

Update on the Prevention and Treatment of Sexually Transmitted Diseases

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The Centers for Disease Control and Prevention (CDC) recently published updated guidelines that provide new strategies for the prevention and treatment of sexually transmitted diseases (STDs). Patient education is the first important step in reducing the number of persons who engage in risky sexual behaviors. Information on STD prevention should be individualized on the basis of the patient's stage of development and understanding of sexual issues. Other preventive strategies include administering the hepatitis B vaccine series to unimmunized patients who present for STD evaluation and administering hepatitis A vaccine to illegal drug users and men who have sex with men. The CDC recommends against using any form of nonoxynol 9 for STD prevention. New treatment strategies include avoiding the use of quinolone therapy in patients who contract gonorrhea in California or Hawaii. Testing for cure is not necessary if chlamydial infection is treated with a first-line antibiotic (azithromycin or doxycycline). However, all women should be retested three to four months after treatment for chlamydial infection, because of the high incidence of reinfection. Testing for herpes simplex virus serotype is advised in patients with genital infection, because recurrent infection is less likely with the type 1 serotype than with the type 2 serotype. The CDC guidelines also include new information on the treatment of diseases characterized by vaginal discharge. (*Am Fam Physician* 2003; 67:1915-22. Copyright© 2003 American Academy of Family Physicians.)



Despite various attempts by health care workers to reduce the morbidity and mortality of sexually transmitted diseases (STDs), more than 15 million persons acquire STDs each year in the United States.¹ Family physicians play a critical role in efforts to prevent or, when prevention fails, to treat these infections. To assist in these endeavors, the Centers for Disease Control and Prevention (CDC)² recently updated guidelines for the prevention and treatment of STDs.

Clinical Prevention Guidelines

The first portion of the 2002 CDC guidelines discusses the prevention and control of STDs using five major strategies (*Table 1*).² The CDC² notes that the first step in primary prevention is to change sexual behaviors that increase the risk of contracting STDs.

Family physicians are in an excellent

position to provide education and counseling on the prevention of STDs. Information should be individualized on the basis of the patient's stage of development and understanding of sexual issues.³ The information should be delivered with respect and compassion, and in a nonjudgmental manner.² In addition to counseling patients who are being assessed for an STD, family physicians should address possible misconceptions about STD-protective behavior in adolescents and young adults. This type of counseling has been shown to reduce misconceptions, and it also may reduce the occurrence of risky sexual behaviors.⁴

A nonintensive systematic intervention performed in an outpatient setting (i.e., counseling during the physical examination or visit for refill of a contraceptive prescription) can be effective.⁵ Over the past 10 years, the use of condoms has increased among at-risk heterosexuals in the United States; this increase suggests

See page 1853 for definitions of strength-of-evidence levels.

Annual screening for chlamydial infection should be performed in all sexually active women 24 years of age and younger.

that the message on STD prevention is being heard.⁶ However, to reduce the incidence of STDs, family physicians must continue providing education and counseling.

One of the most reliable methods of avoiding STD transmission is abstinence from sexual relations, including oral, vaginal, and anal sex.² Education on abstinence can reduce risky sexual behaviors,⁷ particularly when information on sexual negotiation skills is included.⁸ Counseling about abstinence is crucial for patients who are receiving treatment for STDs or whose partners are undergoing treatment for STDs, and those who wish to avoid possible consequences of sexual intercourse, such as pregnancy or exposure to an STD.²

The other method for reducing the risk of STD exposure is to be in a long-term monog-

amous relationship with an uninfected partner. The CDC² recommends that potential sexual partners be tested for STDs, including human immunodeficiency virus (HIV) infection, before they begin having sexual intercourse. If one of the partners is infected or the infection status is unknown, a new condom should be used for each action of insertive sexual intercourse.

Preexposure vaccination is one of the most effective strategies for preventing the transmission of certain STDs. The CDC² recommends that patients being evaluated for an STD receive a hepatitis B vaccine series if they were not immunized in the past. Vaccination is particularly important in adolescents, who generally do not consider themselves to be at risk for contracting hepatitis B.⁹ The CDC also recommends the administration of hepatitis A vaccine to illegal drug users and men who have sex with men.

Another preventive strategy is the screening of selected populations. The CDC currently recommends annual screening for chlamydial infection in all sexually active women 24 years of age and younger.² [Evidence level C, consensus/expert guidelines] Screening is important even if these women are asymptomatic, because younger women are more susceptible to chlamydial infection than older women. Women older than 24 years should be screened if they are at risk for chlamydial infection (e.g., new sexual partner, history of multiple sexual partners).²

Nonoxynol 9 is a chemical compound that has been promoted as a potential aid in reducing the transmission of STDs. However, recent studies^{10,11} have found that this compound provides no protection against gonorrhea or chlamydial infection. In one study,¹² the use of nonoxynol 9 actually increased the risk of contracting gonorrhea. Condoms lubricated with nonoxynol 9 have a short shelf life and cost more than other condoms; furthermore, their use may increase the risk of urinary tract infection.² Because of these factors, the CDC² recommends against using

TABLE 1
Major Strategies for the Prevention and Control of STDs

Education and counseling about safer sexual behaviors in persons at risk for STDs
Identification of asymptomatic persons with STDs, as well as symptomatic infected persons who are unlikely to seek diagnostic and treatment services
Effective diagnosis and treatment of persons with STDs
Evaluation, treatment, and counseling of sexual partners of persons with STDs
Preexposure immunizations for vaccine-preventable STDs in selected populations

STDs = sexually transmitted diseases.

Adapted from Sexually transmitted diseases treatment guidelines 2002. Centers for Disease Control and Prevention. MMWR Recomm Rep 2002;51(RR-6):1-78.

nonoxynol 9 or condoms lubricated with this compound for preventing the transmission of STDs.

Diseases Characterized by Urethritis and Cervicitis

The diagnosis and treatment of urethritis and cervicitis are discussed in detail in the CDC guidelines.² New information includes the wider spread of quinolone resistance to *Neisseria gonorrhoeae* and the need for follow-up testing in women treated for chlamydial infection.

GONOCOCCAL DISEASE

Since the last CDC recommendations were published, resistance to quinolones has spread

to Hawaii and parts of the West Coast. Based on epidemiology, resistance to these drugs is believed to have originated in Asia and the Pacific region; the incidence of quinolone resistance has been high in these areas for some time. In Hawaii, quinolones are no longer recommended for the treatment of gonorrhea. The CDC² suggests that, because of the increased prevalence of resistant *N. gonorrhoeae*, quinolone therapy is “inadvisable” in California as well.

Cephalosporins, specifically orally administered cefixime (Suprax) and intramuscularly administered ceftriaxone (Rocephin), are first-line agents for the treatment of gonococcal urethritis (Table 2).² Ceftriaxone, which

TABLE 2
Treatment Recommendations for STDs Characterized by Urethritis and Cervicitis

Disease	Preferred treatment	Alternative treatment
Uncomplicated gonorrhea	Cefixime (Suprax), 400 mg orally one time Ceftriaxone (Rocephin), 125 mg IM one time* Ciprofloxacin (Cipro), 500 mg orally one time Ofloxacin (Floxin), 400 mg orally one time Levofloxacin (Levaquin), 250 mg orally one time	Spectinomycin (Trobicin), 2 g IM one time Ceftizoxime (Cefizox), 500 mg IM one time Cefoxitin (Mefoxin), 2 g IM one time, plus probenecid, 1 g orally one time Cefotaxime (Claforan), 500 mg IM one time Gatifloxacin (Tequin), 400 mg orally one time Norfloxacin (Noroxin), 800 mg orally one time Lomefloxacin (Maxaquin), 400 mg orally one time
Chlamydial infection	Azithromycin (Zithromax), 1 g orally one time Doxycycline (Vibramycin), 100 mg orally twice daily for 7 days	Erythromycin base, 500 mg orally four times daily for 7 days Erythromycin ethylsuccinate (E.E.S.), 800 mg orally four times daily for 7 days Ofloxacin, 300 mg orally twice daily for 7 days Levofloxacin, 500 mg orally once daily for 7 days
Persistent urethritis	Metronidazole (Flagyl), 2 g orally one time, plus erythromycin base, 500 mg orally four times daily for 7 days, or erythromycin ethylsuccinate, 800 mg orally four times daily for 7 days	

STDs = sexually transmitted diseases; IM = intramuscularly.

*—No advantage exists for use of the alternative injectable cephalosporins over ceftriaxone; in addition, no advantage exists for use of orally administered quinolones over the first-line quinolones, and data on their use are limited.

Adapted from Sexually transmitted diseases treatment guidelines 2002. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 2002;51(RR-6):1-78.

Treatment for gonorrhea and chlamydial infection should be provided if empiric therapy is initiated before the test results are known or when patients are likely to be lost to follow-up.

remains the agent of choice for other forms of gonococcal disease, is given intravenously to treat all serious or systemic infections.

Quinolones are safe and effective for treating nonresistant gonococcal infections. However, these drugs should be used with caution when an infection may have been acquired in or from Asia or the Pacific region. Ciprofloxacin (Cipro) and ofloxacin (Floxin) are options for the intravenous treatment of disseminated gonococcal infections and are given orally for the treatment of uncomplicated infections of the urethra, cervix, or rectum.²

NONGONOCOCCAL URETHRITIS

Etiologic agents in nongonococcal urethritis include *Chlamydia trachomatis*, *Mycoplasma genitalium*, and *Ureaplasma urealyticum*. Rarely, nongonococcal urethritis is

caused by *Trichomonas vaginalis* or herpes simplex virus (HSV).

The recommended treatment for nongonococcal urethritis (e.g., chlamydial infection) is azithromycin (Zithromax) or doxycycline (Vibramycin). Alternatively, the infection can be treated with a seven-day course of erythromycin base or erythromycin ethylsuccinate (E.E.S), ofloxacin, or levofloxacin (Levaquin).² The CDC encourages testing for *C. trachomatis* in all patients with urethritis and cervicitis, and recommends treatment of gonorrhea and chlamydial infection if empiric therapy is initiated before test results are known or when patients are likely to be lost to follow-up.² [Evidence level C, consensus/expert guidelines]

PERSISTENT URETHRITIS

Rarely, symptoms persist after routine therapy. Unfortunately, there is no proven effective treatment for persistent urethritis. Recommendations include repeating the initial therapy if the patient did not comply with the original treatment plan. If the patient was compliant, consideration can be given to swab testing for *T. vaginalis* and treatment with metronidazole (Flagyl) and erythromycin.

CHLAMYDIAL INFECTION

The updated CDC guidelines² include follow-up strategies for use in women with chlamydial infection. Unless symptoms persist, testing for cure is unnecessary when a chlamydial infection is treated with azithromycin or doxycycline. If retesting is indicated, it should be delayed for more than three weeks after treatment is completed to reduce the possibility of a false-positive result.

The CDC² notes that patients who have had a chlamydial infection are at high risk for reinfection. Therefore, all women with previous chlamydial infection should be retested three to four months after treatment. Regardless of whether their sexual partner has been treated, these women should be rescreened by no later than 12 months after the infection.²

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Diseases Characterized by Genital Ulcers

In the United States, the most common causes of genital ulcers are genital herpes, syphilis, and chancroid.^{2,13} Each of these diseases is associated with an increased risk for HIV infection.² The only significant change in the CDC recommendations concerns HSV infection.

GENITAL HERPES

HSV infection is the most common cause of genital ulcers in this country.¹³ Approximately 45 to 50 million Americans have genital herpes, and an estimated 1 million new cases occur each year.^{2,14} Primary infection occurs mostly in adolescents and young adults. Genital herpes is more common in women, blacks, and persons with multiple sexual partners.

Two HSV serotypes have been identified in humans. HSV-1 is the most common cause of oral herpes infection, and HSV-2 is the primary pathogen in sexually transmitted genital herpes. Both serotypes can be present at oral or genital sites.

HSV infection can be characterized by episodes of latency, with asymptomatic viral shedding, recurrent activation, and perinatal and sexual transmission.¹⁵ Along with most common genital ulcerative diseases, HSV infection increases the risk of HIV transmission and is believed to play an important role in the heterosexual spread of HIV.¹⁶

The diagnosis of genital herpes is best established by viral culture. In the updated guidelines, the CDC² also recommends type-specific serologic testing to determine which HSV serotype has caused the genital infection. Knowing the HSV serotype is important in counseling patients about the potential for recurrent genital herpes, because recurrent episodes are less likely with the HSV-1 serotype than with the HSV-2 serotype. In addition, type-specific serologic tests may help confirm the diagnosis of genital herpes in patients with recurrent infection or with healing lesions, for which HSV culture results may be false-negative.

All women with previous chlamydial infection should be retested three to four months after treatment.

The treatment of genital herpes depends on whether the infection is a first episode or a recurrence (*Table 3*).² The CDC² also has established regimens for suppressive therapy in patients with recurrent genital herpes.

Diseases Characterized by Vaginal Discharge

Bacterial vaginosis, trichomoniasis, and candidiasis are the most common diseases associated with vaginal discharge. Patients with any of these diseases also may have vulvar itching or irritation and a vaginal odor.

BACTERIAL VAGINOSIS

Bacterial vaginosis is caused by the replacement of normal vaginal flora with an over-

TABLE 3
Treatment Regimens for Genital Herpes

First episode*

Acyclovir (Zovirax), 400 mg orally three times daily for 7 to 10 days, or 200 mg orally five times daily for 7 to 10 days
Famciclovir (Famvir), 250 mg orally three times daily for 7 to 10 days
Valacyclovir (Valtrex), 1 g orally twice daily for 7 to 10 days

Recurrent episode

Acyclovir, 400 mg orally three times daily for 5 days, or 200 mg orally five times daily for 5 days, or 800 mg orally twice daily for 5 days
Famciclovir, 125 mg orally twice daily for 5 days
Valacyclovir, 500 mg orally twice daily for 3 to 5 days, or 1 g orally once daily for 5 days

Suppressive therapy

Acyclovir, 400 mg orally twice daily
Famciclovir, 250 mg orally twice daily
Valacyclovir, 500 mg orally once daily, or 1 g orally once daily

*—Antiviral drug therapy may be extended if healing is incomplete after 10 days.

Adapted from *Sexually transmitted diseases treatment guidelines 2002*. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 2002;51(RR-6):1-78.

growth of anaerobic microorganisms, *Mycoplasma hominis*, and *Gardnerella vaginalis*. This disease is the most frequent cause of vaginal discharge, but most affected women are asymptomatic.

The current controversy about bacterial vaginosis concerns screening for and treating this disease in pregnant women. The presence of bacterial vaginosis during pregnancy has been associated with premature rupture of membranes, preterm labor, preterm birth, chorioamnionitis, postpartum endometritis, and postcesarean section infection. However, routine screening for and treatment of bacterial vaginosis during the prenatal period have not been shown to reduce these adverse pregnancy outcomes.¹⁷⁻²⁰ [References 17 and 18—Evidence level A, randomized controlled trials (RCTs); reference 19—Evidence level A, meta-analysis; reference 20—Evidence level A, systematic review of RCTs]

The CDC² recommends screening for bacterial vaginosis in all symptomatic pregnant women, followed by treatment if indicated. Testing for bacterial vaginosis also may be performed in pregnant women who have a history of preterm labor, with treatment given if disease is present. However, the optimal treatment regimen for these patients has not been established.

TRICHOMONIASIS

Men with trichomoniasis tend to be asymptomatic, but infected women tend to have a diffuse, malodorous, yellow-green vaginal discharge that causes vulvar irritation. Trichomoniasis is diagnosed by the presence of moving flagellated organisms in vaginal secretions viewed under a microscope.

Topical agents administered vaginally do not provide adequate coverage for trichomoniasis. The recommended treatment for this infection is metronidazole, taken orally in a single 2-g dose. Alternatively, metronidazole can be administered in a dosage of 500 mg orally twice daily for seven days.²

Pregnant women with symptomatic tricho-

TABLE 4

Diagnostic Criteria for PID

Minimum criteria

Uterine or adnexal tenderness

or

Cervical motion tenderness

Additional criteria

Oral temperature $>38.3^{\circ}\text{C}$ ($>101^{\circ}\text{F}$)

Abnormal cervical or vaginal mucopurulent discharge

Presence of white blood cells on saline microscopy of vaginal secretions

Laboratory documentation of cervical gonococcal or chlamydial infection

Elevated C-reactive protein level

Elevated erythrocyte sedimentation rate

Specific criteria

Endometrial biopsy with histopathologic evidence of endometritis

Laparoscopic abnormalities consistent with PID

Transvaginal ultrasound or MRI study showing thickened, fluid-filled tubes, with or without free pelvic fluid or tubo-ovarian complex

PID = pelvic inflammatory disease; MRI = magnetic resonance imaging.

Adapted from Sexually transmitted diseases treatment guidelines 2002. Centers for Disease Control and Prevention. MMWR Recomm Rep 2002;51(RR-6):1-78.

moniasis should be given a single dose of metronidazole.²¹ Treatment of asymptomatic trichomoniasis during pregnancy has not been shown to prevent preterm delivery.²² [Evidence level A, RCT]

VULVOVAGINAL CANDIDIASIS

Vulvovaginal candidiasis usually presents as pruritus and vulvovaginal erythema. The diagnosis of this infection can be confirmed by finding budding yeast or hyphae under a microscope after a 10 percent potassium hydroxide solution has been added to vaginal secretions. Current treatment recommendations include a substantial number of over-the-counter (OTC) antifungal agents, as well as prescription fluconazole (Diflucan) taken orally in a single 150-mg dose.²

An important concern is that women frequently self-diagnose vulvovaginal candidiasis incorrectly.^{2,23} The CDC² notes that unneces-

TABLE 5
Treatment Regimens for PID

Parenteral regimen A

Cefotetan (Cefotan), 2 g IV every 12 hours,
or cefoxitin (Mefoxin), 2 g IV every 6 hours
plus

Doxycycline (Vibramycin), 100 mg orally
or IV every 12 hours

Parenteral regimen B

Clindamycin (Cleocin), 900 mg IV every 8 hours
plus

Gentamicin, 2 mg per kg IV or IM (loading dose),
followed by 1.5 mg per kg IM or IV every 8 hours
(maintenance dosage; single daily dosing may be
substituted)

Alternative parenteral regimens

Ofloxacin (Floxin), 400 mg IV every 12 hours, or
levofloxacin (Levaquin), 500 mg IV once daily
with or without

Metronidazole (Flagyl), 500 mg IV every 8 hours, or
ampicillin-sulbactam (Unasyn), 3 g IV every 6 hours
plus

Doxycycline, 100 mg orally or IV every 12 hours

Outpatient regimen A

Ofloxacin, 400 mg orally twice daily for
14 days, or levofloxacin, 500 mg orally
once daily for 14 days

with or without

Metronidazole, 500 mg orally twice daily
for 14 days

Outpatient regimen B

Ceftriaxone (Rocephin), 250 mg IM one time;
or cefoxitin, 2 g IM, plus probenecid, 1 g
orally administered concurrently; or other
parenterally administered third-generation
cephalosporin (e.g., ceftizoxime [Cefizox],
cefotaxime [Claforan])

plus

Doxycycline, 100 mg orally twice daily for
14 days

with or without

Metronidazole, 500 mg orally twice daily
for 14 days

PID = pelvic inflammatory disease; IV = intravenously; IM = intramuscularly.

Adapted from *Sexually transmitted diseases treatment guidelines 2002*. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 2002;51(RR-6):1-78.

sary or inappropriate use of OTC antifungal agents can delay correct diagnosis and treatment of vulvovaginitis resulting from other causes. Hence, self-medication with antifungal agents should be done only for recurrence of symptoms in women who have been diagnosed with vulvovaginal candidiasis by a health care professional. Women who use OTC antifungal agents should be advised to seek medical care if their symptoms do not resolve or if their symptoms recur within two months after OTC antifungal treatment.

PELVIC INFLAMMATORY DISEASE

Pelvic inflammatory disease (PID) encompasses a range of inflammatory disorders that affect the female upper genital tract. The most common causes are *C. trachomatis* and *N. gonorrhoeae*. Other possible causes include anaerobes, *G. vaginalis*, *Haemophilus influenzae*, enteric gram-negative rods, *Streptococcus*

agalactiae, cytomegalovirus, *M. hominis*, and *U. urealyticum*.

The CDC has developed diagnostic criteria for PID (Table 4).² The updated CDC guidelines² state that to reduce morbidity from PID, empiric therapy should be initiated in patients who have uterine or adnexal tenderness or cervical motion tenderness (minimum diagnostic criteria), with treatment based on the individual patient's risk profile. In one recent study,²⁴ adnexal tenderness was found to be the most sensitive diagnostic criterion. Additional criteria can be used to support the diagnosis of PID.²

The CDC updated treatment regimens for PID to include levofloxacin in the alternative parenteral regimen and one of the outpatient regimens (Table 5).²

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