worldwide.[1] In England, around 450,000 new STIs are diagnosed every year and people aged 16-24-year-old account for 50% of new diagnoses.[2] The estimated costs of STI treatments equate to £620 million per year.[3] Gay, bisexual and other men who have sex with men (MSM) as well as Black Asian and minority ethnic (BAME) individuals are the most affected. [2]

*Chlamydia trachomatis* is the most common bacterial STI in North America and Europe.[4] If left untreated, Chlamydia can cause pelvic inflammatory disease, tubal infertility and ectopic pregnancy in women, as well as epididymal-orchitis in men and less frequently sexually acquired reactive arthritis in both genders.[5] The UK introduced The National Chlamydia Screening Programme (NCSP) in 2003 to improve detection, decrease transmission rates, and reduce the associated morbidities.[6] There has been a significant shift towards providing online sexual and reproductive health services (SRHS), including the utilisation of self-sampling/-testing kits, which is particularly pertinent to 15-24-year-old women in whom Chlamydia is most prevalent.[7] As STIs continues to be a major public health concern, policy-makers emphasise the need for optimal and cost-effective methods for increasing screening and treatment uptake.[8] Young women are also at an increased risk of unplanned pregnancies, thus the provision of contraception services is a cost-effective public health intervention. In the UK, 45% of pregnancies were unplanned in women aged 16-19.[9] As a significant proportion of women face barriers to healthcare access, individual, social and service-delivery considerations need to be addressed to reduce these barriers and increase the cost-effectiveness and efficiency of SRHS.

Digitalisation offers solutions to service delivery aiding standard care. It has been driven by the need to manage demand in an increasing austere financial environment, to increase access, equity and reduce the burden on overstretched face-to-face services in what

is hoped to be a cost-effective manner. Research has demonstrated that women benefit from digital sex education and counselling around contraceptive choices and STI screening.[10-11]. Online services are feasible, safe and effective in the management of patients with Chlamydia and other STIs.[12] The proportion of Chlamydia tests that are provided via online postal self-sampling services has rapidly increased, with 17% of all chlamydia tests in 15 to 24-year-olds in 2018 being accessed online in the UK.[2] This has also been accelerated during the COVID-19 pandemic, where services had to rapidly switch to online delivery. Users express positive attitudes to online services that are convenient, fast, secure and linked with pharmacies or helplines.[13] Pathway frameworks offer a comprehensive structure of e-health services in sexual and reproductive medicine as a powerful tool in public health and clinical management.[14] Standardised digital history taking tools, which can be used in both face-to-face and remote clinical settings, have the potential to improve the quality of drug prescription and patient safety if users are willing to provide the necessary clinical information.

Solent SRHS have provided online postal self-sampling to the Hampshire (UK) community since 2015. The service considered remote consultations and provision of contraception and Chlamydia treatment via postal delivery. Before introducing these services, the acceptability of remote management in the population needs to be established to identify barriers to effective implementation. We aimed to assess the acceptability and preferences for remote prescribing and delivery of Chlamydia treatment and contraception by post.

## **Methods**

### **Design**

This was an exploratory, cross-sectional survey focusing on service users' willingness to input clinical information online and receive Chlamydia treatment and contraceptive pills

delivered by post. The survey was approved as a service evaluation & development by Solent NHS Trust Clinical Governance (ref:SE-271).

### **Participants and data collection**

Between May and August 2018, we conducted a cross-sectional survey exploring potential “mediation-by-post” services for Solent NHS Trust SRHS. We recruited participants above the age of 16 years accessing services within Hampshire, UK. The survey was designed after consultations with service users about the development of online services. Views were gathered to formulate this questionnaire available in both pencil-and-paper and digital formats. Eight hundred paper surveys were distributed in three sexual health clinics. Service users were encouraged to complete the anonymous questionnaire while registering for their clinical appointment, with completion indicating their consent. Completed surveys were returned to the reception in an envelope and placed in a secure location. Additional 600 surveys were sent to those who requested an online STI self-sampling kit via SRHS website: [www.letstalkabout.nhs.uk](http://www.letstalkabout.nhs.uk). They were then asked to return it in an envelope to the laboratory which processed the samples. Also, a web link to an online survey was advertised on the SRHS website and Twitter for additional responses. We were unable to calculate the overall response rate as there was no record of how many questionnaires were accessed online, nevertheless, 866 paper surveys were completed.

### **Measurement**

The survey consisted of 32 questions (see supplementary appendix 1), including demographic variables such as age, gender identity, ethnicity, sexual orientation, education, whether participants were registered with a General Practitioner and any past STI diagnoses. Participants were asked about their preferred method for, and frequency of, STI screening and whether they had previously collected any medication via post or at a pharmacy with options ‘Delivered at home’, ‘Given by a doctor’ or ‘Collected at my pharmacy’.

Two outcome variables measured the acceptability of postal treatment services: i) the willingness to receive Chlamydia treatment (antibiotics) by post and ii) the willingness to receive contraceptive pills by post, both with options “Yes”, “No” and “Not sure” (“*Would you be willing to receive medication (antibiotic) to treat chlamydia by post?*”). Other questions assessed the most preferred methods for receiving medication and the concerns about confidentiality in receiving them by post. The acceptability of remote prescribing was assessed by asking about willingness: to be contacted by a health advisor, to completing an online questionnaire, to disclosing pre-existing medical conditions, to providing blood pressure reading, to accepting generic (non-branded) medication and to registering their real name and contact details before the order being finalised. Specific preferences for a tracked delivery of the medication, a mobile phone text message with the status of the order and the need to discuss the side-effects and dosage with a pharmacist were assessed to inform the development of the service. Also, an expected arrival delivery time and the time to contact the clinic in case of misplaced delivery were assessed. The questions related to the contraceptive pill were only directed to women.

### **Patient and public involvement**

Patients were not directly involved in the design, recruitment and the conduct of the survey. Posters were disseminated in the waiting areas outlining the results of the study.

### **Data analysis**

The variables were either categorical or ordinal. Descriptive statistics were performed to identify the percentage of responses using IBM SPSS software version 24. All variables were then dichotomised (i.e. ‘yes’ and ‘no/unsure’; see Table 2). Twenty-one simple logistic regressions with single categorical predictor were performed to identify potential correlates of acceptability of the two outcome variables and calculate odds ratios and 95% confidence intervals to determine their magnitude. No modelling was used to perform regressions due to the explorative nature of the analysis.

## Results

In total, 1281 service users completed the survey, with about a half (49%) under the age of 25 years (Table 1). The majority (74%) identified as female, White (91%), heterosexual or straight (86%), and having a college or university education (78%). Almost all (95%) were registered with GP services and 40% reported being diagnosed with an STI in the past. While half of the sample reported STI screening once per year or more often, for 20% the survey testing was the first time they had been screened. Nearly half (48%) stated that remote STI self-sampling, using an online testing kit, was their preferred method of STI screening.

While the majority (87%) had collected medication at a pharmacy, only 8% reported ever receiving medication by post. In general, most participants preferred to either be given the medication by a doctor (20%) or collect it at a pharmacy (34%). However, in terms of receiving Chlamydia treatment and contraceptive pills, many (45%) chose home delivery as their preferred method. When asked directly, around 83% of participants were willing to receive antibiotics and contraceptive pills by post.

The assessment of preferences for remote prescribing showed that most participants reported their willingness to complete an online questionnaire (78%), register their real name and contact details (85%), disclose pre-existing conditions (89%), and speak to a health advisor on the phone (85%) before the finalisation of the medication order. Only 27% reported a preference for a consultation about dosage and side-effects with a pharmacist. Regarding contraception for women, 81% would be willing to provide blood pressure readings and 67% would accept receiving a generic version of the contraceptive pill.

The assessment of preferences for the “medication by post” method showed that most participants (76%) were not concerned about confidentiality, but 44% would be concerned about the medication delivery if they were away from home. Only 35% endorsed a preference for signed tracked delivery of medication. The majority (83%) would prefer to receive a



mobile phone update about their delivery and most participants (86%) thought that delivery within 3 working days was appropriate, although a substantial proportion indicated “next day delivery” as their preferred option for Chlamydia treatment (43%) and contraception (37%). While 48% of the sample would wait 2-3 days to contact the clinic if the medication was not delivered, about 36% would wait only 1 day. Sexual health clinics were perceived as the preferred source of advice on the medication by post.

The highest willingness (99%) of using remote services for chlamydia treatment was observed amongst participants who showed strong preferences for ‘home delivery methods’ of medication; the lowest willingness (41%) was reported by the participants who would not register their real name for the medication order. Lower acceptability of Chlamydia treatment by post was observed amongst participants who were: above the age of 45 years, screened for STI less than once a year, concerned about their confidentiality, concerned about the delivery during their absence, and those not willing to provide their blood pressure readings. Higher acceptability was observed amongst participants who had received medication by post in the past, preferred the home delivery method for medication, preferred online/home testing for STIs, were willing to speak with a health advisor, register their real name, complete online health questionnaires, and use generic medication.

The highest willingness (97%) of using remote services for contraceptive pills was observed amongst women who were willing to use generic, non-branded versions of the medication and the lowest willingness (47%) was seen amongst the participants who would prefer not to register their real name for the medication order. Lower acceptability of receiving contraceptive pills by post was observed amongst participants who were: above the age of 45 years and those who expressed a preference for a consultation with a pharmacist to discuss side-effects and dosage. Higher acceptability was reported by women who had collected medication at a pharmacy in the past and who were willing to complete an online questionnaire about their health before ordering medication.

## Discussion

To our knowledge, this is the first study exploring the acceptability and user preferences for remote prescribing and postal treatment for chlamydia treatment and contraception provision. The findings indicate that most participants would agree to provide the necessary information for remote prescribing such as real name, medical and drug/allergy history and blood pressure readings.[15-16] Although approximately only 1 in 12 participants had previously received medication in the post, the majority reported “medication by post” or “click and collect” as their preferred delivery methods. This suggests that a significant proportion of service users would be receptive to remote antibiotic treatment and contraception services, as the preferences overlap with acceptability, indicating the willingness to receive medication away from the clinic. Most participants were willing to receive generic drugs and would expect delivery within three working days or in the case of Chlamydia treatment, next day delivery. Sexual health clinics were the preferred source of information about “medication by post”.

Previous studies have demonstrated the value of assessing acceptability and motivations for digital services. One study indicated mixed attitudes towards remote prescribing services amongst health professionals, with perceived usefulness, ease of use and perceived risk of error in prescribing associated with acceptability.[17] A small study of medication by post in Malaysia showed that services users were unaware of this method of delivery and only a half showed interest in the service, with the majority reporting concerns with a potential missed delivery.[18] In the present study, about 20% of participants were not willing to provide via an online questionnaire the information necessary to allow safe prescribing,=. Hence, users’ concerns should be explored in more detail in subsequent research to identify common barriers and design user-centred digital service for all patients and identify those who find digital services less suitable. Although telemedicine offers

valuable opportunities, there is a risk of widening health inequalities due to access to digital technologies.[19] Thus, service users who are not capable or unwilling to use e-prescribing due to digital literacy, access to technology or personal preferences should have access to alternative pathways of care.

This study achieved a large sample size and provides novel knowledge about online services. However, there are several limitations as it was exploratory and not designed to test prespecified hypotheses. The participants were recruited within one NHS Trust in Hampshire and their responses may not be representative of service users in other regions, especially in big cities, and individuals that are ‘seldom heard’ or hard-to-engage. Due to various sources of recruitment, we were uncertain about the refusal rate and how that affected the representativeness of the sample. Also, the survey was conducted before the coronavirus outbreak and patients’ views on remote prescribing and postal treatment might be different if assessed now. The novel coronavirus SARS-COV-2 outbreak in 2020 transferred the majority of SRHS either to phone or online assessments, as face-to-face healthcare was dramatically reduced, due to social distancing measures and staff illness or redeployment. Remote management using phone assessments and online services has allowed service providers to continue, including diagnosis and management of sexual health conditions with remote prescribing and postal treatment or “click-and-collect”. These developments mean that the current findings are of particular importance by providing insight into individuals’ preferences before service changes being implemented and will inform future service development as we transition from lockdown to a post-SARS-COV-2 time.

In conclusion, as a majority of service users in this study were receptive to these methods of delivery, remote prescribing and postal delivery of treatment for uncomplicated chlamydia and contraception should be considered as part of SRHS. Nevertheless, such a service needs to be closely monitored to identify any potential missed delivery, medication non-adherence, or misuse. Further research needs to explore health professionals’ and users’

concerns as well as individual barriers to design the most acceptable, effective, and equitable digital SRH services supporting patients with their treatment and prophylaxis.

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**Table 1. Sample characteristics and preferences for e-prescribing (N=1281)**

Variable	Total number (%)	Variable	Total number (%)
<b>Demographic variables</b>		<b>Preferences for remote prescribing and postal treatment</b>	
Age		Willingness to receive antibiotic by post	1042 (82)
<18	41 (3)	Yes	230 (18)
18-24	555 (46)	No/not sure	
25-34	410 (34)	Willingness to receive contraceptive pills by post	797 (83)
35-44	122 (10)	Yes	160 (17)
45-54	56 (7)	No/not sure	
55-64	22 (2)	Willingness to provide blood pressure reading	772 (81)
Over 65	7 (<1)	Yes	185 (19)
Gender		No/not sure	
Male	325 (26)	Willingness to receive generic contraceptive pills	640 (67)
Female	932 (74)	Yes	313 (33)
Non-binary	3 (<1)	No/not sure	
Other	5 (<1)	Concerned about confidentiality using post delivery	312 (24)
Ethnicity		Yes	960 (76)
White	1163 (91)	No/unsure	
Black African	22 (2)	Concern about delivery if absent at home	554 (44)
Black Caribbean	11 (1)	Yes	715 (56)
Asian	21 (2)	No/unsure	
Mixed-race	47 (4)	Willingness to speak with health advisor via phone prior to finalise medication order	1078 (85)
Other	10 (<1)	Yes	194 (15)
Sexual orientation		No/unsure	
Heterosexual or Straight	1091 (86)	Willingness to disclose pre-existing conditions	1053 (89)
Gay or Lesbian	78 (6)	Yes	126 (11)
Bisexual	83 (7)	No/unsure	
Prefer not say and other	17 (1)	Willingness to register a real name for the order	1075 (85)
Education		Yes	191 (15)
No formal education	91 (7)	No/not sure	
Primary school	8 (<1)	Willingness to fill in an online questionnaire about health prior to medication order	987 (78)
High school	144 (12)	Yes	280 (22)
Collage	508 (41)	No/not sure	
University degree	473 (38)	Preference for signed tracked delivery	443 (35)
Other	24 (2)	Yes	821 (65)
Registered with GP		No/not sure	
Yes	1208 (95)	Preference for a consultation with a pharmacist to discuss side-effects and dosage	345 (27)
No/not sure	66 (5)	Yes	918 (73)
Past STI diagnosis		No/not sure	
Yes	504 (40)	Preference for mobile phone updates about the delivery status	1050 (83)
No	729 (57)	Yes	212 (17)
Not sure	42 (3)	No/not sure	
The frequency of STI screening		Preferred waiting time for antibiotic to be delivered	522 (43)
First time	249 (20)	Next day delivery	524 (43)
Once every few years	379 (30)	Within 3 working days	148 (12)
Once a year	266 (22)	Within 5 working days	25 (2)
Several times a year	354 (28)	Within 7 working days	
The preferred method of STI screening		Preferred waiting time for contraceptive pills to be delivered	337 (37)
Online (home) testing	611 (48)	Next day delivery	418 (46)
At a sexual health clinic	552 (44)	Within 3 working days	103 (12)
At GP surgery	83 (7)	Within 5 working days	41 (5)
Other	15 (1)	Within 7 working days	
<b>Variables related to medication delivery</b>		Optimal waiting time to contact the clinic in case the delivery is misplaced	451 (36)
Ever collected medication at the pharmacy		1 day	603 (48)
Yes	1104 (87)	2-3 days	168 (14)
No/not sure	171 (13)	4-7 days	32 (2)
Ever received medication via post		Over a week	
Yes	97 (8)	A preferred source of advice on the medication delivered by post	387 (31)
No/not sure	1179 (92)	GP	711 (57)
Preference for receiving medication (general)		Sexual health clinic	126 (10)
Delivered to home	568 (45)	Pharmacy	29 (2)
Given by a doctor	260 (20)	Other	
Collected at pharmacy	427 (34)		
Other	15 (1)		
Preference for receiving chlamydia treatment			
Delivered to home	721 (57)		
Given by a doctor at the clinic	261 (21)		
Collected at pharmacy	273 (22)		
Other	9 (<1)		
Preference for receiving contraceptive pills			
Delivered to home	536 (60)		
Given by a doctor at the clinic	92 (10)		
Collected at pharmacy	250 (28)		
Other	20 (2)		

GP -General Practitioner, STI – sexually transmitted infection



**Table 2. Correlates of the willingness to receive medication by post**

Variable	(% of those 'willing' to receive chlamydia treatment by post with Odds ratio [95% Confidence intervals])		(% of those 'willing' to receive contraceptive pills by post with Odds ratio [95% Confidence intervals])	
Age				
Under 45 years	(88.0)	1.00 - ref	(84.9)	1.00 - ref
45+	(76.3)	0.43 [0.23-0.81]*	(56.8)	0.19 [0.09-0.41]*
Gender				
Male	(81.1)	1.00 - ref		
Female	(88.8)	1.48 [0.96-2.29]	0	
Ethnicity				
White	(87.2)	1.00 - ref	(83.7)	1.00 - ref
Ethnic minority (non-white)	(84.1)	0.78 [0.41-1.49]	(78.6)	0.87 [0.42-1.80]
Sexual orientation				
Heterosexual	(87.3)	1.00 - ref	(83.9)	1.00 - ref
Sexual minority	(88.1)	1.09 [0.60-2.00]	(78.2)	0.77 [0.38-1.58]
Education				
High school or below	(89.1)	1.00 - ref	(83.9)	1.26 [0.75-2.10]
College and university degree	(86.6)	0.73 [0.42-1.26]	(84.0)	1.00 - ref
Registered with a GP				
Yes	(87.2)	1.00 - ref	(83.3)	1.00 - ref
No	(77.4)	0.53 [0.19-1.48]	(69.6)	0.57 [0.15-2.06]
Past STI infection				
Yes	(88.4)	1.00 - ref	(85.9)	1.40 [0.93-2.11]
No	(86.1)	0.75 [0.50-1.13]	(82.5)	1.00 - ref
Ever collected medication at the pharmacy				
Yes	(87.6)	1.37 [0.84-2.22]	(84.3)	2.04 [1.20-3.47]*
No	(83.7)	1.00 - ref	(75.8)	1.00 - ref
Ever received medication via post				
Yes	(96.7)	4.63 [1.44-14.8]*	(85.3)	1.56 [0.66-3.73]
No	(86.2)	1.00 - ref	(83.0)	1.00 - ref
The frequency of STI screening				
First time or less than once a year	(83.1)	0.63 [0.42-0.93]*	(80.7)	0.77 [0.51-1.16]
Once a year or more often	(91.0)	1.00 - ref	(86.3)	1.00 - ref
The preferred method of STI screening				
Online (home) testing	(97.1)	10.3 [6.16-17.4]*	(88.1)	1.63 [1.05-2.55]
In-clinic (GP or sexual health)	(76.7)	1.00 - ref	(78.6)	1.00 - ref
Preference for receiving medication (general)				
Delivered to home	(98.8)	24.1 [11.1-51.9]*	(89.8)	2.30 [1.44-2.55]
Collected from a pharmacy or a doctor	(76.7)	1.00 - ref	(77.7)	1.00 - ref
Concerned about confidentiality				
Yes	(60.6)	0.21 [0.90-0.50]*	(67.8)	0.61 [0.25-1.44]
No	(94.6)	1.00 - ref	(88.4)	1.00 - ref
Concern about delivery if absent at home				
Yes	(75.2)	0.09 [0.02-0.32]*	(78.3)	0.83 [0.36-1.89]
No	(95.6)	1.00 - ref	(87.3)	1.00 - ref
Willingness to speak with health advisor via phone prior to finalise medication order				
Yes	(91.9)	4.01 [1.03-15.6]*	(85.5)	1.68 [0.49-5.74]
No	(54.5)	1.00 - ref	(60.6)	1.00 - ref
Willingness to disclose pre-existing conditions				
Yes	(91.0)	2.87 [0.79-10.4]	(85.9)	1.00 - ref
No	(51.4)	1.00 - ref	(55.3)	0.35 [0.13-2.05]
Willingness to register a real name for the order				
Yes	(91.9)	5.65 [1.76-18.1]*	(87.7)	2.00 [0.58-6.86]
No	(41.2)	1.00 - ref	(47.1)	1.00 - ref
Willingness to fill in an online questionnaire about health prior to order				
Yes	(94.5)	3.09 [1.43-10.6]*	(88.8)	3.67 [1.45-9.27]*
No	(54.1)	1.00 - ref	(60.9)	1.00 - ref
Willingness to provide blood pressure reading				
Yes	(89.7)	1.00 - ref	(82.2)	2.08 [0.83-5.22]
No	(80.1)	0.20 [0.04-0.97]*	(56.2)	1.00 - ref
Willingness to receive generic (non-branded) medication				
Yes	(93.9)	2.88 [1.21-6.83]*	(97.5)	35.8 [15.8-81.3]
No	(71.9)	1.00 - ref	(44.1)	1.00 - ref
Preference for a consultation with a pharmacist to discuss side-effects and dosage				
Yes	(78.2)	0.52 [0.23-1.16]	(75.0)	0.34 [0.16-0.73]*
No	(90.3)	1.00 - ref	(86.1)	1.00 - ref

\*p&lt;0.05, GP -General Practitioner, STI – sexually transmitted infection