Testing for *Chlamydia trachomatis*: self-test or laboratory-based diagnosis?

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Background

Increasing publicity about sexually transmitted infections (STIs), in particular about screening young people for *Chlamydia trachomatis* (CT), is accompanied by some confusion about the various types of tests available including those done outside the usual health care settings (Box 1).

At the present time, nucleic acid amplification tests (NAATs) are considered to be the most sensitive and specific tests available for CT testing and are considered to be the 'gold standard'. In the UK, the Department of Health (DH) has provided funding for all National Health Service (NHS) laboratories to adopt these tests and the National Chlamydia Screening Programme (NCSP) stipulates that screening must be carried out using NAATs. The introduction of these tests has indeed facilitated screening by enabling the use of non-invasive samples (i.e. urine and self-taken vaginal swabs). However, in addition to these laboratory-based assays, there is debate about the role of more rapid tests and their suitability for home use.

Point-of-care tests

Rapid tests for STIs have been advocated for some time and there appears to be increasing interest in point-of-care tests (POCTs).¹ A recent editorial set out the 'pros and cons' of such tests and highlighted the way forward for the introduction of these rapid tests.²

In this context, POCTs are those tests carried out, usually by a health care professional, without the need for the patient sample to be sent to a laboratory. This has the advantage of the diagnosis being made on the spot so that the patient does not have to return at a later date for the result. The tests therefore need to provide almost immediate results that can be given to the patient within a single consultation and they are often referred to as rapid test devices (RTDs). This approach to testing is particularly advantageous in the developing world where health care is not easily accessible and where the prevalence of STIs is high.³ The requirements for a suitable test have been represented by the acronym ASSURED: Affordable, Sensitive, Specific, User-friendly, Rapid and Robust, Equipment-free and Deliverable to end-users. To date no such test has been marketed, although several are under development and may eventually prove to be suitable additions to the testing repertoire. It has been suggested

Box 1: Key points for *Chlamydia trachomatis* (CT) testing

- At the present time, laboratory-based **nucleic acid amplification tests (NAATs)** for *Chlamydia trachomatis* (CT) provide the most sensitive and specific results. These are used by laboratories participating in the National Chlamydia Screening Programme and are also the standard diagnostic test recommended by the Department of Health (www.dh.gov.uk).
- **NAATs** allow the use of non-invasive samples such as urine and vulvovaginal swabs. These samples can be self-collected.
- Rapid, point-of-care tests (**POCTs**) is a term that should be restricted to tests performed by health care workers at the time they see the patient (i.e. without the involvement of the laboratory). These may be useful in some situations but tend to be less sensitive and specific than NAATs.
- Commercially available **self-test kits** are rapid tests that can be performed at home by the patient. Limited studies suggest that to date these tests have reduced specificity and sensitivity compared to NAATs.
- **Self-sampling kits** are where a sample is collected by the patient (either at a health care facility or at home), which is sent to a laboratory for testing. If NAATs are used then the results should be reliable.
- **Self-test kits and self-sampling kits** for CT are now available over-the-counter and via the Internet. There needs to be awareness amongst both professional health care workers and the general population of the differences between these kits and the related issues of reliability.
- **Partner notification and treatment of sexual contacts** must also be emphasised.
- **CE marking** ensures the safety of the contents and the performance as set out in the manufacturer's product description; it is not a guarantee of diagnostic accuracy.

that where risk of transmission is high and patient return rate is low (e.g. in developing countries), a POCT with lower sensitivity than the 'gold standard' test could be tolerated and that its use would still have an impact. This is because the consequences of undetected, untreated infection are significant.⁴

In contrast to developing countries, in the developed world the issues are somewhat different since screening for asymptomatic CT infection has been widely introduced by health care organisations. In the UK there are laboratory and health care facilities that can manage STIs and it is relatively easy for patients to access testing and treatment. However, to try to reduce the prevalence of CT (the most common bacterial STI) the DH commissioned the NCSP to expand the provision of STI screening by offering CT testing to sexually active under-25-year-olds, the group with the highest prevalence. Education, treatment and partner notification are also important integral parts of this strategy. The screening programme depends on using non-invasive samples (i.e. urine, self-taken swabs) tested by NAATs. As mentioned previously, these tests are far more sensitive than any currently available POCT and are regarded as the 'gold standard' test. So, although a sensitive, specific POCT might be useful in certain circumstances such as outreach clinics, the requirement for such a test in the UK should be limited because of widespread access to screening. It should be emphasised that even if suitable POCTs become available, their use requires strict protocols such as those that accompany HIV POCTs and continuing quality assurance has to be

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guaranteed.⁵ It should also be noted that many advertisements for POCTs mention CE marking. [NB. CE marking is a declaration by the manufacturer that the product meets all the appropriate provisions of the relevant legislation implementing certain European Directives.] However, although mandatory, CE marking only ensures the safety of the contents and the performance as set out in the manufacturer's product description; it is not a guarantee of diagnostic accuracy.

Self-testing

So far, discussion of rapid tests has been about their use as POCTs carried out by health care staff; however, there is potential for RTDs to be used for self-testing. Universal access to the Internet means that people can search for information about STIs and access testing outside traditional health care settings. Although this has advantages,⁶ there is a downside. In the UK, a 'Google' search carried out by the Health Protection Agency Chlamydia Diagnosis Forum revealed at least a dozen sites offering testing for CT. Some sites offer testing by NAATs for self-collected samples. These, in general, would be expected to offer a reliable service if this involves samples being sent to reputable laboratories for testing. Additionally, there is often information on the site about treatment and partner notification for those individuals who test positive, and this is an important part of testing as mentioned earlier. Of more concern is the availability of self-test kits, whereby the person performs the test themselves rather than collecting the sample and forwarding it to a laboratory for testing. The performance of these tests is still being researched and there is a need for further independent evaluation. However, limited studies suggest that sensitivity and specificity may be much less than that obtained with NAATs^{7,8} (Moller JK, personal communication, 2007). All of these studies report poor correlation of the results obtained with self-tests when compared with NAATs, with sensitivity as low as 25% and positive predictive values around 20%. In the study by Kegg and Roberts, 11/100 tests were NAAT-positive with only four identified by the POCT; a further 18 were considered positive by the POCT but could not be confirmed by NAAT.⁷

In general, lower specificity leads to false-positive results. This may not be a problem in all cases because, at least anecdotally, women obtaining a positive result often seek advice at a genitourinary medicine (GUM) clinic, sexual health clinic or general practice and are re-tested and a true result obtained. Conversely, poor sensitivity leads to false-negative results and this obviously means missed positive cases. Although these kits are CE marked, as stated earlier this does not guarantee performance and it is essential that both health care professionals and the public are made aware of the possible shortcomings of the assays.

It is acknowledged that many young people do not wish to attend GUM clinics; instead they want to access services that fit in with their lifestyle and therefore they may consider self-testing. However, the wide variety of screening venues available should allow access to testing at a site where people are comfortable with the surroundings and where they can be given suitable advice and treatment.

In addition, many areas taking part in screening programmes now offer postal submission of self-collected samples with results available by text or e-mail.

Regardless of the issues surrounding available self-test technology, it must be recognised that those seeking to self-test may be vulnerable to their own lack of understanding. This has been recognised by the UK Government, who issued a briefing notice on medical self-test kits that describes the range of tests available and discusses the implications of self-testing for individuals and for the NHS.⁹ In general, will users be sufficiently competent to follow instructions, perform the technical manipulation, read/interpret the result and seek help with treatment? In particular for CT testing, will users distinguish 'screening for a silent infection' from 'diagnosis prompted by symptoms', which would require investigation of other causes beyond chlamydia? Do they understand the significance of partner notification?

With rapid tests becoming available for STIs including CT it is worth considering whether restrictions need to be placed on the sale of these kits to the public, as is the case with HIV.¹⁰ Finally, since control of trading via the World Wide Web is impossible, perhaps the approaches used to market and promote self-test devices (e.g. Internet, magazines, television, etc.) could be adopted to promulgate cautions about self-help medical devices in general.

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References

- 1 Hook EW 3rd, Spitters C, Reichart CA, Neumann TM, Quinn TC. Use of cell culture and a rapid diagnostic assay for *Chlamydia trachomatis* screening. *JAMA* 1994; **272**: 867–870.
- 2 Peeling RW. Testing for sexually transmitted infections: a brave new world? *Sex Transm Infect* 2006; **82**: 425–430.
- 3 Peeling RW, Holmes KK, Mabey D, Ronald A. Rapid tests for STIs: the way forward. *Sex Transm Infect* 2006; **82**(Suppl. 5): V1–V6.
- 4 Vickerman P, Watts C, Alary M, Mabey D, Peeling RW. Sensitivity requirements for the point of care diagnosis of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* in women. *Sex Transm Infect* 2003; **79**: 363–367.
- 5 Winter A, Sulaiman Z, Hawkins D. *BASHH Clinical Governance Committee Guidance on the Appropriate Use of HIV Point of Care Tests*. 2006. http://www.bashh.org/committees/cgc/reports/final_hiv_point_of_care_tests_guidance_rev080606.pdf [Accessed 12 May 2007].
- 6 Gaydos CA, Dwyer K, Barnes M, Rizzo-Price PA, Wood BJ, Flemming T, *et al.* Internet-based screening for *Chlamydia trachomatis* to reach non-clinic populations with mailed self-administered vaginal swabs. *Sex Transm Dis* 2006; **33**: 451–457.
- 7 Kegg S, Roberts C. Evaluation of a rapid self-administered test for *Chlamydia trachomatis*: caveat emptor (P017). Poster presentation at the 22nd IUSTI-Europe Conference, Versailles, France, October 2006.
- 8 Moi H. Handilab C chlamydia for home testing is not what it claims [in Norwegian]. *Tidsskr Nor Laegeforen*. 2007; **127**: 2083–2085.
- 9 Parliamentary Office of Science and Technology. Medical self-test kits. *Postnote*, March 2003, No. 194. <http://www.parliament.uk/post/pn194.pdf> [Accessed 12 May 2007].
- 10 The HIV Testing Kits and Services Regulations 1992. Statutory Instrument 1992 No. 460. http://www.opsi.gov.uk/SI/si1992/Uksi_19920460_en_1.htm [Accessed 12 May 2007].

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