

In the Clinic

Chlamydia and Gonorrhea

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CME Objective: To review current evidence for the prevention, diagnosis, and treatment of chlamydia and gonorrhea.

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Infections due to *Chlamydia trachomatis* and *Neisseria gonorrhoeae* can cause cervicitis, urethritis, proctitis, and pelvic inflammatory disease (PID), and their complications can significantly compromise a woman's reproductive functioning. These infections are a leading preventable cause of involuntary infertility and ectopic pregnancy and can influence pregnancy outcomes ranging from low birth weight, prematurity, fetal demise, and congenital infection. Chlamydial and gonococcal infections can also increase susceptibility to and facilitate transmission of HIV.

Chlamydia infection is the most common notifiable infection in the United States. A total of 1 412 791 cases were reported to the Centers for Disease Control and Prevention (CDC) in 2011 (1). Reported rates of chlamydial infections have increased over the past decade, reflecting expansion of screening using highly sensitive nucleic acid amplification tests (NAATs) and improvements in reporting systems.

Gonorrhea is the second most common reportable infection in the United States. A total of 329 849 cases were reported in 2011 (1). Case rates are higher in persons < 25 years of age, and infection can be asymptomatic, especially in women.

Prevention is crucial to improving sexual and reproductive health in the individual patient as well as in the community. Early detection, appropriate treatment, and prompt management of sex partners are important components of an effective prevention strategy.

Screening

What are the indications for screening for chlamydia in asymptomatic individuals? How often should such individuals be screened?

Detection of infection relies on screening tests because most chlamydial infections are asymptomatic. The United States Preventive Services Task Force (USPSTF) recommends annual chlamydia screening for all sexually active women younger than 25 years of age and screening of older women with high-risk sexual behaviors (multiple current partners, new sex partner, inconsistent condom use) (2). The CDC recommends annual screening of sexually active women through the age of 25 years and in women older than 25 years with risk factors (3).

The USPSTF found insufficient evidence to recommend chlamydial screening for men who are not at increased risk for infection (2). Targeted screening in heterosexual

men in correctional facilities, adolescent clinics, and sexually transmitted disease (STD) clinics can be considered when resources permit (4, 5). Routine annual chlamydia screening is recommended for sexually active men who have sex with men (MSM) at anatomical sites of exposure (3).

For what indications should asymptomatic individuals be screened for gonorrhea? How often should such individuals be screened?

The USPSTF and the CDC recommend annual gonorrhea screening of sexually active women at increased risk for infection (3, 6). Factors that increase risk include age younger than 25 years, having previous gonorrhea infection or other STDs, having new or multiple sex partners, using condoms inconsistently, working in the commercial sex industry, using drugs, or living in communities with a high prevalence of disease. Screening all

1. Centers for Disease Control and Prevention. Sexually transmitted disease surveillance 2011. Atlanta, GA: U.S. Department of Health and Human Services; 2012.
2. Meyers DS, Halvorson H, Luckhaupt S; U.S. Preventive Services Task Force. Screening for chlamydial infection: an evidence update for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2007;147:135-42. [PMID: 17576995]
3. Workowski KA, Berman S; Centers for Disease Control and Prevention (CDC). Sexually transmitted diseases treatment guidelines, 2010. *MMWR Recomm Rep*. 2010;59(RR-12):1-110. [PMID: 21160459]
4. Centers for Disease Control and Prevention. Male Chlamydia Screening Consultation, Atlanta, Georgia, March 28–29, 2006: Meeting Report, May 2007. www.cdc.gov/std/chlamydia/ChlamydiaScreening-males.pdf.

sexually active women at increased risk for infection can prevent gonococcal infections in neonates.

Screening for gonorrhea is not recommended in heterosexual men and women at low risk for infection. Routine annual gonococcal screening at anatomical sites of exposure is recommended for sexually active MSM (3).

Are chlamydia and gonorrhea reportable conditions?

Chlamydial and gonococcal infections are reportable conditions in

every state. Providers should be familiar with their state and local reporting requirements. Providers who are unsure of these requirements should seek advice from state or local health departments. Case reports may be generated by a provider who makes a diagnosis, a laboratory where a clinical test is performed, or a local health department. Accurate reporting is integral to assess infection trends and to assist local health authorities in partner notification and treatment.

Screening... Providers should screen for chlamydia in sexually active women younger than 25 years and in older women with high-risk sexual behavior. Targeted screening in some heterosexual men at high risk for infection can be considered. Annual gonorrhea screening of sexually active women at increased risk for infection is recommended. Screening for gonorrhea is not recommended in men or in women at low risk for infection. Routine annual chlamydia and gonorrhea screening at anatomical sites of exposure is recommended in MSM.

CLINICAL BOTTOM LINE

What are the clinical features of chlamydia and gonorrhea?

The elements of the history and physical examination for chlamydia and gonorrhea can be found in Table 1.

Chlamydial and gonococcal urogenital infections in women are often asymptomatic, but both can mimic standard urinary tract infection and cause abdominal pain. Symptoms in women, when present, are often nonspecific and may include painful or burning urination, vaginal discharge or bleeding between menses, pain with sexual intercourse, or abdominal or pelvic pain.

Chlamydia may cause the dysuria-pyuria syndrome (a combination of painful or difficult urination plus urine containing white blood cells) mimicking acute cystitis. Asymptomatic infections in men can occur more commonly with chlamydial

than with gonococcal infection, but when symptoms develop they can include dysuria; urethral discharge; urethral pruritus; or testicular, scrotal, or epididymal pain.

Disseminated gonococcal infection (DGI) occurs infrequently and tends to be more common in women. Clinical manifestations of DGI can include petechial, vesicular, or pustular skin lesions; oligoarthritis; tenosynovitis; perihepatitis; endocarditis; and meningitis.

Chlamydial or gonococcal infection can cause anorectal infection, usually through receptive anal intercourse in men, but it sometimes accompanies genital infection in women by autoinoculation. In most instances, anal infection is asymptomatic but it occasionally causes severe proctitis. Rectal infection can present as anal pruritus,

Diagnosis

5. Gift TL, Blake DR, Gaydos CA, Mrazek JM. The cost-effectiveness of screening men for *Chlamydia trachomatis*: a review of the literature. *Sex Transm Dis*. 2008;35:S51-60. [PMID: 18520977]
6. U.S. Preventive Services Task Force. Screening for gonorrhea: recommendation statement. *Ann Fam Med*. 2005;3:263-7. [PMID: 15928231]
7. Bernstein KT, Stephens SC, Barry PM, et al. *Chlamydia trachomatis* and *Neisseria gonorrhoeae* transmission from the oropharynx to the urethra among men who have sex with men. *Clin Infect Dis*. 2009;49:1793-7. [PMID: 19911970]

Table 1. History and Physical Examination Elements for Gonorrhea and Evaluation of Patients for Possible Chlamydial Infections and Gonorrhea

Sex	History or Physical Examination	Element	Notes	
Men and Women	History	Sexual contact with person with known STD or STD-related manifestations	Includes partners with genital ulcers, rash suggestive of STD (including genital herpes, DGI, secondary syphilis, or scabies), swollen glands, or vaginal/urethral/rectal signs.	
		Use of condoms	Important as part of exposure risk assessment, but report of condom use is not a reliable predictor for absence of STD.	
		Number of recent sex partners, new sex partners	In the past 60 days.	
		Exchange of sex for drugs or money	Important to assess high-risk behaviors.	
		Rash	Associated with scabies, herpes, condylomata accumulata, primary HIV, primary or secondary syphilis, crabs, or molluscum contagiosum; DGI rash (described below); rash associated with reactive arthritis.	
		Pain in joints or at sites of tendon insertions	Important clues to DGI or reactive arthritis.	
		Fever	May indicate moderate or severe PID in women, DGI in men and women, or (rarely) more invasive gonorrhea (endocarditis, meningitis).	
		Pharyngeal discomfort	Infection in the pharynx is usually asymptomatic but occasionally causes sore throat.	
		Physical examination	Skin examination for rash	DGI rash consists classically of tender necrotic pustules on an erythematous base (usually <30 lesions), especially on distal extremities; reactive arthritis is associated keratoderma blennorrhagica on the soles of the feet.
			Oral examination for lesions (pharyngitis, mucous patches)	Gonorrhea or chlamydial infection do not usually cause overt pharyngitis; mucous patches indicate secondary syphilis and should prompt consideration of other STDs.
	Joint examination for tenderness and swelling		Wrist, metacarpophalangeal joint, ankle, and knee are most common, but any joint may be affected in DGI or reactive arthritis.	
	Men	History	Rectal examination for mucosal friability, purulent discharge, perianal lesions	Anoscopic examination directed by patient complaints or report of receptive anal sex.
			Inguinal, femoral, epitrochlear, cervical nodes for swelling and/or tenderness	Generalized lymphadenopathy is seen in HIV and secondary syphilis. Regional (often inguino-femoral) accompanies herpes, chancroid, or lymphogranuloma venereum (tender) or primary syphilis (usually nontender).
Physical examination		Genital examination for urethral discharge (presence, characteristics), testicular/epididymal tenderness	Gonococcal discharge may be grossly purulent, seropurulent, or serous; chlamydia urethritis tends to be mucoid; important cause of sexually acquired epididymitis.	
		History	History of sex with men Urethral discharge, dysuria, testicular pain	Assess which mucosal sites were exposed (urethra, anus, pharynx). Most men (>95%) with urethral gonorrhea have discharge/dysuria; two thirds of men with chlamydia have symptoms.
Women		History	Change in odor, amount, quality, color of vaginal discharge	Symptoms of cervical infection are usually nonspecific in women.
			Dysuria	Internal dysuria accompanies gonorrhea, chlamydial, or herpetic urethritis. External dysuria usually accompanies vulvovaginitis or external herpes.
			Lower abdominal or pelvic pain Pelvic pain with intercourse	Women with gonorrhea or chlamydia are at increased risk for PID. The symptomatic equivalent of cervical motion tenderness, may indicate PID.
			Date of last menses Intermenstrual bleeding	Pregnancy status important to ascertain; DGI more common in the immediate postmenstrual period. Report of abnormal bleeding may indicate cervical friability due to infection.
		Physical examination	Pelvic speculum examination for vaginal pH, fluid characteristics, purulent discharge at the endocervix, cervical ectopy (especially ectopy-associated edema), easily induced endocervical bleeding	Bacterial vaginosis may predispose to acquisition of gonorrhea or chlamydia; trichomoniasis may be acquired as well. <i>N. gonorrhoeae</i> and <i>C. trachomatis</i> are the principal causes of cervicitis and can be reliably distinguished only by laboratory testing. The columnar epithelial cells of ectopy are the targets for infection. Brisk endocervical bleeding after gentle examination with a regular swab (not cytobrush) is a criterion for cervicitis.

Table 1. History and Physical Examination Elements for Gonorrhea and Evaluation of Patients for Possible Chlamydial Infections and Gonorrhea (Continued)

Sex	History or Physical Examination	Element	Notes
		Pelvic bimanual examination	Any combination of adnexal, uterine, or cervical motion tenderness should prompt presumptive PID diagnosis, which may consist of endometritis, salpingitis, or oophoritis.

DGI = disseminated gonococcal infection; PID = pelvic inflammatory disease; STD = sexually transmitted disease.

mucopurulent or bloody rectal discharge, anal pain, constipation, or tenesmus. Lymphogranuloma venereum (LGV) is caused by specific strains of chlamydia (L1, L2, L3) and can manifest as proctitis, diarrhea or abdominal cramps, and fever. LGV can also cause mild and transient genital ulcers followed by dramatic tender femoral and inguinal adenopathy. The pharynx may be the sole site of infection if oral-genital contact is the only exposure.

A cross-sectional study in MSM attending a municipal STD clinic whose only sexual exposure in the past 3 months was receiving fellatio found a 4.8% prevalence of urethral chlamydia and a 4.1% prevalence of urethral gonorrhea infection (7).

Pharyngeal infection is usually asymptomatic but symptoms can include sore throat, fever, and tender cervical adenopathy. In adults, purulent conjunctival discharge can occur and is usually the result of autoinoculation.

What are the usual physical findings with chlamydia and gonorrhea?

Cervicitis, if present, is generally defined by the presence of purulent discharge or easily induced endocervical bleeding (friability). Easily induced bleeding may actually be a more sensitive indicator of cervical chlamydial infection than purulent exudate (8). The predictive value of individual cervical findings may vary with age and other risk factors. Because cervicitis may be a sign of upper genital tract infection (endometritis), it is important to

perform a vaginal and pelvic examination for abnormal vaginal discharge or bleeding and evaluate for pelvic tenderness, masses, or adnexal enlargement. Upper genital tract infection is difficult to diagnose because the clinical presentation and signs of infection can vary and symptoms can be subtle.

In men, the urethra is the most common site of infection. Signs of urethral infection include mucopurulent or purulent urethral discharge or erythema around the meatus. Discharge may be eliminated by recent micturition, which patients should be advised to avoid before examination. Acute epididymitis can occur and presents with unilateral testicular pain, swelling along the epididymis, and subclinical urethritis.

Chlamydia and gonococcal infections are among the most common sexually transmitted pathogens causing proctitis in men or women. Additional information on the necessary elements of the physical examination can be found in Table 1.

What is the differential diagnosis of chlamydial infection and gonorrhea?

When an etiologic agent is isolated from a woman with cervicitis, it is usually *C. trachomatis*, *N. gonorrhoeae*, or both. However, in many cases no organism is isolated, especially in women at relatively low risk for recent acquisition of either chlamydial infection or gonorrhea (e.g., women aged >30 years). In these individuals, it is important to consider other conditions (Table 2).

- Marrazzo JM, Handsfield HH, Whittington WL. Predicting chlamydial and gonococcal cervical infection: implications for management of cervicitis. *Obstet Gynecol.* 2002;100:579-84. [PMID: 12220782]
- Marrazzo JM, Martin DH. Management of women with cervicitis. *Clin Infect Dis.* 2007;44 Suppl 3:S102-10. [PMID: 17342663]
- Gaydos C, Maldeis NE, Hardick A, Hardick J, Quinn TC. *Mycoplasma genitalium* as a contributor to the multiple etiologies of cervicitis in women attending sexually transmitted disease clinics. *Sex Transm Dis.* 2009;36:598-606. [PMID: 19704398]

Table 2. Differential Diagnosis of Gonorrhea and Chlamydial Infection

Disease	Characteristics	Notes
Genital herpes	Initial or recurrent genital herpes ulcerative disease may be accompanied by mucosal inflammation in the form of urethritis, cervicitis, and proctitis	Mucosal inflammation due to genital herpes is most common in the initial episode but can accompany recurrences.
Trichomoniasis	Common cause of vaginitis; less common cause of urethritis in men	Should be considered in men whose urethritis does not respond to treatment for gonorrhea and chlamydia.
Mycoplasma genitalium	Can cause urethritis and cervicitis in sexually active young adults	Treatment response improved with azithromycin; doxycycline less effective; resistance to both drugs has been reported.
Reactive arthritis	Postinfectious reactive arthritis syndrome that may be accompanied by conjunctivitis, urethritis, and characteristic dermatitis (keratoderma blennorrhagica, circinate balanitis)	Usually occurs in men, uncommon in women; generally responds to NSAID therapy.
Septic arthritis due to other organisms	Presentation may be acute (fever, warmth and redness at affected joint, limited range of motion)	Although staphylococci and streptococci should be considered in the differential diagnosis of acute septic-appearing joints in sexually active young adults, gonococcal infection should be an important consideration, especially if accompanied by tenosynovitis.
Syphilis	Secondary syphilis, occurring weeks to months after infection, is often accompanied by a diffuse rash	Rash is typically nonpustular and nontender, involves palms and soles, is symmetrical, and includes the presence of condylomata accumulata and oral mucous patches, whereas DGI lesions are often more asymmetric, sparse, and sometimes tender.
Lyme disease	Cause of acute mono- or oligoarticular arthritis in young adults	May occur in men and women; those who live in endemic areas and with general outdoor or known tick exposure are at risk.
Causes of pelvic pain other than pelvic inflammatory disease	Ruptured or enlarged ovarian cyst, ectopic pregnancy, endometriosis, ovulation, and appendicitis all may cause nonspecific pelvic pain	Also consider other intra-abdominal causes, such as the irritable bowel syndrome and cholecystitis.
Bacterial endocarditis due to other organisms	Presentation may be acute, with fever, rash, hemodynamic instability, and a new murmur or subacute with malaise and weight loss	Streptococci and staphylococci are more common causes of bacterial endocarditis than <i>N. gonorrhoeae</i> .

Infection with *M. genitalium*, bacterial vaginosis, and frequent douching can cause cervicitis (9, 10). It can also accompany trichomoniasis and genital herpes and can persist despite repeated courses of antimicrobial therapy. Most persistent cases of cervicitis are not caused by relapse or reinfection with *C. trachomatis* or *N. gonorrhoeae* but may result from such factors as persistent abnormality of vaginal flora, exposure to chemical irritants, or idiopathic inflammation in the zone of ectopy. Among women with pelvic pain, consideration of noninfectious causes including ovarian cyst, ectopic pregnancy, endometriosis, and gastrointestinal causes is appropriate. Although *N. gonorrhoeae* and *C. trachomatis* are well-established as clinically important infectious causes of urethritis in males, *M. genitalium* has also been associated with urethritis (11).

In a recent randomized, controlled trial of men with nongonococcal urethritis, the

prevalence of C. trachomatis, M. genitalium, and T. vaginalis were 43%, 31%, and 13%, respectively (12).

Trichomonas vaginalis, herpes simplex virus and adenovirus can also cause NGU, but data supporting other *Mycoplasma* species and *Ureaplasma* as etiologic agents are inconsistent (13, 14). Diagnostic evaluation for these organisms is reserved for suspected cases of infection, including trichomoniasis contact, genital ulcers, and urethritis nonresponsive to therapy. Enteric bacteria have been identified as an uncommon cause of NGU and have been associated with insertive anal intercourse (13).

Acute proctitis among persons who have recently practiced receptive anal intercourse is usually sexually acquired (15). *N. gonorrhoeae*, *C. trachomatis* (including LGV serovars), *Treponema pallidum*, and genital herpes are the most common sexually transmitted

11. Schwebke JR, Rompalo A, Taylor S, et al. Re-evaluating the treatment of nongonococcal urethritis: emphasizing emerging pathogens—a randomized clinical trial. *Clin Infect Dis*. 2011;52:163-70. [PMID: 21288838]
12. Manhart LE, Broad JM, Golden MR. *Mycoplasma genitalium*: should we treat and how? *Clin Infect Dis*. 2011;53 Suppl 3:S129-42. [PMID: 22080266]
13. Bradshaw CS, Tabrizi SN, Read TR, et al. Etiologies of nongonococcal urethritis: bacteria, viruses, and the association with orogenital exposure. *J Infect Dis*. 2006;193:336-45. [PMID: 16388480]

pathogens involved. Proctitis occurs predominantly among persons who participate in receptive anal intercourse. Proctocolitis involves extension of the infection above the anus and can be associated with LGV serovars of *C. trachomatis*.

How often are co-pathogens detected along with chlamydia and gonorrhea, and how should the workup and treatment be modified?

Persons infected with *N. gonorrhoeae* are frequently co-infected with *C. trachomatis* (16). Chlamydial co-infection has been associated with higher gonorrhea organism loads, potentially increasing the likelihood of transmission (17). CDC treatment guidelines recommend a combination antimicrobial regimen for gonorrhea that includes an antimicrobial effective against chlamydia (18). In routine clinical practice, tests for *M. genitalium* are not available. This organism may be co-prevalent in those with cervicitis or urethritis.

Acquisition of a chlamydial or gonococcal infection should always prompt consideration for screening other STDs, including syphilis and HIV (3). Women with bacterial vaginosis are at increased risk for chlamydia and gonorrhea.

A longitudinal study that included 3620 nonpregnant women in routine care demonstrated that an intermediate vaginal flora (defined by Nugent Gram stain score) or bacterial vaginosis at a prior visit was associated with a 1.5- to 2-fold increased risk for incident trichomonal, gonococcal, and/or chlamydial infection (adjusted hazard ratio [AHR] for intermediate state, 1.41[95% CI, 1.12–1.76]; AHR for bacterial vaginosis, 1.73 [CI, 1.42 to 2.11]; P = 0.058 for trend (19).

Providers should assess the STD-related risks for all male patients, including routine inquiry about the gender of sexual partners. MSM should consistently have STD risk assessment, client-centered prevention counseling, and routine annual screening for

chlamydia and gonorrhea, according to CDC guidelines (3). In an evaluation at a primary care clinic, rectal gonorrhea and syphilis seropositivity were frequently diagnosed in persons with high-risk sexual exposure (20).

What diagnostic tests should be used to diagnose chlamydial infection and gonorrhea? Is clinical diagnosis alone ever sufficient?

Establishing the etiologic diagnosis of chlamydia or gonorrhea is important because both infections are reportable to health departments and a specific diagnosis may improve partner notification and treatment. Asymptomatic infection is common among both women and men, so providers often rely on screening tests for diagnosis. Repeated NAAT is the most sensitive test for detection of chlamydia and gonorrhea (see the Box: Nucleic Acid Amplification Testing) (3). Diagnosis of genital tract infection relies on vaginal swabs (either clinician- or self-collected), endocervical swabs, or first-catch urine from women or men or urethral swabs from men.

The sensitivity of NAATs for detection of gonorrhea or chlamydia is superior to culture at nongenital anatomical sites but can vary by NAAT type with gonorrhea (21–23). Commercially available NAATs for *C. trachomatis* detect both LGV and non-LGV

C. trachomatis but cannot distinguish between them. Additional molecular procedures (polymerase chain reaction–based genotyping) may be used to differentiate LGV from non-LGV *C. trachomatis*.

The ability to culture *N. gonorrhoeae* remains necessary for evaluating suspected gonorrhea treatment failure, monitoring antimicrobial susceptibility for resistance trends, and guiding treatment after treatment failure (18). In addition, the ability to culture *N. gonorrhoeae* and *C. trachomatis* is

14. Martin DH. Non-gonococcal urethritis: new views through the prism of modern molecular microbiology. *Curr Infect Dis Rep.* 2008;10:128-32. [PMID: 18462587]
15. Klausner JD, Kohn R, Kent C. Etiology of clinical proctitis among men who have sex with men. *Clin Infect Dis.* 2004;38:300-2. [PMID: 14699467]
16. Lyss SB, Kamb ML, Peterman TA, et al; Project RESPECT Study Group. *Chlamydia trachomatis* among patients infected with and treated for *Neisseria gonorrhoeae* in sexually transmitted disease clinics in the United States. *Ann Intern Med.* 2003;139:178-85. [PMID: 12899585]
17. Stupiansky NW, Van Der Pol B, Williams JA, Weaver B, Taylor SE, Fortenberry JD. The natural history of incident gonococcal infection in adolescent women. *Sex Transm Dis.* 2011;38:750-4. [PMID: 21317686]
18. Centers for Disease Control and Prevention (CDC). Update to CDC's Sexually transmitted diseases treatment guidelines, 2010: oral cephalosporins no longer a recommended treatment for gonococcal infections. *MMWR Morb Mortal Wkly Rep.* 2012;61:590-4. [PMID: 22874837]
19. Brotman RM, Klebanoff MA, Nansel TR, et al. Bacterial vaginosis assessed by Gram stain and diminished colonization resistance to incident gonococcal, chlamydial, and trichomonal genital infection. *J Infect Dis.* 2010;202:1907-15. [PMID: 21067371]
20. Mimiaga MJ, Helms DJ, Reisner SL, et al. Gonococcal, chlamydia, and syphilis infection positivity among MSM attending a large primary care clinic, Boston, 2003 to 2004. *Sex Transm Dis.* 2009;36:507-11. [PMID: 19455081]

Nucleic Acid Amplification Testing*

- Recommended for detection of urogenital infections caused by *C. trachomatis* and *N. gonorrhoeae* in asymptomatic men and women.
- Optimal specimen types: first-catch urine from men and vaginal swabs from women.
- Recommended for detection of rectal and oropharyngeal infections caused by *C. trachomatis* and *N. gonorrhoeae*. However, these sites have not been approved by the U.S. Food and Drug Administration for use with nucleic acid amplification tests, and laboratories must establish performance specifications to satisfy regulations of the Centers for Medicare & Medicaid Services for compliance to Clinical Laboratory Improvement Amendments before reporting results for patient management (www.cdc.gov/ncez/diseases/gonorrhea/CLIA-compliance/CLIA-compliance-report.pdf).

necessary for legal evidence in some cases of child sexual abuse (3).

Women who have cervicitis should be tested for chlamydial infection and gonorrhea, should receive NAAT, and be assessed for signs of pelvic inflammatory disease (PID). In the absence of trichomoniasis, finding of >10 white blood cells per high-power (400X) field in a wet mount of vaginal fluid might indicate endocervical inflammation caused specifically by *C. trachomatis* or *N. gonorrhoeae* (24). In men with objective evidence of urethritis, the Gram stain is the preferred rapid diagnostic test for evaluation and is highly sensitive and specific for documenting both urethritis and the presence of white blood cells containing gram-negative intracellular diplococci (establishing the diagnosis of gonococcal infection). Use of the Gram stain is not recommended for endocervical specimens from women or pharyngeal or rectal specimens from men or women due to low sensitivity. For patients presenting with proctitis, a rectal *C. trachomatis* NAAT is recommended. Positive results on NAAT do not provide a definitive diagnosis of LGV; however, they may aid in a presumptive clinical diagnosis.

What are the complications of chlamydial infection and gonorrhea?

Complications from chlamydia and gonorrhea are listed in the Box. Immediate recognition and prompt treatment prevents complications and transmission to sex partners. Complications in women include endometritis, salpingitis, PID, tubo-ovarian abscess, and pelvic peritonitis. Long-term sequelae of untreated PID include chronic pelvic pain, tubal infertility, and ectopic pregnancy. Inflammation of the liver capsule and the adjacent peritoneum (the Fitz-Hugh-Curtis syndrome) can also occur. This syndrome is more commonly associated with chlamydial infection and is

characterized by right upper quadrant pain and occasionally abnormally elevated liver enzymes. Some women with gonococcal infection can develop extension of infection into the accessory glands (Bartholin or Skene), which may cause abscess. DGI is uncommon but tends to occur more frequently in women and is associated with a gonococcal strain that has a propensity to produce bacteremia without associated urogenital symptoms.

Complications in men are uncommon but may include epididymitis. A postinflammatory reactive arthritis can occur after chlamydial infection that is more common in men. The characteristic manifestations include conjunctivitis, urethritis, oligoarthritis, and skin lesions (keratoderma blenorrhagica, circinate balanitis) that can arise several weeks after genital chlamydial infection. LGV proctocolitis in men or women can lead to chronic colorectal fistulas and strictures.

Complications of Chlamydia and Gonorrhea

- Endometritis
- Salpingitis
- Pelvic inflammatory disease (long-term sequelae include chronic pelvic pain, tubal infertility, and ectopic pregnancy)
- Tubo-ovarian abscess
- Pelvic peritonitis
- Inflammation of the liver capsule and adjacent peritoneum (the Fitz-Hugh-Curtis syndrome) (more common with chlamydial infection)
- Infection of the accessory glands (Bartholin or Skene) in gonococcal infection
- Bacteremia, endocarditis, meningitis
- Postinflammatory reactive arthritis following chlamydia infection (more common in men): conjunctivitis, urethritis, oligoarthritis, and skin lesions
- Lymphogranuloma venereum proctocolitis (can lead to chronic colorectal fistulas and strictures)
- Epididymitis

21. Schachter J, Moncada J, Liska S, Shayevich C, Klausner JD. Nucleic acid amplification tests in the diagnosis of chlamydial and gonococcal infections of the oropharynx and rectum in men who have sex with men. *Sex Transm Dis*. 2008;35:637-42. [PMID: 18520976]

22. Bachmann LH, Johnson RE, Cheng H, et al. Nucleic acid amplification tests for diagnosis of *Neisseria gonorrhoeae* and *Chlamydia trachomatis* rectal infections. *J Clin Microbiol*. 2010;48:1827-32. [PMID: 20335410]

Diagnosis... Asymptomatic infection is common among women and men, so providers usually rely on screening tests for diagnosis. NAAT is the most sensitive test for the detection of chlamydia and gonorrhea. Symptoms in women can be nonspecific and may include discomfort with urination, bleeding between menses, or abdominal pain. The clinical presentation in men may include dysuria, urethral discharge, and testicular or scrotal pain. Anorectal infection can occur and is usually acquired by receptive anal intercourse. Infection at anogenital sites is often asymptomatic.

CLINICAL BOTTOM LINE

Treatment

What therapies are used to treat chlamydial infection and gonorrhea?

Prompt treatment of infection can prevent sexual transmission, reinfection of sex partners, and transmission to infants. Delays in treatment for chlamydia have been associated with complications in women (25).

Chlamydia

The recommended treatment of chlamydial infection is either oral doxycycline, 100 mg twice daily for 7 days, or azithromycin, 1 gram as a single oral dose (see the Box: CDC Treatment Regimens for Chlamydial Infections) (3). In clinical practice, azithromycin may be more cost-effective in treating chlamydial infection because it enables provision of a single dose of directly observed therapy (26); however, a recent trial showed lower treatment effectiveness with azithromycin than with doxycycline for chlamydial urethritis.

In a randomized clinical trial of 293 heterosexual men with symptomatic urethritis, 44% had chlamydial urethritis at baseline evaluation. Persistent chlamydial infection, which was associated with signs and symptoms of urethritis, was identified in 12% of participants at 4 weeks after therapy. Persistent infection was detected in 23% of men after treatment with azithromycin vs. 5% after doxycycline (P = 0.011) (27).

The preferred treatment for LGV is doxycycline, 100 mg twice daily for 21 days.

Gonorrhea

The recommendations for the treatment of gonorrhea are rapidly evolving, and the clinician is advised to consult the latest CDC guidelines. The currently recommended treatment of uncomplicated urogenital, anorectal, or pharyngeal gonorrhea is combination therapy with a single intramuscular dose of ceftriaxone 250 mg plus either azithromycin 1 gram orally or doxycycline 100 mg orally, twice daily for 7 days.

CDC Treatment Regimens for Chlamydial Infections*

Recommended Regimen

Azithromycin, 1 g orally in a single dose

or

Doxycycline, 100 mg orally twice daily for 7 days

Alternative Regimens

Erythromycin base, 500 mg orally 4 times daily for 7 days

or

Erythromycin ethylsuccinate, 800 mg orally 4 times daily for 7 days

or

Levofloxacin, 500 mg orally once daily for 7 days

or

Ofloxacin, 300 mg orally twice daily for 7 days

Recommended Regimen in Pregnancy†

Azithromycin, 1 g orally in a single dose

or

Amoxicillin, 500 mg orally times daily for 7 days

*From reference 6. Repeat test in women and men 3 months after treatment regardless of whether sex partners were treated due to high incidence of recurrent infection.

†Repeat test 3 weeks after completion of treatment to ensure cure, due to the possible sequelae of persistent infection.

23. Bachmann LH, Johnson RE, Cheng H, Markowitz LE, Papp JR, Hook EW 3rd. Nucleic acid amplification tests for diagnosis of *Neisseria gonorrhoeae* oropharyngeal infections. *J Clin Microbiol*. 2009;47:902-7. [PMID: 19193848]
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26. Lau CY, Qureshi AK. Azithromycin versus doxycycline for genital chlamydial infections: a meta-analysis of randomized clinical trials. *Sex Transm Dis*. 2002;29:497-502. [PMID: 12218839]
27. Seña AC, Lensing S, Rompalo A, et al. *Chlamydia trachomatis*, *Mycoplasma genitalium*, and *Trichomonas vaginalis* infections in men with nongonococcal urethritis: predictors and persistence after therapy. *J Infect Dis*. 2012;206:357-65. [PMID: 22615318]

CDC Treatment Regimens for Uncomplicated Gonococcal Infection*

Cervix, Urethra, and Rectum Recommended regimen

- Ceftriaxone, 250 mg in a single intramuscular dose

plus

- Azithromycin, 1 g orally in a single dose, or doxycycline†, 100 mg orally twice daily for 7 days‡§

Alternative regimens

If ceftriaxone is not available:

- Cefixime 400 mg in a single oral dose

plus

- Azithromycin, 1 g orally in a single dose, or doxycycline†, 100 mg orally twice daily for 7 days‡

plus

- Test-of-cure in 1 week

If the patient has severe cephalosporin allergy:

- Azithromycin, 2 g in a single oral dose

plus

- Test-of-cure in 1 week

Pharynx

Recommended Regimen

- Ceftriaxone, 250 mg in a single intramuscular dose

plus

- Azithromycin, 1 g orally in a single dose, or doxycycline†, 100 mg orally twice daily for 7 days‡

*From reference 18. Repeat test in women and men 3 months after treatment regardless of whether sex partners were treated due to high incidence of recurrent infection.

†Contraindicated in pregnant women.

‡Because of the high prevalence of tetracycline resistance, azithromycin is preferred as the second antimicrobial.

Gonorrhea treatment has been complicated by development of antimicrobial-resistant organisms (28) (see the Box: CDC Treatment Regimens for Uncomplicated Gonococcal Infection). Recently observed patterns indicate that resistance to oral cephalosporins is developing (19).

If symptoms persist after the recommended treatment regimen, culture and sensitivity testing should be done at the site of exposure. The provider should consult an infectious disease specialist for specific treatment advice after possible failure of recommended treatment and then report the case to the local or state health department within 24 hours of diagnosis. A test of cure should be done at the site of exposure 1 week after re-treatment. To minimize the risk for reinfection, abstinence from sexual contact is recommended for at least 1 week after treatment and until all sex partners have been treated. Invasive gonococcal infection (endocarditis or meningitis) requires prolonged therapy.

How is recurrence differentiated from reinfection?

Determining reinfection from persistent infection is challenging because most information is based on patient history and not on strain comparison. Certainly, the prevalence of repeated chlamydial and gonococcal infections is high in previously treated persons of both sexes (29, 30). Most repeated infections result from failure of sex partners to receive treatment or sexual activity with a new, infected partner. In a recent study involving adolescent women, early repeated chlamydial infections were more likely to be caused by the same genotype than were later repeated infections (31).

Because most infections are asymptomatic, repeated testing 3

months after treatment is recommended to detect repeated infection and prevent adverse health outcomes (3). Reinfection is associated with an increased risk for reproductive complications, especially in women.

What are the special considerations of screening, diagnosis, and treatment of chlamydial infection and gonorrhea in pregnancy?

Prenatal screening and treatment of pregnant women can prevent chlamydial and gonococcal infection among neonates. The USPSTF recommends that pregnant women younger than 25 years and those engaging in high-risk sexual behaviors (multiple current partners, new partner, drug use) be tested for chlamydial infection and gonorrhea during the first prenatal visit (2, 6). Women with infection diagnosed in the first trimester should be retested in 3 to 6 months, preferably in the third trimester. Treatment of chlamydial infection in pregnancy includes azithromycin, 1 gram in a single dose, or amoxicillin, 500 mg 3 times a day for 7 days. Repeated NAAT to document eradication is recommended 3 weeks after completion of therapy to confirm cure, because persistent infection can be transmitted to the neonate during parturition. Clinical manifestations of neonatal chlamydial infection include conjunctivitis, pneumonia, and rectogenital infections. Gonococcal infection can cause premature delivery, premature rupture of membranes, and perinatal distress. The most serious manifestations of *N. gonorrhoeae* infection are ophthalmia neonatorum, sepsis, arthritis, and meningitis. Diagnosis and treatment of gonococcal and chlamydial infections in pregnant women provide the best method for preventing neonatal infection.

28. Workowski KA, Berman SM, Douglas JM Jr. Emerging antimicrobial resistance in *Neisseria gonorrhoeae*: urgent need to strengthen prevention strategies. *Ann Intern Med*. 2008;148:606-13. [PMID: 18413622]

29. Fung M, Scott KC, Kent CK, Klausner JD. Chlamydial and gonococcal reinfection among men: a systematic review of data to evaluate the need for retesting. *Sex Transm Infect*. 2007;83:304-9. [PMID: 17166889]

How can transmission of gonorrhea to infants be prevented?

Screening all sexually active women at increased risk for infection can prevent gonococcal infections in neonates (32). The prevalence of gonorrhea varies widely among communities, and providers should use current epidemiologic data to assist with screening programs based on the population. For women at ongoing risk, screening should be repeated in the third trimester. Because not all women receive prenatal care, ocular prophylaxis with instillation of a prophylactic agent (erythromycin) into the eyes of all newborn infants is recommended to prevent gonococcal ophthalmia (3). Ocular prophylaxis can prevent sight-threatening gonococcal ophthalmia and should be administered to every neonate as soon as possible after birth, regardless of method of delivery.

When should patients with known or suspected chlamydia or gonorrhea be referred to a specialist?

Consultation with an infectious disease specialist is recommended for persons with persistent gonococcal infection after recommended treatment (treatment failure) or in cases of in vitro antimicrobial resistance, especially after treatment with ceftriaxone. In addition, these cases should be reported to CDC through the local or state health department within 24 hours of diagnosis. Consultation may also be advised for cases of nongonococcal urethritis or cervicitis persisting after appropriate therapy.

Consultation may also be required in some cases of DGI based on the severity of illness (endocarditis or meningitis), in persistent chlamydial or gonococcal infection in pregnant women, and in cases of anti-microbial allergy or shortages.

What are the indications for hospitalization for chlamydia and gonorrhea?

Hospitalization is indicated for initial therapy of DGI, especially if the diagnosis is uncertain, and in persons who have purulent synovial effusions or are suspected of having endocarditis or meningitis.

In women with PID, hospitalization should be based on the provider's judgment and presence of the following criteria: a surgical emergency (e.g., appendicitis) cannot be excluded, pregnancy, failure to respond or intolerance to oral antimicrobials, severe illness (nausea and vomiting, high fever, hemodynamic instability), or tubo-ovarian abscess (3).

How are the sex partners of patients with chlamydial infection and gonorrhea managed?

Treating STDs always involves consideration of sex partners. Epidemiologic treatment—treating partners on the basis of risk (sexual contact with an infected partner) rather than only on diagnosis—has been the cornerstone of STD management for decades. Sex partners should be referred for evaluation, testing, and treatment if they have had sexual contact with the patient within 60 days of the patient's onset of symptoms or diagnosis (3). If the last sexual intercourse was more than 60 days before onset of symptoms or diagnosis, the most recent sexual partner should be treated. If a heterosexual partner declines evaluation, then expedited partner therapy (EPT)—giving prescriptions or medications to the patient for delivery to the partner without the evaluation of the partner—may be considered (www.cdc.gov/std/ept). Patient-delivered partner therapy is discouraged for MSM because of the high risk for coexisting infections. Although EPT has been shown to reduce the relative incidence of apparent reinfection for chlamydia

30. Hosenfeld CB, Workowski KA, Berman S, et al. Repeat infection with chlamydia and gonorrhea among females: a systematic review of the literature. *Sex Transm Dis.* 2009;36:478-89. [PMID: 19617871]
31. Batteiger BE, Tu W, Ofner S, et al. Repeated *Chlamydia trachomatis* genital infections in adolescent women. *J Infect Dis.* 2010;201:42-51. [PMID: 19929379]
32. Hammerschlag MR. Chlamydial and gonococcal infections in infants and children. *Clin Infect Dis.* 2011;53 Suppl 3:S99-102. [PMID: 22080275]
33. Kamb ML, Fishbein M, Douglas JM Jr, et al. Efficacy of risk-reduction counseling to prevent human immunodeficiency virus and sexually transmitted diseases: a randomized controlled trial. Project RESPECT Study Group. *JAMA.* 1998;280:1161-7. [PMID: 9777816]

and gonorrhea, the clinician should consider the following. First, the process relies on timely delivery; thus, patients must not divide the medication among several partners or save all or part of it for future use. Second, it deprives partners of examination for other STDs, counseling, and a definitive diagnosis. Third, it is not possible to assess

partners for possible allergies or other adverse reactions to medications and to document adequacy of therapy. Fourth, the legality of EPT varies from state to state, and the clinician is advised to review local regulations. Finally, timely treatment of sex partners is essential for decreasing the risk for reinfection.

Treatment... Prompt treatment of infection can prevent sexual transmission, reinfection of sex partners, and transmission to infants. For the treatment of chlamydia, the recommended regimen is 1 gram of azithromycin orally as a single dose or 100 mg of doxycycline orally twice daily for 7 days. For treatment of uncomplicated urogenital, anorectal, or pharyngeal gonorrhea, the recommended regimen is combination therapy with a single intramuscular dose of 250 mg of ceftriaxone plus either 1 gram of azithromycin orally or 100 mg of doxycycline orally twice daily for 7 days. Invasive gonococcal infection (endocarditis or meningitis) requires prolonged therapy. If symptoms persist, gonococcal culture and sensitivity testing should be performed due to the potential for antibiotic resistance, and an infectious disease specialist should be consulted. Complicated infections may require hospitalization. To minimize the risk for reinfection, patients should abstain from sexual contact for at least 1 week after treatment and until all sex partners have been treated.

CLINICAL BOTTOM LINE

Prevention

How can chlamydia and gonorrhea be prevented?

Clinical prevention includes education and counseling of at-risk persons on methods to avoid infection through changes in sexual behavior and specific actions that can reduce the risk for transmission. Such actions include abstaining from sex, using condoms, limiting the number of sex partners, and modifying sexual practices. Interactive counseling directed at individual risk has been found to reduce the frequency of risk behaviors and the rate of acquisition of gonococcal and chlamydial infections.

A multicenter, randomized, controlled trial assigned 5758 heterosexual men and women who presented to 5 public STD clinics for 1 of 3 types of individual face-to-face counseling interventions (enhanced, brief, didactic). At the 3- and 6-month follow-up visits, self-reported 100% condom use was higher ($P < 0.05$)

in both the enhanced and brief counseling groups. STD incidence was lower in the counseling intervention groups than in the didactic message intervention group. At the 6-month interval, 30% fewer participants had new STDs in both the enhanced counseling (7.3%; $P = 0.005$) groups compared with those in the didactic message group (10.4%) (33).

Training in client-centered counseling is available through the CDC STD/HIV Prevention Training Centers (www.stdhivpreventiontraining.org).

Identifying asymptomatic infection is important for reducing infection rates. Established guidelines recommend testing at-risk individuals. Retesting for chlamydia and gonorrhea several months after appropriate treatment is also useful for detecting repeated infection and for enhancing population-based prevention (34).

34. Peterman TA, Tian LH, Metcalf CA, et al; RESPECT-2 Study Group. High incidence of new sexually transmitted infections in the year following a sexually transmitted infection: a case for re-screening. *Ann Intern Med.* 2006;145:564-72. [PMID: 17043338]
35. U.S. Preventive Services Task Force. Behavioral counseling to prevent sexually transmitted infections: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2008;149:491-6, W95. [PMID: 18838729]
36. Shafer MA, Tebb KP, Pantell RH, et al. Effect of a clinical practice improvement intervention on chlamydial screening among adolescent girls. *JAMA.* 2002;288:2846-52. [PMID: 12472326]
37. Hoover KW, Tao G, Berman S, Kent CK. Utilization of health services in physician offices and outpatient clinics by adolescents and young women in the United States: implications for improving access to reproductive health services. *J Adolesc Health.* 2010;46:324-30. [PMID: 20307820]
38. Burstein GR, Snyder MH, Conley D, et al. Chlamydia screening in a health plan before and after a national performance measure introduction. *Obstet Gynecol.* 2005;106:327-34. [PMID: 16055583]

Prevention... Education and counseling of at-risk persons and identification of asymptomatic infection is important for reducing infection rates. Established guidelines recommend screening at-risk individuals. Retesting for chlamydial infection and gonorrhea several months after appropriate treatment is also useful for detecting repeated infection and for enhancing population-based prevention. Behavior that can reduce infection includes abstaining, using condoms, limiting the number of sex partners, and modifying sexual practices.

CLINICAL BOTTOM LINE

What guidelines have been issued to assist in management of chlamydial infection and gonorrhea?

The USPSTF provides guidance on behavioral counseling for persons at increased risk for STDs and specific screening guidelines for gonorrhea and chlamydial infection (2, 6, 35).

The CDC publishes evidence-based guidance for the effective clinical management of STDs (3). Updated recommendations on laboratory detection of *C. trachomatis* and *N. gonorrhoeae* are also available (www.cdc.gov/od/oc/media/pressrels/r091101.htm).

What practice improvement measures assess quality of care of chlamydial infection and gonorrhea?

A range of interventions have evaluated system- and clinic-level practice improvements to improve guideline-recommended chlamydia testing among women (36), including examination of utilization patterns of at-risk persons (37), noninvasive collection of specimens before a provider examination (38), and use of computer alert reminders for testing (39). Lower-than-expected retesting

rates suggest that many providers are not following guidelines for repeated testing of women with chlamydial infection (40). Interventions to improve chlamydia rescreening have included mailed screening kits, phone reminder systems or text messaging, or motivational interviewing (41). Implementation of enhanced screening in a high morbidity population has been associated with reductions in hospitalizations due to PID, ectopic pregnancy, and emergency department visits in women with chlamydia or gonorrhea

An ecologic study evaluated data from 1996 to 2007. Multivariate linear regression was used to assess the association between annual chlamydia/gonorrhea screening tests by gender and the number of women aged 14–30 years hospitalized for PID or ectopic pregnancy. Screening 10 000 women for chlamydia/gonorrhea resulted in 26.1 fewer hospitalized PID cases (CI, 11.2–41.1) and 28.6 fewer ectopic pregnancies (CI, 7.4–49.8) (42).

Several clinic-based interventions have been used to improve STD screening of MSM. These include use of computer alerts on an electronic medical record, text messaging reminders for repeated STD screening, and introduction of clinic guidelines on screening (43).

Practice Improvement

39. Walker J, Fairley CK, Walker SM, et al. Computer reminders for chlamydia screening in general practice: a randomized controlled trial. *Sex Transm Dis.* 2010;37:445-50. [PMID: 20375930]
40. Hoover KW, Tao G, Nye MB, Body BA. Suboptimal adherence to repeat testing recommendations for men and women with positive chlamydia tests in the United States, 2008-2010. *Clin Infect Dis.* 2013;56:51-7. [PMID: 23074316]
41. Guy R, Hocking J, Low N, et al. Interventions to increase rescreening for repeat chlamydial infection. *Sex Transm Dis.* 2012;39:136-46. [PMID: 22249303]
42. Anschuetz GL, Asbel L, Spain CV, et al. Association between enhanced screening for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* and reductions in sequelae among women. *J Adolesc Health.* 2012;51:80-5. [PMID: 22727081]
43. Zou H, Fairley CK, Guy R, Chen MY. The efficacy of clinic-based interventions aimed at increasing screening for bacterial sexually transmitted infections among men who have sex with men: a systematic review. *Sex Transm Dis.* 2012;39:382-7. [PMID: 22504605]

In the Clinic Tool Kit

Chlamydia and Gonorrhea

PIER Module

<http://pier.acponline.org/physicians/diseases/d458/d458.html>
(gonorrhea)

<http://pier.acponline.org/physicians/diseases/d652/d652.html>
(pelvic inflammatory disease)

<http://pier.acponline.org/physicians/diseases/d196/d196.html>
(vaginitis and cervicitis)

PIER modules from the American College of Physicians.

Patient Information

<http://pier.acponline.org/physicians/diseases/d458/d458-pi.html>
(gonorrhea)

<http://pier.acponline.org/physicians/diseases/d652/d652-pi.html>
(pelvic inflammatory disease)

<http://pier.acponline.org/physicians/diseases/d196/d196-pi.html>
(vaginitis and cervicitis)

Patient information material that appears on the next page for duplication and distribution to patients.

<http://www.ashastd.org/std-sti/gonorrhea.html>

<http://www.ashastd.org/std-sti/chlamydia.html>

Information on gonorrhea and chlamydia from the American Social Health Association.

www.cdc.gov/std/gonorrhea/default.htm

www.cdc.gov/std/chlamydia/default.htm

Information on gonorrhea and chlamydia from the Centers for Disease Control and Prevention.

Clinical Guidelines

www.cdc.gov/std/treatment/default.htm

The 2010 treatment guidelines for sexually transmitted diseases, from the Centers for Disease Control and Prevention.

www.annals.org/content/149/7/491.full (recommendation statement)

www.annals.org/content/149/7/497.full (systematic review)

The U.S. Preventive Services Task Force recommendation statement and systematic review on behavioral counseling to prevent sexually transmitted infections.

www.cdc.gov/std/treatment/2006/toc.htm (2006)

www.cdc.gov/std/treatment/2006/updated-regimens.htm
(2007 update)

Sexually transmitted diseases treatment guidelines published in 2006, with an update in 2007 when fluoroquinolones were no longer recommended for gonococcal infections, from the Centers for Disease Control and Prevention.

Diagnostic Tests and Criteria

<http://pier.acponline.org/physicians/diseases/d458/tables/d458-tlab.html>

Listing of laboratory and other studies for gonorrhea.

<http://pier.acponline.org/physicians/diseases/d196/tables/d196-tlab.html>

Listing of laboratory and other studies for vaginitis and cervicitis, including studies for chlamydia.

Quality-of-Care Guidelines

<http://pier.acponline.org/qualitym/t007.html>

2011 Physician Quality Reporting System measure 205:

Percentage of patients \geq 13 years of age with a diagnosis of HIV/AIDS for whom chlamydia and gonorrhea screenings were done at least once with the diagnosis of HIV infection.

THINGS YOU SHOULD KNOW ABOUT GONORRHEA AND CHLAMYDIA

In the Clinic
Annals of Internal Medicine

What are gonorrhea and chlamydia?

- Sexually transmitted diseases (STDs)
- Gonorrhea is caused by the bacterium *Neisseria gonorrhoeae*
- Chlamydia is caused by the bacterium *Chlamydia trachomatis*
- The bacteria grow and multiply in warm, moist areas, including the mouth, throat, eyes, anus, urethra (tube carrying urine outside the body); and the cervix, uterus, and fallopian tubes in women.
- May cause pelvic inflammatory disease (PID) in women, which increases the risk for ectopic pregnancy (when fertilized egg grows outside the uterus) and infertility.
- May cause epididymitis in men (painful inflammation of the epididymis, the coiled tube behind the testicle that stores and carries sperm), which can cause infertility.

What are the symptoms?

- Symptoms of gonorrhea and chlamydia are often mild and even absent.
- Burning during urination.
- Unusual or increased discharge from the vagina or penis.
- Painful or swollen testicles.
- Vaginal bleeding between periods.
- Rectal infection, which is characterized by discharge, anal itching, soreness, bleeding, or painful bowel movements.
- Throat infection characterized by a sore throat.

How are they treated?

- When taken as directed, appropriately prescribed antibiotics can cure the infection.
- If symptoms persist after treatment, return to a doctor for reevaluation.



- All sex partners should be evaluated, tested, and treated.
- Get retested 3 months after treatment of an initial infection to check for recurrence.
- Antibiotics will not repair any permanent damage caused by the disease, including infertility.

How can they be prevented?

- The surest way is to abstain from sexual intercourse.
- Be in a long-term mutually monogamous relationship with a partner who was tested and is uninfected.
- Use latex condoms consistently and correctly.
- See a doctor immediately if any genital symptoms develop.
- If diagnosed and treated, notify all recent sex partners so they can seek treatment.
- Abstain from sexual intercourse for as long your doctor advises to prevent spreading the infection.
- Regular testing for gonorrhea and chlamydia may be advised by your doctor.

For More Information

www.nlm.nih.gov/medlineplus/sexuallytransmitteddiseases.html
www.nlm.nih.gov/medlineplus/tutorials/sexuallytransmitteddiseases/htm/index.htm (English)

www.nlm.nih.gov/medlineplus/spanish/tutorials/sexuallytransmitteddiseasespanish/htm/index.htm (Spanish)

Information on sexually transmitted diseases from the National Institutes of Health MedlinePlus, including an interactive tutorial in English and Spanish.

<http://familydoctor.org/online/famdocen/home/tools/symptom/539.printerview.html> (men)

<http://familydoctor.org/online/famdocen/home/tools/symptom/537.printerview.html> (women)

Chart listing genital problems in men and women and providing guidance about when to see a doctor from the American Academy of Family Physicians.

www.mayoclinic.com/health/condoms/MY00654/METHOD=print
Information about condoms and their proper use from the Mayo Clinic.

ACP

AMERICAN COLLEGE OF PHYSICIANS
INTERNAL MEDICINE | Doctors for Adults

1. A 32-year-old man has a 1-day history of dysuria and a urethral discharge. He is in a monogamous sexual relationship. The patient has no drug allergies.

Physical examination discloses a urethral discharge. No rashes or other lesions are seen. In addition to screening for other sexually transmitted diseases, which of the following is the most appropriate treatment?

- A. Azithromycin, single dose orally
- B. Benzathine penicillin, single dose intramuscularly
- C. Ceftriaxone and azithromycin
- D. Ciprofloxacin and doxycycline

2. An 18-year-old woman is evaluated in the emergency department for a 3-day history of fever and rash accompanied by joint pain and swelling that initially involved only the left elbow before progressing to the left wrist. Medical history is unremarkable. She receives a depot medroxyprogesterone acetate injection every 12 weeks for contraception.

On physical examination, temperature is 38.1°C (100.6°C); other vital signs are normal. The left wrist is erythematous and swollen, and pain is induced with active range of motion. The left elbow is also swollen and painful. Scattered lesions are present on the left hand and both feet.

Appropriate cultures are taken.

Definitive diagnosis can be accomplished by which of the following?

- A. Blood cultures
- B. Gram stain and culture of left elbow joint
- C. Culture of cervix, urethra, or rectum
- D. Biopsy, Gram stain, and culture of peripheral skin lesion

3. A 25-year-old man is evaluated in the emergency department for a 3-day history of scrotal pain without fever. Medical history is unremarkable, and he takes no medications. The patient is frequently sexually active with women and never has sex with men.

On physical examination, vital signs, including temperature, are normal.

Genitourinary examination discloses a purulent urethral discharge and right-sided scrotal swelling and tenderness, especially superior to the right testis.

Duplex Doppler ultrasonography of the scrotum shows normal-sized testes and a swollen right epididymis with normal blood flow.

Which of the following is the most appropriate treatment?

- A. Ampicillin and gentamicin
- B. Azithromycin
- C. Ceftriaxone and doxycycline
- D. Levofloxacin

4. An 18-year-old woman is evaluated in the emergency department because of a 3-day history of lower abdominal pain. She does not have urinary frequency, dysuria, flank pain, nausea, or vomiting. Her only medication is an oral contraceptive agent.

On physical examination, temperature is 38.3°C (101.0°F), blood pressure is 118/68 mm Hg, pulse rate is 104/min, and respiration rate is 16/min. Abdominal examination is normal. There is no flank tenderness. Pelvic examination shows purulent endocervical discharge, cervical motion tenderness, fundal tenderness, and bilateral adnexal tenderness on bimanual examination.

The leukocyte count and urinalysis are normal. Urine and serum pregnancy tests are negative.

Which of the following is the most appropriate treatment?

- A. Ampicillin and gentamicin, intravenously
- B. Azithromycin, orally
- C. Cefoxitin, intramuscularly
- D. Ceftriaxone, intramuscularly, and doxycycline, orally
- E. Metronidazole, orally

5. A 26-year-old homosexual man is evaluated because of a 2-week history of a sore throat. He was seen in an emergency department when the sore throat first developed. Following results of a throat culture, gonorrhea was diagnosed, and ciprofloxacin, 500 mg orally in a single dose, was prescribed.

When seen today, the patient reports that the sore throat never completely resolved and has become somewhat more painful. He has no constitutional symptoms. Medical history is unremarkable, and he takes no medications.

On physical examination, vital signs are normal. The pharynx appears erythematous, and the tonsils are moderately enlarged. Bilateral small, tender anterior cervical lymph nodes are palpated. A rapid streptococcal antigen test is negative, and another throat culture is obtained. One day later, the laboratory reports that the culture is again positive for *Neisseria gonorrhoeae*.

Which of the following is the most appropriate treatment at this time?

- A. Benzathine penicillin 4.8 million units IM
- B. Ciprofloxacin 500 mg bid for 7 days
- C. Doxycycline 100 mg bid for 7 days
- D. Bactrim DS one tab daily for 7 days
- E. Ceftriaxone 250 mg IM in a single dose plus azithromycin 1 gram orally in a single dose

Questions are largely from the ACP's Medical Knowledge Self-Assessment Program (MKSAP, accessed at http://www.acponline.org/products_services/mksap/15/?pr31). Go to www.annals.org/intheclinic/ to complete the quiz and earn up to 1.5 CME credits, or to purchase the complete MKSAP program.

CORRECTION: IN THE CLINIC: CHLAMYDIA AND GONORRHEA

“The Reiter syndrome” was used in a recent issue of In the Clinic (1). “Reactive arthritis” is now considered the more appropriate term.

This has been corrected in the online version.

Reference

1. Workowski K. In the Clinic: chlamydia and gonorrhea. *Ann Intern Med.* 2013; 158:ITC2-1-16.