



Management of genital *Chlamydia trachomatis* infection

A national clinical guideline



March 2009

KEY TO EVIDENCE STATEMENTS AND GRADES OF RECOMMENDATIONS

LEVELS OF EVIDENCE

- 1⁺⁺ High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
- 1⁺ Well conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
- 1⁻ Meta-analyses, systematic reviews, or RCTs with a high risk of bias
- 2⁺⁺ High quality systematic reviews of case control or cohort studies
High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
- 2⁺ Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
- 2⁻ Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
- 3 Non-analytic studies, eg case reports, case series
- 4 Expert opinion

GRADES OF RECOMMENDATION

Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

- A** At least one meta-analysis, systematic review, or RCT rated as 1⁺⁺, and directly applicable to the target population; or
A body of evidence consisting principally of studies rated as 1⁺, directly applicable to the target population, and demonstrating overall consistency of results
- B** A body of evidence including studies rated as 2⁺⁺, directly applicable to the target population, and demonstrating overall consistency of results; or
Extrapolated evidence from studies rated as 1⁺⁺ or 1⁺
- C** A body of evidence including studies rated as 2⁺, directly applicable to the target population and demonstrating overall consistency of results; or
Extrapolated evidence from studies rated as 2⁺⁺
- D** Evidence level 3 or 4; or
Extrapolated evidence from studies rated as 2⁺

GOOD PRACTICE POINTS

- ☒ Recommended best practice based on the clinical experience of the guideline development group.

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Scottish Intercollegiate Guidelines Network

**Management of
genital *Chlamydia trachomatis* infection**
A national clinical guideline



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1 Introduction

1.1 THE NEED FOR A GUIDELINE

Chlamydia trachomatis is the most prevalent bacterial sexually transmitted infection in Scotland with 17,928 cases of chlamydial infection diagnosed in 2007, a 45% rise since 2002.¹

Many thousands of cases still remain undiagnosed. Population based studies such as NATSAL and the ClaSS study suggest a prevalence of 2-6% in men and women under 25.^{2,3} Opportunistic testing programmes such as the pilot studies in Portsmouth and the Wirral and Healthy Respect suggest that as many as 1 in 10 people aged under 25 attending selected healthcare settings may be infected.^{4,5}

It is unclear what happens to those whose infection is not diagnosed and treated. Genital chlamydial infection remains asymptomatic in at least 70% of women and at least 50% of men and the majority of infections probably clear spontaneously without morbidity.⁶⁻⁸ Genital chlamydial infection can cause significant short and long term morbidity with accompanying costs to the individual and the health service. The complications of chlamydial infection include pelvic inflammatory disease (PID), ectopic pregnancy and tubal infertility in women, epididymo-orchitis in men, and reactive arthritis. Women diagnosed with chlamydial infection may suffer anxiety and psychological distress.⁹

Early studies suggested that these complications of chlamydial infection were common, especially in women, although there may have been selection bias with over-representation of women admitted to hospital.^{10,11} One randomised controlled trial (RCT) showed a reduction in cases of PID if selected testing of women for chlamydia was introduced.¹² Computer modelling suggested that screening for chlamydia in high-risk populations could reduce prevalence of infection.¹³ A national screening programme for chlamydia was established in England in 2003. A 2006 study suggested that the complication rate was lower than believed previously, thus calling into question the cost effectiveness of widespread testing for chlamydia.¹⁴ There is debate in Scotland about how to manage chlamydia at both an individual and population level. Most of the rise in diagnosed cases in Scotland is accounted for by increased testing of asymptomatic, at-risk women as was advocated in SIGN 42, Management of Genital *Chlamydia trachomatis* Infection (2000), but there has been no accompanying change in complications such as PID or ectopic pregnancy.¹⁵

This guideline updates SIGN 42 to reflect the most recent evidence. The guideline aims to advise on policy for the most cost-effective testing strategy at a population level and to consolidate best practice in the management of individual cases of diagnosed genital chlamydial infection.

Standards for testing and management of positive cases of chlamydia in sexual health services in Scotland were set by NHS Quality Improvement Scotland (NHS QIS) in 2008.¹⁶ These standards are based on existing practice informed by SIGN 42. This revised guideline presents evidence that will inform future standards of care.

1.2 REMIT OF THE GUIDELINE

This guideline covers chlamydial infection of the genital tract and rectum. It excludes other sites of infection, eg ocular.

1.2.1 TARGET USERS OF THE GUIDELINE

This guideline will be of particular interest to primary care practitioners, patients, people at risk of infection, charities and voluntary organisations with an interest in sexual health, microbiologists, pharmacists, medical and nursing specialists in sexual health, medical and nursing specialists in genitourinary medicine (GUM), gynaecologists, sexual health advisers, public health specialists, and academic researchers.

1.2.2 SUMMARY OF UPDATES TO THE GUIDELINE

2	Key recommendations	New
3	Laboratory tests	Completely revised
4.1	Patients with symptoms/signs	Minor update
4.2	Asymptomatic groups at risk of chlamydial infection	Completely revised
4.2.1	Screening	Completely revised
4.2.2	Targeted testing for chlamydia	New
4.2.3	Testing for other sexually transmitted infections	New
5	Antimicrobial treatment	Completely revised
5.7	Rectal infection in men	New
6	Partner notification	Minor update
6.1	Methods of partner notification	Updated
6.2	Additional interventions for partners	New
6.3	Time period for identifying previous partners	Minor update
7	Health education in primary prevention and prevention of re-infection	Completely revised
8	Provision of information	New

1.3 DEFINITIONS

Chlamydia: *Chlamydia trachomatis* infection of the genital tract and/or rectum.

First void urine (FVU): the first 20 ml of urine produced.

Opportunistic testing: offering a test during a healthcare consultation when the consultation was initiated for a purpose other than obtaining the test.

Partner notification: the process of identifying and informing sexual partners of individuals with a sexually transmitted infection (STI) so that the partners may attend for testing and treatment.

Patient: many people who use sexual health services are not unwell and the term 'patient' may seem inappropriate. In this guideline the term 'patient' is used to encompass the terms 'clients' and 'service users'.

Rapid testing: a near patient diagnostic test that does not have to be sent to a laboratory for analysis and that produces results quickly, eg in less than one hour.

Screening: the proactive application of a diagnostic test via a programme of testing to a target population in order to identify individuals who are at risk of developing a disease.

Uncomplicated infection: the absence of clinical salpingitis in women or clinical epididymo-orchitis in men.

1.4 STATEMENT OF INTENT

This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's case notes at the time the relevant decision is taken.

1.4.1 PRESCRIBING OF MEDICINES OUTWITH THEIR MARKETING AUTHORISATION

Recommendations within this guideline are based on the best clinical evidence. Some recommendations may be for medicines prescribed outwith the marketing authorisation (product licence). This is known as "off label" use. It is not unusual for medicines to be prescribed outwith their product licence and this can be necessary for a variety of reasons.

Generally the unlicensed use of medicines becomes necessary if the clinical need cannot be met by licensed medicines; such use should be supported by appropriate evidence and experience.¹⁷

Medicines may be prescribed outwith their product licence in the following circumstances:

- for an indication not specified within the marketing authorisation
- for administration via a different route
- for administration of a different dose.

'Prescribing medicines outside the recommendations of their marketing authorisation alters (and probably increases) the prescribers' professional responsibility and potential liability. The prescriber should be able to justify and feel competent in using such medicines.'¹⁷

Any practitioner following a SIGN recommendation and prescribing a licensed medicine outwith the product licence needs to be aware that they are responsible for this decision, and in the event of adverse outcomes, may be required to justify the actions that they have taken.

Prior to prescribing, the licensing status of a medication should be checked in the current version of the British National Formulary (BNF).

1.4.2 ADDITIONAL ADVICE TO NHSSCOTLAND FROM NHS QUALITY IMPROVEMENT SCOTLAND AND THE SCOTTISH MEDICINES CONSORTIUM

NHS QIS processes multiple technology appraisals (MTAs) for NHSScotland that have been produced by the National Institute for Health and Clinical Excellence (NICE) in England and Wales.

The Scottish Medicines Consortium (SMC) provides advice to NHS Boards and their Area Drug and Therapeutics Committees about the status of all newly licensed medicines and any major new indications for established products.

No relevant SMC advice or NICE MTAs were identified.

2 Key recommendations

The following recommendations were highlighted by the guideline development group as being clinically very important. They are the key clinical recommendations that should be prioritised for implementation. The clinical importance of these recommendations is not dependent on the strength of the supporting evidence.

2.1 TESTING

In the absence of data to support a complication rate of 10% or more in women with untreated chlamydial infection, there is no evidence that a screening programme for chlamydia is cost effective with regard to reducing morbidity.

- D** If the patient is having a speculum examination either an endocervical or vaginal swab can be used to test for chlamydia.
- D** Women not undergoing speculum examination should be offered the choice between SOLVS or FVU.
- D** Resources for chlamydia testing in women should be targeted where prevalence is known to be highest, ie first those aged 15-19 and then those aged 20-24.
- D** Resources for chlamydia testing in men should be targeted where prevalence is known to be highest, ie those aged under 25.
- D** All patients attending GUM clinics should be tested for chlamydia.
- B** Postal testing kits should be used to increase chlamydia testing among young men.

2.2 TREATMENT

- B** Taking compliance with therapy into account, uncomplicated genital chlamydial infection should be treated with azithromycin 1 g as a single oral dose.
- B** Taking compliance, tolerability, and efficacy into account, azithromycin 1 g as a single oral dose is recommended for uncomplicated genital chlamydial infection in pregnancy following discussion of the balance of benefits and risks with the patient.
- C** Patients diagnosed with chlamydia must receive a partner notification interview.
- B** Patients diagnosed with chlamydia in general practice should be offered a choice of provider for initial partner notification – either trained practice nurses with support from health advisers in GUM, or referral to GUM.

2.3 FOLLOW UP

- D** All patients treated for chlamydia should be given a follow-up interview within 2-4 weeks of treatment.
- D** Test for re-infection should be recommended at 3-12 months, or sooner if there is a change of partner.
- C** For prevention of STIs, including chlamydia, condom use should be promoted in all settings where sexual health care is provided.

3 Laboratory tests

3.1 CHOICE OF TEST

All Scottish microbiology laboratories use nucleic acid amplification assays (NAATs) to diagnose chlamydial infection. The advantages of NAATs include their sensitivity and their suitability for the assessment of self obtained specimens such as urine and discharge from the vagina.

Five commercial chlamydia NAAT platforms are currently available:

- standard polymerase chain reaction (sPCR) used in Roche Cobas Amplicor
- real time polymerase chain reaction (rtPCR) used in Roche Cobas Taqman CT and Abbott Real Time CT/NG
- strand displacement amplification (SDA) used in Becton Dickinson Probetec
- transcription mediated amplification (TMA) used in Genprobe Aptima Combo 2 and Aptima CT
- nucleic acid sequence based amplification (NASBA).

Two systematic reviews^{18,19} and eight studies of diagnostic accuracy²⁰⁻²⁷ address the question of which NAAT is the most accurate for the diagnosis of chlamydia. Not all tests have been compared head-to-head. Ligase chain reaction (LCR) was withdrawn in 2003. Standard PCR Cobas Amplicor has since been superseded by rtPCR Cobas Taqman. No eligible studies of diagnostic accuracy assessed NASBA.

The limited data have made it difficult to draw conclusions about test performance and make cross comparisons. Prevalences, populations, and settings varied across studies. There were few studies on low prevalence or asymptomatic populations. The conclusions cannot be assumed to apply to Scotland.

A systematic review found that BD Probetec and Aptima Combo 2 are both highly sensitive and specific tests for the diagnosis of genital chlamydial infection.¹⁸ The specimens assessed were FVUs versus cervical swabs in women and FVUs versus urethral swabs in men. A comparison study found no statistically significant difference between the performance of BD Probetec and Aptima Combo 2 when assessing urine.²²

2+
3

C Aptima Combo 2 (TMA) and BD Probetec (SDA) are recommended tests for chlamydial infection.

Analytical sensitivity data and a small clinical study found no significant difference in performance between Abbott Real Time CT/NG and Aptima Combo 2.^{28,29}

3

A prospective study of 501 women found that Cobas Amplicor and Cobas Taqman demonstrated equal sensitivity and specificity in detecting chlamydia.³⁰

3

D Real time PCR can be used as an alternative to TMA and SDA.

Local testing and confirmation should be done in accordance with nationally agreed standards.³¹

3.1.1 NEW VARIANT *CHLAMYDIA TRACHOMATIS* (nvCT)

A new variant of *Chlamydia trachomatis* (nvCT) was identified in Sweden in 2005 and has since been detected in Norway, Denmark, Ireland and Scotland.^{32,33} This strain has a deletion in the cryptic plasmid that is the target for some NAATs, which can produce false negative results. Tests based on TMA, rtPCR and SDA are unaffected by this plasmid deletion.

3.1.2 DUAL TESTS

Combined chlamydia/gonorrhoea tests are also available. These include Abbott Real Time CT/NG, BD Probetec and Aptima Combo 2. One study found that Aptima CT and Aptima Combo 2 had equivalent performance.³⁴

2+

C Either single or dual (combined with gonorrhoea) tests can be used to test for chlamydial infection.

3.2 CHOICE OF SPECIMEN

Specimens tested for chlamydia include material obtained by swabbing the cervix, vagina (clinician-obtained or patient-obtained), urethra, rectum or pharynx, and FVU.

Most eligible studies evaluated FVU. In women this was usually compared to an endocervical swab and in men it was compared to a urethral swab. Two systematic reviews found that use of an endocervical swab gave greater sensitivity than a FVU with sPCR and BD Probetec.^{18,19}

The use of a vaginal swab or endocervical swab results in similar performance.³⁵

2+

Clinician and patient-obtained vaginal swabs have similar performance.^{35,36}

Although chlamydia load is higher in discharge from the vagina than in FVU,³⁷ no well designed studies have shown a statistically significant difference in sensitivity between vaginal swabs and FVUs.^{35,38,39}

In men, FVUs and urethral swabs have similar performance.^{21,40}

3.2.1 PATIENT ACCEPTABILITY

Four cohort studies conducted outwith the UK compared the acceptability of urine, self obtained low vaginal swab (SOLVS) or clinician-obtained vaginal or endocervical swabs in women. A study involving 1,382 army recruits found an overall preference for FVU over SOLVS; however, Caucasian subjects and those with risk factors for an STI preferred SOLVS.⁴¹ A study of 1,090 women attending a variety of American clinics found a preference for SOLVS over FVU or clinician-collected specimen.⁴² Studies involving 535 female prisoners and 413 women attending public health STI clinics found SOLVS were as acceptable as FVUs and women preferred either specimen to examination by a clinician.^{43,44}

3

In men, urethral swabs and first void urine have equal sensitivity, but urethral sampling causes discomfort.^{45,46}

2+

D If the patient is having a speculum examination either an endocervical or vaginal swab can be used to test for chlamydia.

D Women not undergoing speculum examination should be offered the choice between SOLVS or FVU.

D In men, FVU is the specimen of choice.

3.2.2 RECTAL AND PHARYNGEAL SPECIMENS

Only one study on rectal or pharyngeal specimens was identified. This prospective study compared Aptima Combo 2 and BD Probetec when testing specimens from the rectum and throat of 1,011 men who have sex with men (MSM).⁴⁷ The sensitivity of Aptima Combo 2 was greater than BD Probetec when testing rectal specimens for chlamydia. No difference was found for pharyngeal specimens; however, the number of samples may have been too small to detect a difference.

4 Testing for genital chlamydial infection

This section addresses testing in:

- individual patients with symptoms and/or signs suggestive of genital chlamydial infection
 - population groups who are at risk of having asymptomatic disease.
- ☒ The reason for, implications of, and results of any test carried out should be explained to the individual being tested.

4.1 PATIENTS WITH SYMPTOMS/SIGNS OF CHLAMYDIAL INFECTION

In women, symptoms of chlamydial infection include increased vaginal discharge, post-coital and/or intermenstrual bleeding, lower abdominal pain and dysuria. Signs include a mucopurulent cervical discharge, cervical friability and adnexal tenderness on vaginal examination.⁴⁸⁻⁶⁴

In men, symptoms include urethral discharge and/or dysuria. Signs include a mucoid or mucopurulent urethral discharge, microscopy of which reveals numerous pus cells.⁶⁵⁻⁶⁸ Epididymo-orchitis causes scrotal pain and swelling, with tender swelling of the epididymis on examination.⁶⁹⁻⁷¹

Reactive arthritis occurs in about 1% of men following chlamydial infection of the urethra and occurs more rarely following chlamydial infection in women.⁷²⁻⁷⁴ Rectal infection in either men or women rarely causes signs or symptoms.⁷⁵ Chlamydial infection may present with right hypochondrial pain due to perihepatitis.⁷⁶

2+

C Testing for chlamydia should be performed in women and men with any of the following symptoms and signs:

- **Women**
 - vaginal discharge
 - post-coital/intermenstrual/breakthrough bleeding
 - inflamed/friable cervix (*which may bleed on contact*)
 - urethritis
 - pelvic inflammatory disease
 - lower abdominal pain in the sexually active
 - reactive arthritis in the sexually active.
- **Men**
 - urethral discharge
 - dysuria
 - urethritis
 - epididymo-orchitis in the sexually active
 - reactive arthritis in the sexually active.

4.2 ASYMPTOMATIC GROUPS AT RISK OF CHLAMYDIAL INFECTION

The majority of men and women with chlamydial infection are asymptomatic.^{77,78}

4.2.1 SCREENING

The aim of a screening programme for chlamydia is to reduce the morbidity and mortality from upper genital tract complications and/or the incidence and prevalence of the disease by controlling its transmission.

Estimates of chlamydia positivity in the UK vary according to the methodology used. The data for women are more reliable than those for men, with highest prevalence being seen in women aged under 20 followed by women 20-24.⁷⁹

Opportunistic testing tends to yield higher prevalence of infection than population based testing. The largest population based study in the UK was the ClaSS project, which found the overall prevalence of chlamydia among people aged 16-39 years to be 2.8% (95% CI 2.2% to 3.4%) in men and 3.6% (3.1% to 4.9%) in women.³ In people younger than 25 years the prevalence was higher: in men 5.1% (95% CI 4.0% to 6.3%) and in women 6.2% (5.2% to 7.8%). Prevalence was higher in the subgroup of younger women who were harder to engage in screening.

A number of mathematical models have been generated to consider the cost effectiveness of different screening/testing strategies at these levels of prevalence.

Of the 19 identified systematic reviews of the cost effectiveness of chlamydia screening, 18 were rejected on the basis that they had been superseded by newer reviews, were based on practice outwith the UK, or used inappropriate static models that failed to allow for individual transmission dynamics. The remaining systematic review was unable to make any firm recommendations about the cost effectiveness of chlamydia screening because of the lack of reliable natural history data.⁸⁰ Most models assume complication rates of 30-40% for women with untreated chlamydia infection, yet the majority of studies (all but one) identified by systematic review do not support this assumption.¹⁰ One model considered three different probabilities of complication rate: 1%, 10% and 30%.⁸¹ This study concluded that annual screening in those with the highest prevalence, ie men and women aged under 20 years, may be cost effective if PID progression is 10% or higher. The population cumulative incidence of PID, ectopic pregnancy and infertility by age 35 in one large cohort study from Sweden was estimated to be 2-4% overall and 3-7% among those with a history of diagnosed chlamydial infection.¹⁴

In the absence of data to support a complication rate of 10% or more in women with untreated chlamydial infection, there is no evidence that screening for chlamydia is cost effective with regard to reducing morbidity.

4.2.2 TARGETED TESTING FOR CHLAMYDIA

The absence of clear data on morbidity does not mean that chlamydial infection is always harmless. Individuals may suffer immediate and long term harm. A reduction in chlamydia prevalence should minimise the risk of disease, and testing should be targeted at those individuals identified as belonging to groups with the highest prevalence of infection. The following recommendations are based on prevalence of chlamydial infection in a range of settings. In some of these, such as termination of pregnancy, there may also be immediate additional benefit by reducing the risk of ascending infection following the procedure.

Sexual partners

Sexual partners of chlamydia-positive individuals are at risk of infection and subsequent morbidity. Treating them will also reduce the risk of re-infection of the index case. The prevalence of infection in sexual partners of chlamydia-positive cases has been shown to be 60-75%.^{8,82-86} Sexual partners of those with conditions for which chlamydia is a frequent cause, such as PID or epididymo-orchitis, are also at risk of infection.^{87,88} Follow up is discussed in section 5.8 and partner notification in section 6.

2+
4

C Sexual partners of chlamydia-positive individuals should be tested.

D Sexual partners of those with suspected but undiagnosed chlamydial infection (with PID or epididymo-orchitis) should be tested.

Those previously diagnosed with chlamydia

Those who have been diagnosed with chlamydia in the previous 12 months have a high positivity rate on retesting. A prospective cohort study conducted in England showed that re-infection rates among those previously diagnosed with and treated for chlamydia were 21.1 – 29.9 per 100 person years depending on test setting, much greater than the prevalence seen in any group of patients tested for the first time.⁸⁹

3

D Those who have been diagnosed with chlamydia in the previous 12 months should be tested.

GUM clinic attendees

GUM clinic attendees have the highest prevalence of infection amongst any group of patients seen in healthcare settings.^{79,90} GUM clinics play an important epidemiological role in monitoring trends in STI and any observed changes in prevalence would be difficult to interpret if testing for chlamydia were not routine in all patients.

3

D All patients attending GUM clinics should be tested for chlamydia.

Patients at risk in other healthcare settings

An essential prerequisite to testing for chlamydia is a sexual history. Other considerations aside, there is little point in offering a test to someone who has never been sexually active. Data from the National Chlamydia Screening Programme in England (NCSP) show that behavioural risk factors, including having had two or more sexual partners in the last 12 months, are associated with the highest risk of positivity.⁹¹

3

D In healthcare settings other than GUM, testing should be most strongly advised for those who have had two or more partners in the past 12 months.

Women

Among women, higher prevalence is found in patients in healthcare settings compared to population based studies. Within healthcare settings, chlamydial infection is more common in women under 20 and then 20-24 year-old women compared to older groups (see Table 1 for estimates of prevalence in women by setting and age group).⁷⁹

Table 1. Results from the random effects model and the meta-analysis, for females only, by age group and setting (%; 95% CI), and the crude overall mean from data included in each setting.⁷⁹

Logistic regression model						
Age group						
Setting	< 20 years	20-24 years	25-29 years	30+ years		
Population based	4.8 (3.2 to 7.6)	3.2 (2.1 to 4.9)	1.5 (1.0 to 2.5)	0.8 (0.5 to 1.3)		
GP surgery	8.1 (6.5 to 9.9)	5.2 (4.3 to 6.3)	2.6 (2.0 to 3.3)	1.4 (1.0 to 1.9)		
Family planning clinic	10.0 (8.7 to 11.5)	6.5 (5.5 to 7.8)	3.2 (2.5 to 4.2)	1.8 (1.3 to 2.4)		
Youth clinic	10.7 (8.3 to 13.8)	7.0 (5.1 to 9.6)	-	-		
Antenatal clinic	12.6 (6.4 to 23.2)	8.3 (4.2 to 15.7)	4.1 (2.0 to 8.2)	2.2 (1.1 to 4.6)		
TOP clinic	12.3 (9.8 to 15.3)	8.1 (6.4 to 10.1)	4.0 (3.0 to 5.4)	2.2 (1.6 to 3.1)		
GUM clinic	17.3 (13.6 to 21.8)	11.6 (8.9 to 14.9)	5.9 (4.3 to 8.1)	3.2 (2.2 to 4.7)		
Meta-analysis						
Age group						
Setting	< 20 years	20-24 years	25-29 years	30+ years	Crude overall mean	Number of individuals in model
Population based	3.8 (1.0 to 8.3)	2.7 (1.1 to 5.0)	2.2 (0.9 to 4.1)	0.9 (0.4 to 1.5)	1.6 (1.0 to 2.3)	1,725
GP surgery	8.6 (6.6 to 10.9)	5.9 (4.7 to 7.2)	2.9 (1.2 to 5.2)	1.1 (0.2 to 2.7)	7.1 (6.7 to 7.6)	13,207
Family planning clinic	10.0 (9.1 to 10.9)	7.4 (5.7 to 9.4)	3.8 (2.2 to 6.0)	1.5 (0.5 to 2.8)	8.1 (7.6 to 8.7)	9,512
Youth clinic	12.3 (10.0 to 14.9)	10.1 (7.0 to 13.6)	-	-	12.2 (10.8 to 13.7)	1,996
Antenatal clinic	13.5 (9.5 to 19.1)	6.5 (3.5 to 10.4)	7.2 (2.4 to 14.2)	0.0 (1.2 to 1.2)	8.5 (6.6 to 10.6)	803
TOP clinic	13.6 (10.6 to 16.8)	9.7 (6.5 to 13.3)	2.0 (0.3 to 5.1)	1.2 (0.2 to 2.9)	8.5 (7.4 to 9.8)	2,114
GUM clinic	17.3 (13.6 to 21.3)	12.4 (10.3 to 14.7)	4.9 (2.6 to 8.0)	5.1 (2.7 to 8.3)	12.7 (11.5 to 14.0)	2,831

D Resources for chlamydia testing in women should be targeted where prevalence is known to be highest, ie first those aged 15-19 and then those aged 20-24.

Women undergoing termination of pregnancy (TOP) are at risk of ascending infection.⁹²⁻⁹⁶ This gives additional importance to testing and treating positive cases prior to the intervention.⁹⁷ Failure to treat chlamydial infection carries around a 25% risk of post-abortion salpingitis.^{93-95,97}

A All women undergoing termination of pregnancy should be tested for chlamydial infection.

1+
3

Pregnant women

One cohort study was part of a parent study looking at pregnant women with bacterial vaginosis or trichomoniasis and the effect of treating these conditions upon the incidence of pre-term labour.⁹⁸ Samples were retrospectively tested for chlamydia and the pregnancy outcomes were assessed. Chlamydial infection did not increase the risk of pre-term labour, nor did treatment of chlamydia reduce the risk of pre-term labour.

3

There is no evidence to suggest that pregnancy alone should be an indication for routine testing for chlamydia.

MEN

Figure 1 shows rates of chlamydia infection diagnosed in men in Scotland in 2007.

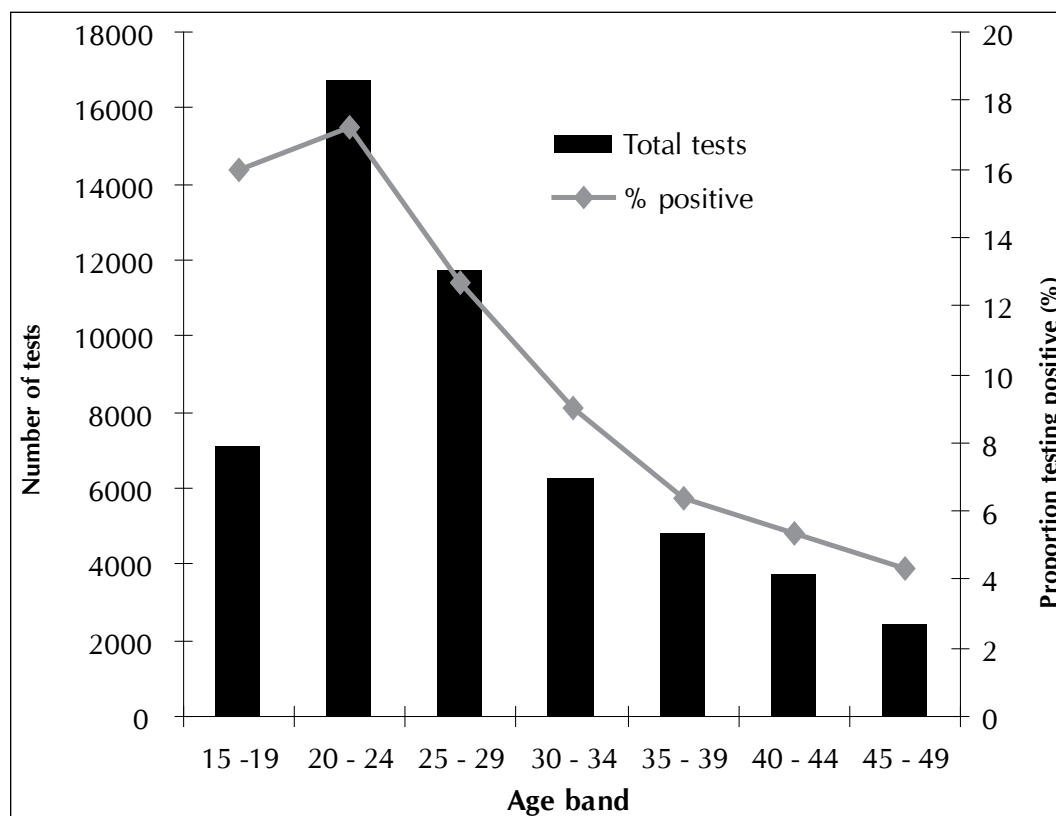


Figure 1. Number of chlamydia tests and proportion positive in men by 5-year age band, Scotland, 2007. Source: ISD

The highest prevalence of chlamydial infection is found in men aged 15-24 years old.¹

3

D Resources for chlamydia testing in men should be targeted where prevalence is known to be highest, ie those aged under 25.

One RCT demonstrated an increase in the uptake of testing when provision of a postal testing kit was compared to usual care. For men aged 21-23 receiving a postal testing kit, the relative risk of being tested was 19.1 (95% CI 16.0-22.8) compared to usual care.⁹⁹

1+

A study from Scotland showed that postal testing was the most frequent way by which men submitted chlamydia tests during an initiative to increase testing in 13-25 year-olds. This study also showed higher prevalence in deprived areas compared to more affluent areas.⁵

3

B Postal testing kits should be used to increase chlamydia testing among young men.

Men who have sex with men (MSM)

No evidence was identified on the clinical or cost effectiveness of screening for chlamydial infection in men who have sex with men, or in persons infected with HIV. One study from Edinburgh showed that 7% of MSM attending the GUM clinic had rectal chlamydial infection.¹⁰⁰ In 2006, GUM clinics in Scotland diagnosed 430 cases of chlamydial infection in MSM, 14% of whom were HIV-infected. Rectal infection accounted for 252 (60%) of these chlamydial cases.¹⁰¹

3

D All MSM attending GUM clinics, including those who are HIV-positive, should be offered chlamydia testing, including rectal swabs.

Testing in other settings

Testing may be undertaken in those falling outwith the above priority groups, for example:

- if there is a high probability of positivity, eg presence of conjunctivitis in a neonate or an adult
- where there is a theoretical concern of morbidity, eg intrauterine device (IUD) insertion
- where it is desirable to reduce immediate risk of transmission, eg semen/egg donor.

Given the current rates of prevalence in Scotland, promotion of testing to asymptomatic women over 25 or asymptomatic heterosexual men over 25 is not advocated, apart from those at increased risk.

4.2.3 TESTING FOR OTHER SEXUALLY TRANSMITTED INFECTIONS

Eleven epidemiological studies looked at the association between various demographic factors (*ethnicity, age, gender, sexual orientation, healthcare setting, deprivation score and pregnancy*) and the risk of sexually transmitted infections. Eight of the studies focused on chlamydia and gonorrhoea.¹⁰²⁻¹⁰⁹ One study focused on trichomonas.¹¹⁰ Two studies looked at general risk of STIs.^{111,112} The only Scottish study looked at sexual orientation and chlamydia risk in men.¹⁰⁷

3

Age under 25 (both sexes) and black ethnicity were risk factors for co-infection with gonorrhoea.^{102-104,108} These studies were not conducted in Scotland and the relevance of the findings to the Scottish population is unclear.

In specimens collected from the Liverpool and South Sefton Chlamydia Screening Programme for gonorrhoea and chlamydial infection, 55 patients from a total of 5,153 tested positive for gonorrhoea.¹⁰⁶ Of these patients, 26 also had a positive chlamydia test with one test being equivocal. Twenty eight cases of gonorrhoea would have been missed if only positive chlamydia tests had been considered for gonorrhoea testing.

Another study looked at all samples submitted for chlamydia testing in rural north Cumbria and screened them for gonorrhoea using Roche Cobas Amplicor.¹⁰⁹ Eleven culture-confirmed positives for gonorrhoea were returned from a sample size of 1,437.

These two studies suggest that testing for gonorrhoea in a low prevalence population, in asymptomatic individuals, would only result in a small pick up rate. Given that prevalence varies by region and may vary over time and that dual testing does not detract from the accuracy of chlamydia diagnosis, some services may feel that dual testing is appropriate.

Table 2 shows the incidence of a range of STIs in Scotland in 2007.

Table 2. Reports of sexually transmitted infections in Scotland, 2007.

	Total numbers of reports	Reports by age and gender (where available)			
		Male		Female	
		< 25	> 25	< 25	> 25
Chlamydia¹	17,928*	3,975	2,601	8,710	2,401
Gonorrhoea¹	1,015	336	329	268	82
HIV¹¹³	446	44	268	25	109
Syphilis¹¹⁴	248**	226***		14	
Trichomonas¹¹⁵	157	5	38	38	76

*Includes 241 unspecified gender reports for chlamydia.

** Includes 8 reports from unspecified gender.

*** MSM figures account for 88% of total male.

There is no evidence to support routine testing for HIV, syphilis or trichomonas in heterosexual patients either presenting for chlamydia testing or who have a positive diagnosis of chlamydial infection.

MSM attending GUM clinics have high rates of infection with syphilis, gonorrhoea and HIV.¹¹⁶

3

D Asymptomatic heterosexual patients requesting an STI screen can be offered a chlamydia test alone in the absence of other risk factors.

D Men who have sex with men (MSM) should be offered a full sexual health screen, including HIV, syphilis, gonorrhoea, and rectal chlamydia testing, depending on their individual risk.

Heterosexual patients whose partners include intravenous drug users, bisexual men, or people who have had unprotected sex in high-risk geographical areas abroad may be at risk for HIV and other STIs.¹¹⁷

3

☒ Consultations for chlamydia testing or treatment should include an assessment of the patient's risk factors for blood borne virus infection.

D Heterosexual patients whose partners include intravenous drug users, bisexual men, or people who have had unprotected sex in high-risk geographical areas abroad should be offered tests for other STIs, depending on their individual risk.

5 Antimicrobial treatment

The management of confirmed chlamydial infection incorporates appropriate antimicrobial therapy, partner notification (see *section 6*), advice to abstain from sex until both the index case and current partner(s) have been treated, and relevant health education (see *section 7*).

- ☑ Patients with symptomatic or confirmed asymptomatic chlamydial infection should be advised to abstain from having sex (including oral and anal) until they and their current partners have been treated and for one week thereafter even when treated at the same time.

5.1 INITIATION OF TREATMENT

In symptomatic patients treatment should be initiated at the first consultation rather than awaiting laboratory confirmation of infection. There is evidence in PID that delay in starting treatment increases the risk of impaired fertility.⁵³ Partners should be treated without waiting for laboratory confirmation.¹¹⁸

2+

- C** Initiate treatment without waiting for laboratory confirmation of infection in patients with symptoms and signs of chlamydial infection and their sexual partners.

5.2 CHOICE OF ANTIMICROBIAL AGENT

The choice of antimicrobial agent is governed by efficacy, incidence of side effects, cost, and adherence.

Given the high cure rate (>90%) with all the agents used, equivalence of effectiveness of therapy, rather than improved effectiveness, was sought. All treatment regimens reviewed are oral, for outpatient use.

Adherence with oral therapy for STIs over several days is suboptimal and gets worse the more frequent the daily dosage. Adherence may be poor for many reasons, ranging from patients being asymptomatic, the symptoms of infection clearing quickly, the presence of side effects, through to lifestyle issues.¹¹⁹⁻¹²²

2+

5.3 UNCOMPLICATED INFECTION

One meta-analysis showed that doxycycline 100 mg twice daily for seven days and azithromycin 1 g once are equally efficacious in the treatment of genital chlamydial infection. No difference in adverse effects was found.¹²³

1++

- A** Uncomplicated genital chlamydial infection may be treated with either azithromycin 1 g as a single oral dose or doxycycline 100 mg twice daily for seven days.

- B** Taking compliance with therapy into account, uncomplicated genital chlamydial infection should be treated with azithromycin 1 g as a single oral dose.

5.4 UNCOMPLICATED INFECTION IN PREGNANCY

In pregnant women, azithromycin 1 g as a single oral dose, amoxicillin 500 mg three times daily orally for seven days, and erythromycin 500 mg four times daily orally for seven days are all equally effective for the treatment of chlamydial infection in pregnancy, with cure rates of over 90%.^{124,125}

1++

Azithromycin is a well tolerated, single dose treatment which can be taken in the presence of a healthcare worker, ensuring adherence. The safety data are reassuring but limited when compared with amoxicillin and erythromycin. Amoxicillin and erythromycin, though cheap and effective with long safety records, are less well tolerated and non-completion of treatment (particularly with erythromycin due to gastrointestinal side effects) is a problem.

A Uncomplicated genital chlamydial infection in pregnancy should be treated with

- **azithromycin 1 g as a single oral dose**

or

- **erythromycin 500 mg four times daily orally for seven days**

or

- **amoxicillin 500 mg three times daily orally for seven days.**

B Taking compliance, tolerability, and efficacy into account, azithromycin 1 g as a single oral dose is recommended for uncomplicated genital chlamydial infection in pregnancy following discussion of the balance of benefits and risks with the patient.

- ☒ In vivo studies of the safety of azithromycin in pregnancy should continue.

In vitro studies suggest that amoxicillin may not always eradicate chlamydial infection but may render the infection latent.¹²⁶ A small study has shown that some infants develop chlamydial infection despite apparently successful treatment of the mother.¹²⁷ Therefore a negative test of cure does not necessarily equate with absence of transmission during delivery.^{124,128}

3

- ☒ When women have been treated with amoxicillin in pregnancy, practitioners should maintain a high index of suspicion should symptoms suggestive of chlamydial infection develop in the infant.

5.5 CHLAMYDIAL SALPINGITIS

No studies on chlamydial salpingitis alone were identified. PID is often multifactorial and its diagnosis and treatment are outwith the scope of this guideline. There are two specific circumstances in which the treatment options given in section 5.3 are inappropriate.

Women returning to a healthcare setting to be treated for chlamydia, or women presenting as the sexual partner of someone with chlamydia, may have symptoms/signs suggestive of salpingitis, in which event there is no evidence for the efficacy of a single dose of azithromycin. The recommendations below have been adapted from the British Association for Sexual Health and HIV (BASHH) guidelines for the management of PID to address the circumstances of symptoms/signs of salpingitis in a patient presenting for treatment of chlamydia or attending as a chlamydia contact.¹²⁹

4

D Chlamydial salpingitis should be treated with doxycycline 100 mg twice daily for 14 days plus metronidazole 400 mg twice daily for 14 days.

D Ofloxacin 400 mg twice daily for 14 days may be used as an alternative to doxycycline.

5.6 CHLAMYDIAL EPIDIDYMO-ORCHITIS

No studies on chlamydial epididymo-orchitis alone were identified. The management of epididymo-orchitis is outwith the scope of this guideline. To address the circumstance of a man returning to a healthcare setting to be treated for chlamydia or presenting as the sexual partner of someone with chlamydia and having symptoms/signs suggestive of epididymo-orchitis, the following recommendation has been adapted from BASHH guidelines.¹³⁰

4

D The recommended treatment for chlamydial epididymo-orchitis in men is doxycycline 100 mg twice daily for 10-14 days.

5.7 RECTAL INFECTION IN MEN

There are no randomised trials comparing doxycycline with azithromycin in the treatment of rectal infection and either appears to be equally appropriate for managing infection with *Chlamydia trachomatis* serovars D-K. The re-emergence of lymphogranuloma venereum (LGV) as a rare cause of proctitis in MSM in Scotland means that all cases should be followed up carefully.

If infection with *Chlamydia trachomatis* serovars L1-3 is diagnosed, or suspected on the grounds of severity of symptoms and signs, a prolonged course of doxycycline is recommended.¹³¹

4

D Rectal infection may be treated with either azithromycin 1 g as a single oral dose or doxycycline 100 mg twice daily for seven days.

D If LGV is diagnosed, or suspected on clinical grounds, the recommended regimen is doxycycline 100 mg twice daily for three weeks.

☒ Primary care health professionals should refer patients with rectal infection to GUM.

5.8 FOLLOW UP AND TEST OF CURE

The quality of evidence available on the efficacy of follow up and the role of test of cure is poor. Many patients fail to return and cannot be included in studies. Conclusions can still be drawn regarding the management of the self selecting group of patients who return for follow up.¹³²⁻¹³⁷ These studies provided no conclusive evidence as to the optimal timing of follow up. Prolonged delay on follow up increases the risk of re-infection from untreated partners.

3

BASHH guidelines advise that patients should be re-interviewed to ensure compliance with treatment, avoidance of risk of re-exposure to infection and that all sexual partners have been contacted.¹³⁸

4

In one study the success rate for partner notification improved from 0.46 to 0.66 contacts per index case after setting up a specific follow-up clinic ($p = 0.005$).¹³⁹

3

In another study the number of contacts confirmed as treated was 51% when patients were interviewed by telephone compared to only 30% in those given a follow-up appointment ($p < 0.00001$).¹⁴⁰ The difference was accounted for by a high default rate in the latter group. Telephone follow up may be more cost effective in terms of staff time.

3

D All patients treated for chlamydia should be given a follow-up interview within 2-4 weeks of treatment.

D Telephone follow up may be used as an alternative to face-to face interviews.

D Adherence with therapy and risk of re-infection should be discussed with patients at follow-up interviews.

D A test of cure need not be performed in patients who have adhered to therapy and in whom there is no risk of re-infection.

☒ A test of cure should be offered to those patients who prefer the reassurance it offers.

A higher rate of positive chlamydia tests may be seen after treatment in pregnancy. This difference is attributed to either a less efficacious treatment regimen, non-compliance or re-infection and routine test of cure is recommended by BASHH.¹³⁸ 4

Healthcare professionals should be aware that if a test of cure is to be done using a NAAT, it should not be done within five weeks of initiation of therapy in order to avoid false positive results due to persistence of non-viable organisms.¹⁴¹ 2+

D Test of cure should be routine during pregnancy.

D Test of cure/re-infection established by NAAT should be performed a minimum of five weeks after the initiation of therapy (*six weeks after azithromycin*), to avoid false positive results.

5.8.1 LONG TERM FOLLOW UP

In persons who have already been diagnosed with and treated for chlamydia, a study conducted in England showed re-infection rates of 21.1- 29.9 per 100 person years depending on test setting, much greater than the prevalence seen in any group of patients tested for the first time.⁸⁹ This suggests that greater efforts should be made to offer repeat testing in the 12 months following a diagnosis of chlamydial infection. 3

D Test for re-infection should be recommended at 3-12 months, or sooner if there is a change of partner.

6 Partner notification

The treatment of sexual contacts prior to resumption of sexual intercourse is the strongest predictor for preventing re-infection.¹⁴² Effective partner notification (also referred to as contact tracing) forms an essential component of the management of chlamydial infection.¹⁴³

2+

C Patients diagnosed with chlamydia must receive a partner notification interview.

6.1 METHODS OF PARTNER NOTIFICATION

Choice of method of partner notification is based on resource availability as well as patient/partner acceptability.¹⁴⁴ It is the role of the healthcare provider to advise individual patients on the best approach in their circumstances. The options are:

- **Patient referral**, when index patients themselves advise their sexual contacts to seek treatment.
- **Provider referral**, when a healthcare provider advises a patient's contacts anonymously that they should seek treatment.
- **Conditional referral**, when the healthcare provider notifies contacts if the patient has not done so after a given number of days.

The quality of studies examining these areas was variable and all were performed outside the UK. Two systematic reviews found some evidence that choice of method helps to increase partner notification.^{145,146}

1+

B Patients should be given a choice of patient or provider referral.

Partner notification used to be performed exclusively by sexual health advisers in GUM, but there is some evidence that others can also undertake this task in community settings. One systematic review investigated who should provide partner notification to identify maximum numbers of partners.¹⁴⁵ None of the trials identified were UK based, all were methodologically flawed, and all had limited applicability. A UK based RCT showed that in primary care, more partners of patients with chlamydia were identified when partner notification was initiated by practice nurses and followed up by sexual health advisers by telephone from GUM, than when treated and referred to GUM only, owing to the high default rate from GUM clinic attendance (risk difference 12.4%, 95% CI -1.8 to 26.5%).¹⁴⁷ The difference was not statistically significant.

1+

There was no evidence to indicate who should provide partner notification in other community settings, eg family planning or gynaecology, although partner notification rates were evaluated in non-GUM locations providing sexual health care.¹⁴⁸

B Patients diagnosed with chlamydia in general practice should be offered a choice of provider for initial partner notification – either trained practice nurses with support from health advisers in GUM, or referral to GUM.

☒ In GUM settings, health advisers should continue to provide partner notification.

☒ In other settings, eg family planning and gynaecology, a decision should be made locally as to how best to provide partner notification, which may include training to support local provision or referral pathways.

☒ Healthcare workers providing partner notification in non-GUM settings should be trained and supported by GUM sexual health advisers.

6.2 ADDITIONAL INTERVENTIONS FOR PARTNERS

Patient delivered partner medication (PDPM), which cannot currently be carried out in the UK because of legal considerations, was found to have some effect in reducing recurrent and persistent infections in patients with chlamydia. Most studies were carried out in the USA.

PDPM can reduce the risk of persistent or recurrent infection in patients with chlamydia compared to simple patient referral.¹⁴⁶ Patient referral with supplemental information including treatment guidelines for their health professional is as effective as PDPM in reducing persisting/recurring infections, but more partners are reported to have been treated if PDPM is used.

1+

Patients with chlamydia may have reduced rates of re-infection if written information and treatment guidelines for health professionals are given to partners. Additional health education and counselling as well as patient referral may result in increased numbers of partners attending for treatment.^{145,146}

1-

There is insufficient evidence for web-based information assisting with patient referral, though this may be a future area of development.¹⁴⁹

C Patients with chlamydia should be offered additional written information for partners, with accompanying guidance for healthcare professionals.

6.3 TIME PERIOD FOR IDENTIFYING PREVIOUS PARTNERS

There is no clear evidence regarding the length of time over which previous sexual partners should be sought. In accordance with other UK guidelines, the following time periods are recommended.¹³⁸

4

D In men with symptomatic chlamydial infection, all partners from the four weeks prior to onset of symptoms should be contacted.

D In women and asymptomatic men, all partners from the last six months or the most recent sexual partner (*if outwith that time period*) should be contacted.

7 Health education in primary prevention and prevention of re-infection

Relatively few studies are available on the effectiveness of sexual health behavioural or educational initiatives in the prevention of STIs in general or chlamydial infection in particular. Few of the studies reviewed met the required methodological standards and the effects of the interventions on subsequent behaviour, and in the longer term, are inconclusive. Almost all of the evidence is from the USA and may not be applicable to the Scottish context. It is not possible to recommend any particular intervention.

7.1 PATIENTS

7.1.1 PRIMARY PREVENTION

There is limited evidence that one to one interventions in clinical settings can reduce STIs and increase condom use.¹⁵⁰ One study found that two and four session one to one counselling reduced STIs.¹⁵¹ Effective one to one interventions are characterised as being client centred and tailored to personal risk, and include behavioural goal setting and risk reduction strategies. Although one to one interventions are unlikely to be feasible in many settings, health advisers could incorporate this approach into their consultations in GUM.

1++

There is limited evidence that group based interventions can reduce chlamydial infection.^{152,153} These interventions have been evaluated with high risk groups in the USA and may not be transferable to the Scottish context. Effective group based interventions have been based on cognitive behavioural change theories.

1+

No specific intervention studies were identified to address whether condom provision was effective in the primary prevention of chlamydial infection. A systematic review of case control and cross-sectional studies concluded that condom use reduced the risk of chlamydial infection.¹⁵⁴

2++

B Client centred, risk reduction focused, one to one counselling involving behavioural goal setting should be considered during consultations for sexual and reproductive health issues.

☒ Where one to one counselling is not feasible, the provision of sexual health information should be integral to consultations for contraception, STI testing or other sexual and reproductive health issues.

C For prevention of STIs, including chlamydia, condom use should be promoted in all settings where sexual health care is provided.

7.1.2 PREVENTION OF RE-INFECTION

Successful treatment and control of STI involves the prevention of re-exposure. In a prospective cohort study of women aged 16-24 years in Portsmouth and the Wirral, acquiring new partners and failing to treat all partners were associated with higher chlamydial re-infection rates.⁸⁹ Few behavioural or educational interventions have been evaluated for efficacy of preventing chlamydial re-infection, and the educational needs of patients are likely to vary according to age, gender, social class, social vulnerability, sexual orientation and ethnicity.¹⁵⁵

2+

The effective one to one interventions described in section 7.1.1 could be tailored to patients with chlamydia to prevent re-infection.

No specific intervention studies were identified to address whether condom provision was effective in preventing re-infection.

- ☒ The provision of sexual health information, including the risk of re-infection associated with partner change and failure to treat all partners, should be integral to consultations for treatment of chlamydial infection.

7.2 GENERAL PUBLIC

Awareness of chlamydial infection among the general population has increased since the publication of SIGN 42. In the 2006-2007 National Statistics Omnibus Survey, 84% of men (aged 16-69) and 92% of women (aged 16-49) recognised chlamydia as an STI (compared with 35% and 65% respectively in 2000-2001); recognition was similarly high across all ages but increased with educational level.¹⁵⁶

Community interventions to increase awareness of chlamydial infection and other STIs, promote prompt treatment seeking, and reduce high-risk sexual behaviours have also been reported.^{157,158} An RCT of school based sex education found pupils in the intervention schools were more knowledgeable about sexual health than those in control schools who received standard sex education.¹⁵⁹ This knowledge was not specific to chlamydia.

1+

No specific population based interventions to prevent chlamydial infection or re-infection were identified. Increasing awareness of chlamydia is central to prevention, and social marketing campaigns may affect behaviour change at the population level.¹⁶⁰

4

- C** Opportunities should be taken to deliver education in a wide variety of non-healthcare settings, eg youth clubs, community centres, and schools. Education about chlamydial infection should be integrated with other sexual health education and condom promotion initiatives.

- D** Social marketing campaigns targeted toward those at risk should continue to raise awareness of chlamydial infection.

8 Provision of information

This section reflects the issues likely to be of most concern to patients and their carers. These points are provided for use by health professionals when discussing chlamydial infection with patients and carers and in guiding the creation of locally produced information material.

8.1 CHECKLIST FOR PROVISION OF INFORMATION

This section gives examples of the information patients/partners may find helpful at the key stages of the patient journey. The checklist was designed by members of the guideline development group based on their experience and their understanding of the evidence base. The checklist is neither exhaustive nor exclusive.

Testing/Treatment
<ul style="list-style-type: none"> ▪ Emphasise to patients that chlamydia is a curable infection. ▪ The following information should be discussed with patients when receiving tests and treatment for chlamydial infection: <ul style="list-style-type: none"> - types of tests available and how samples can be taken - time taken for test result to be known - treatment for chlamydial infection if result is positive - duration of treatment - the importance of complying with treatment - potential interactions between alcohol and antibiotics. ▪ Advise patients who have symptoms of the need to start treatment without waiting for laboratory confirmation. ▪ Female patients should be advised of the effects antibiotics can have on combined hormonal contraception (pill and patch). ▪ Provide patients with written information. ▪ Inform patients that follow up is advised, either by telephone or a further appointment. ▪ Inform patients that partner notification will be necessary, should they test positive. ▪ Inform patients they should abstain from having sex (including oral and anal) until current partners have been treated and for one week thereafter even when both patient and partner are treated at the same time.
Partner notification
<ul style="list-style-type: none"> ▪ The following information should be discussed with patients: <ul style="list-style-type: none"> - the importance of partner notification - the availability of trained staff to help with partner notification. ▪ Ensure patients are aware of the choice of patient, provider or conditional referral for partner notification. ▪ Ensure patients are aware of the choice of testing provider for partners, eg postal testing kits, attending local sexual health or GUM clinics or GP. ▪ Ensure patients have appropriate information for partners including <ul style="list-style-type: none"> - what chlamydia is and how it is contracted - how to access testing services - types of tests and treatment available - information on safer sex. ▪ Provide patients and partners with written information.
Follow up
<ul style="list-style-type: none"> ▪ The following information should be discussed with patients: <ul style="list-style-type: none"> - compliance with treatment and risk of re-infection - whether there is a need to perform a test of cure - the importance of a repeat test 3-12 months later, or sooner if they have a new sexual partner. ▪ Re-emphasise the need for safer sex and the use of condoms to prevent re-infection.

8.2 SOURCES OF FURTHER INFORMATION

Caledonia Youth

5 Castle Terrace

Edinburgh EH1

Tel: 0131 229 3596

Email: Edinburgh.information@caledoniayouth.org • Website: www.caledoniayouth.org

Caledonia Youth is a young person's service that provides advice, information and support on any aspect of sex, contraception and relationships. Caledonia Youth has a number of local projects throughout Scotland.

Family Planning Association (FPA) Scotland

Unit 10, Firhill Business Centre

76 Firhill Road

Glasgow G20 7BA

Tel: 0141 576 5088 • National Helpline: 0845 122 8690 (Monday to Friday, 9am to 6pm)

Website: www.fpa.org.uk

The Family Planning Association (FPA) Scotland provides a range of confidential sexual health and reproductive information and advice in a number of languages and also offers a service for the hard of hearing and partially sighted. Services include contraception, STI testing and pregnancy testing.

NHS24

Tel: 0845 4647 • Website: www.nhs24.com

NHS24 is a nurse-led helpline that offers confidential health advice and information 24 hours per day, 365 days per year. NHS24 can give information on local health service providers near you. A range of information leaflets are available.

The Sandyford Initiative

2-6 Sandyford Place, Sauchiehall Street

Glasgow G3 7NB

Tel: 0141 211 8130 • Website: www.sandyford.org

The Sandyford Initiative is a Glasgow-wide service provider in sexual and reproductive health offering a range of confidential information, counselling and testing services.

Terrence Higgins Trust

134 Douglas Street

Glasgow G2 4HF

Tel: 0141 332 3838

Email: info.glasgow@tht.org.uk • Website: www.tht.org.uk

Terrence Higgins Trust is a UK charity that provides information, support and advice on HIV and sexual health. Its mission statement includes the aim to 'maximise sexual health in the UK, and minimise the spread of HIV and STIs, by encouraging people to value their sexual health and by leading innovation to increase access to local sexual health services.' The Trust has centres in Aberdeen, Glasgow, and Inverness. Information resources and details of services offered are available from their website.

GUM clinics

To find your nearest GUM clinic, contact NHS24 (above) or look up GUM clinics in your local telephone directory. Contact details of local GUM clinics are available from the following websites:

www.bashh.org (searchable by post code)

www.healthygayScotland.com/directory.htm

Websites that also provide information on chlamydia prevention, testing, treatment, and follow up:

www.bashh.org

www.brook.org.uk

www.cdc.gov/std/chlamydia

www.chlamydia-screening.nhs.uk

www.engenderhealth.org

www.healthyrespect.org.uk

www.nhsdirect.nhs.uk

www.patient.co.uk

9 Implementing the guideline

This section provides advice on the resource implications associated with implementing the key clinical recommendations, and advice on audit as a tool to aid implementation.

Implementation of national clinical guidelines is the responsibility of each NHS Board and is an essential part of clinical governance. Mechanisms should be in place to review care provided against the guideline recommendations. The reasons for any differences should be assessed and addressed where appropriate. Local arrangements should then be made to implement the national guideline in individual hospitals, units and practices.

9.1 RESOURCE IMPLICATIONS OF KEY RECOMMENDATIONS

A budget impact report and an associated spreadsheet have been developed to provide each NHS board with resource and cost information to support the implementation of three recommendations judged to have a material impact on resources (see *Table 3*). These documents are available from the NHS QIS website: www.nhshealthquality.org.

By reducing the spread of infection and re-infection, implementation of these recommendations will lead to reduced testing and treatment costs in future, as well as patient and clinical benefits. These benefits have not been quantified or costed.

The total costs of implementing these three recommendations across NHSScotland are estimated to be £533,100 in the first year. The estimated additional resources required across Scotland are 3,900 GP hours, 1,700 practice nurse hours, 560 health adviser hours, 60 GUM consultant hours and 1,070 receptionist or staff member hours. The remaining expenditure is mainly on 13,000 laboratory tests and drugs for 7,000 treatments. These figures are based on an assumed staffing ratio of 70% GPs/30% nurses.

These costs would be reduced by £98,000 if a health adviser or a trained practice nurse replaced the GP to give a ratio of 30% GPs/70% nurses.

Some of these costs would overlap with the costs necessary to meet the NHS QIS sexual health standards on partner notification and testing for young people. If both the standards and the guideline are implemented, the additional first year costs of implementing these three recommendations across NHSScotland would be £333,100.

For a full description of the assumed parameters and sensitivity analyses, see the budget impact report.

Table 3. Recommendations costed in the budget impact report.

Recommendation		Section
C	Patients diagnosed with chlamydia must receive a partner notification interview.	6
D	All patients treated for chlamydia should be given a follow-up interview within 2–4 weeks of treatment.	5.8
D	Test for re-infection should be recommended at 3–12 months, or sooner if there is a change of partner.	5.8.1

9.2 AUDITING CURRENT PRACTICE

A first step in implementing a clinical practice guideline is to gain an understanding of current clinical practice. Audit tools designed around guideline recommendations can assist in this process. Audit tools should be comprehensive but not time consuming to use. Successful implementation and audit of guideline recommendations requires good communication between staff and multidisciplinary team working.

9.2.1 NATIONAL TARGETS

NHS QIS has established standards for sexual health services that include audit criteria. The standards are available from the NHS QIS website: www.nhshealthquality.org.

The guideline development group has identified the following as key points to audit to assist with the implementation of this guideline:

9.2.2 REGIONAL TARGETS

- number of tests per head of population
- number of tests carried out in men
- development and dissemination of information materials to health professionals and the general public.

9.2.3 TARGETS WITHIN DEPARTMENTS, CLINICS, HEALTH CENTRES, etc.

General

- rates of referral to GUM health advisers from other settings

Diagnostic testing

- percentage of women with suspected PID tested for chlamydial infection
- percentage of men with epididymitis tested for chlamydial infection

Testing specific asymptomatic groups

- percentage of chlamydia tests per year taken from males aged under 25
- percentage of chlamydia tests per year taken from females aged 15-19
- percentage of chlamydia tests per year taken from females aged 20-24
- percentage of women tested before TOP
- percentage of patients attending GUM clinics offered chlamydia testing
- percentage of MSM attending GUM clinics offered chlamydia testing

Follow-up rate

- partner notification success rates
- percentage of patients with chlamydial infection who receive a follow-up interview within four weeks
- percentage of patients with chlamydia who are retested 3-12 months later.

10 The evidence base

10.1 SYSTEMATIC LITERATURE REVIEW

The evidence base for this guideline was synthesised in accordance with SIGN methodology. A systematic review of the literature was carried out using an explicit search strategy devised by a SIGN Information Officer. Databases searched include Medline, Embase, Cinahl, and the Cochrane Library. The date range covered by the search to update this guideline was 1999-October 2007. Internet searches were carried out on various websites including the New Zealand Guidelines Programme, NeLH Guidelines Finder, Guidelines International Network, and the US National Guidelines Clearinghouse. Articles relating to *Chlamydia pneumoniae* were excluded. All articles that were not related to the diagnosis or management of genital *Chlamydia trachomatis* infection were excluded. Where sufficient evidence was felt to be available in the English literature, the non-English literature was not reviewed. The main searches were supplemented by material identified by individual members of the guideline development group and peer reviewers. Each of the selected papers was evaluated by two members of the group using standard SIGN methodological checklists before conclusions were considered as evidence.

10.1.1 LITERATURE SEARCH FOR PATIENT ISSUES

A search for studies identifying issues of concern to patients with genital *Chlamydia trachomatis* infection was conducted using the SIGN patient information filter. Databases searched include Medline, Embase, Cinahl, PsycINFO, and the Cochrane Library. The date range covered was 1999-May 2007. The SIGN Patient Involvement Officer analysed the search results to identify themes in the literature. This analysis was used to inform section 8 of the guideline along with original research conducted in one to one interviews in November 2007 with 24 patients at a sexual health clinic in Scotland.

10.2 RECOMMENDATIONS FOR RESEARCH

The guideline development group was not able to identify sufficient evidence to answer all of the key questions asked in this guideline (see *Annex*). The following areas for further research have been identified:

- evaluation of the effectiveness of group based and one to one behavioural and educational interventions in Scotland in the prevention of chlamydial infection and re-infection
- evaluation of the effectiveness of condom provision in the prevention of chlamydial infection and re-infection
- comparison of doxycycline with azithromycin in rectal chlamydial infection
- usefulness of test of cure in rectal infection.

10.3 REVIEW AND UPDATING

This guideline was issued in 2009 and will be considered for review in three years. Any updates to the guideline in the interim period will be noted on the SIGN website: **www.sign.ac.uk**.

11 Development of the guideline

11.1 INTRODUCTION

SIGN is a collaborative network of clinicians, other healthcare professionals and patient organisations and is part of NHS Quality Improvement Scotland. SIGN guidelines are developed by multidisciplinary groups of practising clinicians using a standard methodology based on a systematic review of the evidence. Further details about SIGN and the guideline development methodology are contained in “SIGN 50: A Guideline Developer’s Handbook”, available at www.sign.ac.uk.

11.2 THE GUIDELINE DEVELOPMENT GROUP

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The membership of the guideline development group was confirmed following consultation with the member organisations of SIGN. All members of the guideline development group made declarations of interest and further details of these are available on request from the SIGN Executive.

Guideline development and literature review expertise, support and facilitation were provided by the SIGN Executive.

11.3 CONSULTATION AND PEER REVIEW

11.3.1 PUBLIC CONSULTATION

The draft guideline was available on the SIGN website from 30 June to 31 July 2008 to allow all interested parties to comment on the draft guideline.

11.3.2 SPECIALIST REVIEW

This guideline was also reviewed in draft form by the following independent expert referees, who were asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence base supporting the recommendations in the guideline. The guideline group addresses every comment made by an external reviewer, and must justify any disagreement with the reviewers' comments.

SIGN is very grateful to all of these experts for their contribution to the guideline.

Dr Susan Brechin	<i>Senior Clinical Lecturer (Honorary Consultant) Sexual and Reproductive Health, Director of Faculty of Family Planning and Reproductive Health Care Clinical Effectiveness Unit, University of Aberdeen</i>
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11.3.3 SIGN EDITORIAL GROUP

As a final quality control check, the guideline is reviewed by an editorial group comprising the relevant specialty representatives on SIGN Council to ensure that the specialist reviewers' comments have been addressed adequately and that any risk of bias in the guideline development process as a whole has been minimised. The editorial group for this guideline was as follows.

Dr Keith Brown	<i>Chair of SIGN; Co-Editor</i>
Dr John Gillies	<i>Royal College of General Practitioners</i>
Dr Ken Lawton	<i>Royal College of General Practitioners</i>
Dr Safia Qureshi	<i>SIGN Programme Director; Co-Editor</i>
Dr Sara Twaddle	<i>Director of SIGN; Co-Editor</i>

Abbreviations

BASHH	British Association for Sexual Health and HIV
BNF	British National Formulary
CDC	Centers for Disease Control
CI	confidence interval
ClasS	Chlamydia Screening Studies
CT/NG	<i>Chlamydia trachomatis/Neisseria gonorrhoeae</i>
DNA	deoxyribonucleic acid
EIA	enzyme immunoassay
FVU	first void urine
GUM	genitourinary medicine
HIV	human immunodeficiency virus
IUD	intrauterine device
KCI	key clinical indicator
LCR	ligase chain reaction
LGV	lymphogranuloma venereum
MSM	men who have sex with men
MTA	multiple technology appraisal
NAAT	nucleic acid amplification test
NASBA	nucleic acid sequence based amplification
NATSAL	National Survey of Sexual Attitudes and Lifestyles
NCSP	National Chlamydia Screening Programme
NG	<i>Neisseria gonorrhoeae</i>
NGU	non-gonococcal urethritis
NHS QIS	NHS Quality Improvement Scotland
NICE	National Institute for Health and Clinical Excellence
NSU	non-specific urethritis
nvCT	new variant <i>Chlamydia trachomatis</i>
PCR	polymerase chain reaction
PDPM	patient delivered partner medication
PID	pelvic inflammatory disease
RCT	randomised controlled trial
RR	relative risk
rtPCR	real time polymerase chain reaction
SDA	strand displacement amplification
SIGN	Scottish Intercollegiate Guidelines Network
SMC	Scottish Medicines Consortium

SOLVS	self obtained low vaginal swab
sPCR	standard polymerase chain reaction
STI	sexually transmitted infection
TMA	transcription mediated amplification
TOP	termination of pregnancy
TV	<i>Trichomonas vaginalis</i>
UK	United Kingdom
USA	United States of America

Annex

Key questions used to develop the guideline

Key question	See guideline section
LABORATORY TESTING	
1. Which nucleic acid amplification test (NAAT) is the most accurate for diagnosis of chlamydia: (a) real time PCR, (b) TMA, (c) SDA, (d) NASBA?	3.1
2. In men/women undergoing nucleic acid amplification tests what is the sensitivity and specificity of each of the above tests on different specimens? Women a) cervical swabs b) first void urine c) vaginal swabs d) self taken vaginal swab/blind swab Men e) urethral swabs f) first void urine Both sexes g) pharyngeal h) rectal In men and women which of the above is the preferred specimen?	3.2
3. Are combined chlamydia/gonorrhoea screening tests as accurate for detecting chlamydia as are individual chlamydia tests?	3.1.2
TESTING FOR GENITAL CHLAMYDIAL INFECTION	
4. a) What is the evidence that under 25s requesting an STI screen should only be tested for chlamydia? b) What is the evidence that anyone who tests positive for chlamydia should also be tested for: i. gonorrhea ii. HIV iii. syphilis iv. Trichomonas	4.2.3
5. What is the evidence that screening for chlamydial infection in the following groups is clinically and cost effective?: a) sexually active women under 25 (and under 20) b) men under 30 c) men who have sex with men d) people who are HIV positive e) pregnant women i. ongoing ii. spontaneous miscarriage f) instrumentation of the uterus	4.2

6. What is the most effective (<i>consider percentage of chlamydia positive patients and cost effectiveness</i>) way to target these groups (as defined in KQ5)? a) specialist (GUM, family planning) b) primary care c) postal testing d) web-based (services that offer people the chance to order test kits online) e) over the counter tests f) community based (youth projects, colleges, prisons etc)	4.2.2
ANTIMICROBIAL TREATMENT FOR GENITAL CHLAMYDIAL INFECTION	
7. a) Which antimicrobial agent is most effective in uncomplicated infection (consider cure and compliance)? [consider duration of treatment] a) azithromycin b) amoxicillin c) erythromycin d) doxycycline e) ofloxacin b) also consider for complicated infection ie PID, epididymitis, epididymo-orchitis	5.3, 5.5, 5.6
8. Which antimicrobial agent is most effective in uncomplicated infection in pregnancy (unplanned, planned), and those at risk of becoming pregnant? a) azithromycin b) amoxicillin c) erythromycin d) doxycycline e) ofloxacin	5.4
9. Which of the following antimicrobial therapies are appropriate for chlamydia positive women who take hormonal contraceptives? a) azithromycin b) amoxicillin c) erythromycin d) doxycycline e) ofloxacin	
10. What follow up is required for people who have received antimicrobial treatment for chlamydia? a) test of cure b) telephone follow up c) face-to-face follow up	5.8

PARTNER NOTIFICATION	
11. Who should provide support for partner notification, in order to identify the maximum number of partners? a) primary care b) specialist clinic (GUM) c) family planning	6.1
12. What is the most effective (consider prevention of re-infection and cost effectiveness) method of managing partners? a) patient delivered partner medication (PDPM) b) postal testing c) patient referral (index patient notifying partner) d) provider referral (partner notification by healthcare personnel) e) conditional referral (where the healthcare provider notifies sexual contacts if the patient has not done so after a given time)	6.1
13. What is the most appropriate length of time over which previous sexual partners should be sought?	6.3
HEALTH EDUCATION IN PRIMARY PREVENTION AND PREVENTION OF RE-INFECTION	
14. Which of the following methods are effective in the primary prevention of chlamydia? a) behavioural b) educational initiatives	7
15. Which of the following methods are effective for preventing chlamydia re-infection? a) behavioural b) educational initiatives	7

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