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ARTICLE

Ten-year review of a shared care approach in the management of ocular chlamydia trachomatis infections

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Abstract

Introduction Since 2007, the ocular 4:1 multiplex PCR assay in NHS Greater Glasgow and Clyde includes *Chlamydia trachomatis* (ocular chlamydia (OC)) testing. OC can be identified following routine 'viral' ophthalmic testing, including in asymptomatic patients. A published audit from 2008 identified only 25% of our OC patients attended and completed sexual health management, particularly when ophthalmologists initiated treatment. We subsequently created a shared care network between ophthalmology, virology and sexual health (including a designated sexual health advisor) to address these clinical issues.

Methods A 10-year retrospective service review audit from January 2010 to December 2019 was performed to evaluate this approach.

Results A total of 86 patients were identified (49 males (57%), median age 23 years (range 16–77)). Ophthalmologists initiated treatment for 37 patients (43%) prior to onward sexual health referral. Of this group, 5 (13.5%) received sub-optimal treatments, and 15 (40.5%) subsequently failed to attend sexual health services for partner notification. Of the 49 (57%) patients who attended sexual health, 25 (51%) had genital chlamydia co-infection, and 98% received adequate systemic treatment. All were offered full sexual health screening and 46 (93.9%) completed partner notification.

Conclusions This shared care approach more than doubled the proportion of OC patients attending sexual health services over this 10-year period (previously 25%, now 57%). Ophthalmologists could defer treatment to sexual health for more effective OC management; however, challenges remain to address real-world issues of non-attendance, inadequate treatment and incomplete contact tracing. We recommend a multi-disciplinary approach to best manage OC cases identified following ophthalmic testing.

Introduction

According to the recent World Health Organisation's statement in June 2019, ~1 million new STIs occur every single day worldwide [1–5]. Chlamydia infection rates continue to increase, accounting for 48% of England's STI diagnoses in 2017 [1–5]. Eighty-five percent of genitourinary infections with *Chlamydia trachomatis* are reported to be asymptomatic, yet can still lead to pelvic inflammatory disease, ectopic pregnancy and infertility in women and epididymitis in men [6, 7]. Chlamydia infections spread via exposure of infected mucous membranes, which can result in patients attending ophthalmic services with undiagnosed chlamydial conjunctivitis [8]. Ocular chlamydia (OC) classically presents as a chronic (>4 weeks) unilateral follicular conjunctivitis, although there can be additional features such as peri-limbal infiltrates or associated peri-ocular cellulitis [9, 10]. The diagnosis is often made through clinical suspicion and conjunctival polymerase chain reaction (PCR) testing [11–15].

In April 2007, the West of Scotland Specialist Virology Centre upgraded their routine assay for all 'viral' eye swabs to an in-house quadriplex PCR assay for adenovirus, herpes simplex, varicella zoster and *Chlamydia trachomatis*. This means positive OC results can be identified following routine conjunctival swabbing, and this situation led to a formal complaint regarding a positive test in a young teenager, raising medico-legal implications regarding STI testing in children [16–18]. We have previously published that 4% of

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the 1914 patients swabbed for presumed viral conjunctivitis in the West of Scotland region in the calendar year following the introduction of this testing method in 2007 were found to have OC [19]. This represented a potentially undiagnosed cohort of individuals with a STI and it follows that a robust system should be in place to address this predictable clinical situation.

Our initial published audit of the clinical management of positive OC results arising from ophthalmology departments in NHS Greater Glasgow and Clyde performed in the calendar year following the introduction of this multiplex assay identified significant issues with incomplete assessments, inadequate treatments and poor contact tracing, particularly when ophthalmologists initiated the management of OC infections [19]. Only 25% of eye patients with positive OC results subsequently attended sexual health services despite referral and/or received adequate treatment and contact tracing [19]. In light of this, we set up a shared care network with the Sandyford Sexual Health services in 2009. Sandyford Sexual Health provides specialist sexual health services to the whole population of NHS Greater Glasgow and Clyde (~1 million) and supports all practitioners in the West of Scotland region managing genital chlamydia cases through a shared care system. They provided a designated sexual health advisor to receive duplicated copies of all positive OC results, and act as a central point of contact to engage patients with OC to arrange best management. These positive results were added to the National Sexual Health database, which has been the sexual health shared care electronic system for Scotland since 2008 [20, 21]. The Regional Virology Centre also included additional guidance on their electronic results system recommending contacting sexual health services for advice and referral in the setting of positive *C. trachomatis* PCR results.

As this shared care network has been in place for the past decade, we wished to perform a retrospective service audit of our adult patients with positive OC results to assess the ongoing effectiveness of this clinical approach.

Methods

We performed a retrospective service audit from January 2010 to December 2019 of adults aged 16 years and over in NHS Greater Glasgow and Clyde, Scotland, UK, with positive OC results. Patients were identified from the Sandyford Sexual Health shared care database, which receives electronic copies of all positive PCR OC results processed by the West of Scotland Regional Virology Centre.

Patient demographics including address postcode for Scottish index of multiple deprivation (SIMD) score were obtained. Clinical records were assessed to identify documentation of consent for testing, documentation of communication of diagnosis, onward referral for complete STI assessment, appropriate treatment, sexual health screen and management of any concurrent disease and follow up of sexual contact tracing.

Our aim was to compare the recorded clinical management with these locally chosen standards and to see if the lessons and solutions identified previously were still being followed [19].

This study was discussed with the West of Scotland Ethics Committee and as it was deemed to be an audit of established clinical practice, no additional ethical permissions were required. The principles of the Declaration of Helsinki were maintained throughout this audit.

Results

Our search of the Sandyford Sexual Health shared care database identified 86 cases of OC originating from NHS Greater Glasgow and Clyde between January 2010 and December 2019.

There were 49 males (57%) and 37 females (43%). The mean age was 27 years (median 23 years; range 16–77). The mean SIMD score was 2.37 (median score 2; range 1 most deprived—5 least deprived). The number of OC cases detected per year generally increased over the 10 years of the study, with a maximum of 18 cases identified in 2019 (median 7.5; range 4–18) [See Fig. 1].

Ophthalmic notes: documentation of consent and result notification

On review of the available ophthalmic casenotes for these 86 patients, only 16 patients (16/86; 18.6%) had evidence of specific consent for conjunctival testing that documented informing the patient that the 4:1 multiplex PCR assay included ocular *C. trachomatis* testing.

Following a positive OC swab result, 76 patients (76/86; 88.4%) had specific documentation in the ophthalmic notes

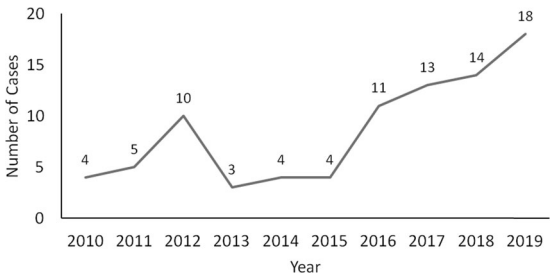

Fig. 1 Graph showing number of OC cases during study period. This illustrates an increasing number of patients with ocular *Chlamydia trachomatis* identified in NHS Greater Glasgow and Clyde over 10 years from January 2010 to December 2019.

of diagnosis notification, with 52 of these patients being informed within 7 days of the positive result being available to clinicians. In the ten cases (10/86; 11.6%) who were not contacted about their positive result, two were 'unable to be contacted/GP informed', three patients 'did not attend' ophthalmology appointments where they would have been notified and the outcome was 'unknown' for the remaining five (no specific documentation in ophthalmic casenotes).

Ophthalmic notes: documentation of sexual health referral

Sixty-seven patients (67/76; 88.2%) had specific documentation in the ophthalmic casenotes regarding advice to attend or a direct referral to the Sandyford Sexual Health services for follow up and appropriate treatment and management. Twelve of these patients elected to attend their GP rather than the sexual health services following notification of their positive result. However, 7 of these 12 patients were also referred again to the sexual health clinic by their GPs, of which 3 attended.

Ophthalmic notes: documentation of systemic treatment

Thirty-seven patients (37/86; 43.0%) received initial systemic treatment directly from the ophthalmology clinic (either 500 mg of oral azithromycin for 3 days, 1 g of oral azithromycin for 1 day or 100 mg of oral doxycycline twice/day for 1 week). Five of these cases (5/37; 13.5%) were subsequently deemed by the sexual health team to have been inadequately treated. Incidentally, 7 patients initially treated by ophthalmologists (7/37; 18.9%) were prescribed systemic treatment after discussion with the sexual health advisors. Of note, 15 of the 37 patients (40.5%) who were initially treated by ophthalmologists did not proceed to attend the sexual health clinic for further investigation or management. One patient (1/37, 2.7%) was empirically treated by the ophthalmologist prior to formal diagnosis and was uncontactable for confirmation of their positive OC result.

Sexual health services: documentation of attendance, screening, treatment and contact tracing

According to the sexual health records, 49 patients (49/86; 57.0%) attended sexual health services following their positive OC diagnosis. As already mentioned, 12 other patients had elected to attend their GP for treatment (although 3 of these 12 additionally attended the sexual health clinic later for contact tracing). The median time for patients to attend the sexual health clinic following notification of their OC diagnosis was 5 days (mean 10 days, range 0–210). The average time for treatment following a positive OC report was 8 days (median 4 days; range 0–57). Twenty-five patients (25/49; 51.0%) had concomitant urogenital tract chlamydial infection on urine or vulvo-vaginal testing. Hepatitis B antibodies were detected in 1 patient (1/49, 2.0%), consistent with a previous STI. No other additional STIs were identified in these 49 patients. Forty eight of those with OC who attended sexual health services (48/49; 98.0%) received an adequate course of systemic treatment with azithromycin or doxycycline. One patient had received an inadequate dose in the eye clinic however this was not re-treated as their result was reported as 'weak' and felt to represent a false positive. All 49 patients were offered full sexual health screening and 46 (46/49; 93.9%) had contact tracing completed (3 patients declined).

Discussion

Consistent with the published public health literature, we found an increasing number of OC cases over this 10-year period [1–5]. Our care cascade also demonstrates the real-world issues in managing this increasing OC population in NHS Greater Glasgow and Clyde, Scotland. In our study, more than half of the patients (49/86; 57%) engaged completely with our shared care network (diagnosis, management, sexual health investigation, appropriate treatment and had contact tracing offered). However, that implies 43% of all our OC patients could have had concurrent STIs but did not attend sexual health services for investigation and appropriate management.

There are limited publications in the ophthalmic literature regarding the best management practice of ocular *C. trachomatis* presenting to the eye department. In 1995, a study from Melbourne, Australia, identified a 2% rate of chlamydia out of 400 consecutive patients presenting with acute conjunctivitis to the eye department [22]. Ten out of their twelve OC patients were discovered to have concomitant asymptomatic genital tract infection. They concluded it is 'essential that all patients with chlamydial conjunctivitis and their sexual partners are examined and treated for concomitant genital infection' [22]. No formal recommendations were offered as to the best method to achieve this goal. In light of this, and our findings, we believe that best practice to address positive OC test results in the ophthalmic department requires a multi-disciplinary approach involving sexual health services to ensure appropriate management, complete sexual health screening and treatment of all STIs.

Partner notification through primary and secondary contact tracing is essential in the comprehensive management of

STIs, with the aim to reduce further infections and re-infections [23]. A study from the Scottish Borders in 2009 to estimate the potential impact of removing secondary contact tracing on the number of chlamydial infections identified in their sexual health service found 127 index cases, which generated 189 contacts [24]. Analysing further positive infections identified by contact tracing identified 22–28% more cases of chlamydial infection than if all partners were treated without tracing and testing [24]. This study has obvious relevance to the eye department's management of positive OC results. If an ophthalmologist's regular practice is to presumptively treat OC patients at the time of ophthalmic presentation, they run the risk of inadequate treatment, failure to encourage attendance at sexual health services and ultimately sub-optimal management. In our study, it was notable that 40.5% of the 37 patients who were initially treated in the eye clinic did not attend the sexual health clinic for further investigation or screening. In addition, 13.5% of these 37 patients were deemed by the sexual health team to have been inadequately treated. The potential for incomplete OC management was previously described in a paper from 2006, which identified that 29.6% of their OC patients required more than one course of systemic azithromycin for effective treatment [25].

The issues we have described with managing OC identified by ophthalmology services over the past 10 years are not unique. A family planning clinic attempting to refer Chlamydia positive patients to genitourinary medicine also reported inadequate pathway engagement [26]. Mirroring our initial experience, they detailed poor consent for testing, poor documentation of consent, limited documentation of patients being informed of positive test results and only 63% of their patients actually attended GUM/sexual health services despite having a GUM diagnosis [26]. It was enlightening to realise that poor attendance is consistently an issue in this patient group, and their experience with developing updated action plans and re-audits as part of a continuous cycle to improve patient care confirmed our previous publication's recommendations [19].

The incidence and prevalence of chlamydia remains high despite targeted efforts, with obvious clinical and public health cost implications to the health service and society. This was the origin of the patient-initiated partner treatment strategies, to try and strengthen infection control [23, 27, 28]. However, the results remain inconsistent. In 2010, 577 pharmacy vouchers were given to index chlamydia cases in the East of Scotland to pass onto sexual partners to obtain treatment. Only 233 vouchers (40%) were redeemed, and only 4% of partners attended a sexual health clinic for treatment [29]. The same group reported better success in 2016 with the use of electronic pharmacy vouchers sent as text messages to mobile phones (549 vouchers; 56% redemption rate at a pharmacy < 1 week of issue) [30].

With similar concerns regarding compliance, a recent study in the USA looking at the efficacy of expedited partner therapy (EPT) for chlamydia discovered that less than 50% of their prescriptions were filled, even when the medication was free of charge [31]. While drug-in-hand EPT seems at odds with our recommendations, it is driven by the fact that STI rates remain high despite interventions and may appear more cost-effective in the debate of 'limited inconsistent treatment versus no treatment' [9, 23, 32, 33]. Summarising this, a recent Cochrane review evaluating enhanced patient referral, EPT, contract referral and provider referral did not identify a single optimal strategy for any particular STI [34].

Despite the various issues described in the best management of OC, our shared care approach has resulted in doubling the proportion of sexual health clinic attendance over this 10-year period (previously 25%, now 57%). It may be that our OC cohort is different from an asymptomatic population because they may have had ocular symptoms leading to the identification of a positive chlamydia result. This may lead to greater patient motivation to attend the sexual health services to receive the correct investigations, treatment and management.

Our multi-disciplinary approach also enables early involvement of specialist sexual health services via the copied positive OC electronic results system. This network enables sexual health advisors to contact patients and the referring clinicians on receipt of positive results, and advise on appropriate genital testing options (including self-taken swabs, on-line access and postal testing and/or physical attendance at a specialist clinic), to get consent to initiate partner notification, which can be done over the phone or through using electronic systems [35]. Providing patients with these options may also result in better engagement with sexual health services, and better management of OC. Through this network, sexual health services can advise ophthalmology services regarding new developments, modern care models and more appropriate treatments (note that some of the traditional standard treatments initiated by ophthalmologists were sub-optimal in our series). We did not identify any patient with an additional STI, but the potential for that scenario clearly exists, and our shared care network approach should help to address such a situation.

Limitations

Our retrospective study relied on specific documentation in clinical casenotes as evidence of practice. It is unlikely that only 18.6% of these patients undergoing viral eye swabs over 10 years were informed that their conjunctival eye swab would involve chlamydia testing among the 4:1 PCR primers. Based on our previous audits, which had identified consent issues, we had created patient information leaflets,

which are commonly distributed by the ophthalmic nurse taking the swab. In addition, there were ten patients who had no specific documentation in their ophthalmic casenotes detailing that they had been informed of their positive OC results, or were uncontactable. The sexual health team informed us that some of their patients do not always provide accurate contact details. Having a multi-disciplinary approach from ophthalmology and sexual health services should be more effective in contacting and managing OC patients. However, for the purposes of this audit we were unable to evaluate the management of this uncontactable (lost to follow up) group.

Conclusion

This care cascade demonstrates the real-world issues with managing OC over the past 10 years, including documenting consent for STI testing in the setting of multiplex PCR assays. Our shared care approach has more than doubled the proportion of sexual health clinic attendance for these patients, from 25 to 57% over this 10-year period. Ophthalmologists could also defer treatment to sexual health services for more effective OC management. Adopting a multi-disciplinary network should encourage greater sexual health attendance for OC patients to receive complete sexual health assessments and appropriate treatments. However, challenges remain to address the real-world issues of non-attendance, inadequate treatments and incomplete contact tracing in the management of OC.

Summary

What was known before

- Since 2007, routine 'viral' ocular 4:1 multiplex PCR testing in NHS Greater Glasgow and Clyde includes *C. trachomatis* (OC) testing.
- Previous publications have identified poor attendances at sexual health clinics by patients with OC (25% from the ophthalmic clinic in the year following the introduction of the multiplex testing).
- A clinical framework is required to best manage OC cases identified by the ophthalmology department, particularly in asymptomatic patients.

What this study adds

- This 10-year review of a shared care network approach between ophthalmology, sexual health and virology describes the management of 86 patients with OC.
- Our multi-disciplinary approach more than doubled the proportion of OC patients attending sexual health services and receiving appropriate treatment and contact tracing (previously 25%, now 57%).
- However, when ophthalmologists initiated systemic management of OC in 37 patients, 5 (13.5%) received sub-optimal treatments and 15 (40.5%) subsequently failed to attend sexual health services.
- Of the 49 (57%) patients who attended sexual health services, 51% had genital chlamydia co-infection, and 98% received adequate systemic treatment and all were offered full sexual health screening.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. World Health Organisation. Global health sector strategy on sexually transmitted infections, 2016-2021. 2016. https://www.who.int/reproductivehealth/publications/rtis/ghss-stis/en/. Accessed 23 Mar 2020.
2. Workowski KA, Bolan GA, Centers for Disease Control and Prevention. Sexually transmitted diseases treatment guidelines, 2015. MMWR Recomm Rep. 2015;64:1–137.
3. Centers for Disease Control and Prevention. Sexually transmitted disease surveillance 2017. 2018. https://www.cdc.gov/std/stats17/default.htm. Accessed 23 Mar 2020.
4. Public Health England. Sexually transmitted infections and chlamydia screening in England, 2018. Health protection report. Volume 13, number 19. Public Health England; 2019. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/806118/hpr1919_stis-ncsp_ann18.pdf. Accessed 23 Mar 2020.
5. Kalwij S, Macintosh M, Baraitser P. Screening and treatment of Chlamydia trachomatis infections. BMJ. 2010;340:c1915.
6. Oakeshott P, Kerry S, Aghaizu A, et al. Randomised controlled trial of screening for Chlamydia trachomatis to prevent pelvic inflammatory disease: the POPI (prevention of pelvic infection) trial. BMJ. 2010;340:c1642.
7. Low N, Hocking J. The POPI trial: what does it mean for chlamydia control now? Sex Transm Infect. 2010;86:158–9.
8. Deschênes J, Seamone C, Baines M. The ocular manifestations of sexually transmitted diseases. Can J Ophthalmol. 1990;25:177–85.
9. Quirke M, Cullinane A. Recent trends in chlamydial and gonococcal conjunctivitis among neonates and adults in an Irish hospital. Int J Infect Dis. 2008;12:371–3.

10. Drummond SR, Diaper CJ. Chlamydial conjunctivitis presenting as pre septal cellulitis. Head Face Med. 2007;3:16–16.
11. Bersudsky V, Rehany U, Tendler Y, et al. Diagnosis of chlamydial infection by direct enzyme-linked immunoassay and polymerase chain reaction in patients with acute follicular conjunctivitis. Graefes Arch Clin Exp Ophthalmol. 1999;237:617–20.
12. Elnifro EM, Cooper RJ, Klapper PE, et al. Multiplex polymerase chain reaction for diagnosis of viral and chlamydial keratoconjunctivitis. Investig Ophthalmol Vis Sci. 2000;41:1818–22.
13. Elnifro EM, Cooper RJ, Klapper PE, et al. Diagnosis of viral and chlamydial keratoconjunctivitis: which laboratory test? Br J Ophthalmol. 1999;83:622–7.
14. Kowalski RP, Thompson PP, Kinchington PR, et al. Evaluation of the SmartCycler II system for real-time detection of viruses and Chlamydia from ocular specimens. Arch Ophthalmol. 2006;124:1135–9.
15. Yip PP, Chan WH, Yip KT, et al. The use of polymerase chain reaction assay versus conventional methods in detecting neonatal chlamydial conjunctivitis. J Pediatr Ophthalmol Strabismus. 2008;45:234–9.
16. Mellman-Rubin TL, Kowalski RP, Uhrin M, et al. Incidence of adenoviral and chlamydial coinfection in acute follicular conjunctivitis. Am J Ophthalmol. 1995;119:652–4.
17. De Barbeyrac B, Benali L, Clerc M, et al. Chlamydia trachomatis infection in children: do not forget perinatal acquisition: a case report of a 7-year old girl, C. trachomatis infected, presumed sexually assaulted. J Forensic Leg Med. 2010;17:96–98.
18. Hammerschlag MR, Guillén CD. Medical and legal implications of testing for sexually transmitted infections in children. Clin Microbiol Rev. 2010;23:493–506. https://doi.org/10.1128/CMR.00024-09.
19. Lockington D, MacDonald R, King S, Weir C, Winter A, Aitken C. Multiplex PCR testing requires a robust multi-disciplinary strategy to effectively manage identified cases of chlamydial conjunctivitis. Scott Med J. 2013;58:77–82.
20. Winter AJ. 'Managing patients differently: the Scottish National Sexual Health IT System (NaSH)'. In: Ilett R, Bigrigg A, editors. Transforming sexual health in Scotland: cultural, organisational and partnership approaches (e-book). Bentham Science Publishers; 2010. http://www.benthamscience.com/ebooks/9781608050659/index.htm.
21. McDaid L, Docherty S, Winter A. Occasional paper no. 24: review of the National Sexual Health IT System (NaSH) in Scotland: the potential for sexual health research. Glasgow: MRC/CSO Social and Public Health Sciences; 2013.
22. Garland SM, Malatt A, Tabrizi S, Grando D, Lees MI, Andrew JH, et al. Chlamydia trachomatis conjunctivitis. Preval Assoc Genit Trac Infect Med J Aust. 1995;162:363–6.
23. Althaus CL, Turner KM, Mercer CH, Auguste P, Roberts TE, Bell G, et al. Effectiveness and cost-effectiveness of traditional and new partner notification technologies for curable sexually transmitted infections: observational study, systematic reviews and mathematical modelling. Health Technol Assess. 2014;18:1–100. vii-viii.
24. Forbes G, Clutterbuck DJ. How many cases of chlamydial infection would we miss by not testing partners for infection? Int J STD Aids. 2009;20:267–8.
25. Chen YM, Hu FR, Hou YC. Effect of oral azithromycin in the treatment of chlamydial conjunctivitis. Eye. 2010;24:985–9.
26. Tobin JM, Bateman J, Banks B, Jeffs J. Clinical audit of the process of referral to genitourinary medicine of patients found to be chlamydia positive in a family planning service. Br J Fam Plann. 1999;24:160–3.
27. Estcourt CS, Gibbs J, Sutcliffe LJ, Gkatzidou V, Tickle L, Hone K, et al. The eSexual Health Clinic system for management, prevention, and control of sexually transmitted infections: exploratory studies in people testing for Chlamydia trachomatis. Lancet Public Health. 2017;2:e182–90.
28. Estcourt CS, Sutcliffe LJ, Copas A, Mercer CH, Roberts TE, Jackson LJ, et al. Developing and testing accelerated partner therapy for partner notification for people with genital Chlamydia trachomatis diagnosed in primary care: a pilot randomised controlled trial. Sex Transm Infect. 2015;91:548–54.
29. Cameron ST, Glasier A, Muir A, Scott G, Johnstone A, Quarrell H, et al. Expedited partner therapy for Chlamydia trachomatis at the community pharmacy. BJOG. 2010;117:1074–9.
30. Willetts SJ, Cowper S, Cameron ST. An audit of a novel electronic messaging treatment service for Chlamydia trachomatis at a community pharmacy. Int J STD Aids. 2018;29:511–4.
31. Slutsker JS, Tsang LB, Schillinger JA. Do prescriptions for expedited partner therapy for chlamydia get filled? Findings from a multijurisdictional evaluation, United States, 2017-2019. Sex Transm Dis. 2020. https://doi.org/10.1097/OLQ.0000000000001163.
32. Gift TL, Kissinger P, Mohammed H, Leichliter JS, Hogben M, Golden MR. The cost and cost-effectiveness of expedited partner therapy compared with standard partner referral for the treatment of chlamydia or gonorrhea. Sex Transm Dis. 2011;38:1067–73.
33. Mmeje OO, Qin MJZ, Wetmore MMK, Kolenic MGE, Diniz MCP, Coleman JS. Breakdown in the expedited partner therapy treatment cascade: from reproductive healthcare provider to the pharmacist. Am J Obstet Gynecol. 2020;S0002-9378:30226–X. https://doi.org/10.1016/j.ajog.2020.02.038.
34. Ferreira A, Young T, Mathews C, Zunza M, Low N. Strategies for partner notification for sexually transmitted infections, including HIV. Cochrane Database Syst Rev. 2013;2013:CD002843.
35. Estcourt CS, Howarth AR, Copas A, et al. Accelerated partner therapy (APT) partner notification for people with Chlamydia trachomatis: protocol for the Limiting Undetected Sexually Transmitted infections to RedUce Morbidity (LUSTRUM) APT cross-over cluster randomised controlled trial. BMJ Open. 2020;10:e034806.