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Diagnosis and Management of Sexually Transmitted Disease Pathogens Among Adolescents

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Diagnosis and Management of Sexually Transmitted Disease Pathogens Among Adolescents

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Objectives

After completing this article, readers should be able to:

1. List the possible clinical presentations and sequelae of *Neisseria gonorrhoeae* and *Chlamydia trachomatis* genital infections in males and females.
2. Describe the various types of licensed *N gonorrhoeae* and *C trachomatis* laboratory tests as well as their advantages and disadvantages.
3. List the Amsel criteria and available laboratory tests for diagnosis of bacterial vaginosis.
4. Describe the various treatments for vulvovaginal candidiasis.
5. Describe patient, partner, and practitioner barriers to implementing effective partner notification.

Introduction

Sexually transmitted diseases (STDs) have been labeled a "hidden epidemic" among adolescents, with adolescent females experiencing some of the highest rates of most STDs. Most adolescent STDs, regardless of pathogen, are asymptomatic. A primary care visit presents the perfect window of opportunity to screen for STDs. Clinical preventive care guidelines, such as the Guidelines for Adolescent Preventive Services (GAPS), Bright Futures, and the American Academy of Pediatrics Recommendations for Preventive Pediatric Health Care, recommend screening adolescents for sexual risk behaviors and offering STD diagnostic tests to all sexually active adolescents. The National Committee for Quality Assurance adopted chlamydia screening of sexually active females ages 15 to 25 years as a new Health Plan Employer Data and Information Set (HEDIS) performance measure for managed care organizations in 2000. New nucleic acid amplification diagnostic technology allows for a widening scope of STD screening without performing an invasive genital examination.

This article reviews the epidemiology and clinical presentation of common curable STDs acquired by adolescents and provides information on new diagnostic technologies and treatments for these STDs. Screening and treating STDs can be offered readily as part of routine adolescent health services.

Chlamydia and Gonorrhea Infection

Epidemiology

Chlamydia trachomatis and *Neisseria gonorrhoeae* are the sexually transmitted genital pathogens reported most commonly among adolescents. Both infections frequently are asymptomatic in males and females. A large multisite, randomized, controlled trial found that 62% of chlamydial infections in both males and females and 28% of male and 51% of female gonorrheal infections were asymptomatic. Most sexually active adolescents are unaware of their risk for these infections. Typically, chlamydial infections in adolescents are diagnosed by screening asymptomatic females. Adolescent males are not screened routinely for STDs. Undetected and, therefore, untreated chlamydial infections among males contribute to the high rates of infection among adolescent females.

Although often asymptomatic, chlamydial and gonorrheal infections can present as

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Table 1. Licensed Amplification Tests for *Chlamydia trachomatis* and *Neisseria gonorrhoeae*

Test	Manufacturer	Specimen	Clinical Utility
Polymerase Chain Reaction	Roche Molecular System (Branchburg, NJ)	Cervical, urethral, first-void urine	*N gonorrhoeae*,* *C trachomatis*, combination *N gonorrhoeae* and *C trachomatis*
Ligase Chain Reaction†	Abbott Laboratories (Abbott Park, IL)	Cervical, urethral, first-void urine	*N gonorrhoeae*, *C trachomatis*, combination *N gonorrhoeae* and *C trachomatis*
Transcription-Mediated Amplification	Gen-Probe (San Diego, CA)	Cervical, urethral, first-void urine	*C trachomatis*, combination *N gonorrhoeae* and *C trachomatis*
Strand Displacement Amplification	Becton Dickinson (Sparks, MD)	Cervical, urethral, first-void urine	*N gonorrhoeae*, *C trachomatis*, combination *N gonorrhoeae* and *C trachomatis*
Hybrid Capture II System	Digene (Beltsville, MD)	Cervical	*N gonorrhoeae*, *C trachomatis*, combination *N gonorrhoeae* and *C trachomatis*

*Polymerase chain reaction is not approved for *N gonorrhoeae* testing with female urine or asymptomatic male urethral swabs.
†Abbott Laboratories will discontinue this product June 30, 2003.

various STD syndromes, depending on the site of infection. Both males and females may develop urethritis, proctitis, or pharyngitis. Females may develop cervicitis. Neither infection causes vaginitis.

Sequelae of uncomplicated gonorrheal and chlamydial infection can be devastating for females. Infection can ascend into the pelvis, causing pelvic inflammatory disease (PID). Many PID cases are "silent," with no symptoms or atypical symptoms that are not perceived as infection. Females who have a history of PID are at high risk for an ectopic pregnancy, chronic pelvic pain, and tubal factor infertility. Chlamydial screening and treatment of adolescent females reduces the incidence of PID.

Sequelae of chlamydial and gonorrheal infections are rare among males. The incidence of epidydimitis among males is much lower than the prevalence of PID among females. Evidence for a causal association between chlamydial and gonorrheal urethritis and male infertility is lacking.

Although uncommon, both males and females are at risk for developing disseminated gonococcal infection and reactive arthritis (Reiter syndrome). Exudative STDs, such as chlamydia and gonorrhea, may facilitate human immunodeficiency virus (HIV) transmission and infection.

Diagnosis

Nucleic acid amplification tests (NAATs) are a new class of highly sensitive and specific diagnostic tests for *C trachomatis* and *N gonorrhoeae* infections. Four NAATs are licensed for both gonorrhea and *Chlamydia* testing, and some only require a single specimen for both tests (Table 1). These tests can detect as few as 10 strands of chlamydial DNA or RNA in a specimen by replicating strands up to 10 million-fold. Advantages over older methods of testing include superior sensitivity, ability to test urine specimens, and practical convenience (Tables 2 and 3). NAATs have made chlamydia and gonorrhea testing more acceptable for asymptomatic patients by eliminating the need for an invasive genital examination.

Symptomatic adolescents, especially females, also require a full genital examination to evaluate for PID and other infections that cause vaginal or urethral discharge (eg, trichomoniasis, bacterial vaginosis, and vulvovaginal candidiasis).

Management

Uncomplicated genital chlamydial and gonorrheal infections can be treated with a single dose of cefixime*, ciprofloxacin, ceftriaxone, ofloxacin, or levofloxacin (Table 4). Because adolescents infected with *N gonorrhoeae* often are coinfected with *C trachomatis,* the Centers for Disease Control and Prevention (CDC) recommend treating persons who have a positive gonorrhea test result for both gonorrheal and chlamydial infection unless a negative result has been obtained with a sensitive chlamydia test. Abstinence should be recommended for at least 7 days after initiation of therapy for both infected patients and their sex partners to decrease the risk of reinfection.

Although once considered an infection responsive to a wide spectrum of antibiotics, treatments for gonorrhea now are limited. In response to the progressive rise in

*In July 2002, Wyeth Pharmaceuticals (Collegeville, PA) discontinued manufacturing cefixime in the United States. No other pharmaceutical company manufactures or sells cefixime tablets in the United States.

Table 2. Advantages and Disadvantages of Specific Laboratory Tests for *Chlamydia trachomatis*

Test	Advantages	Disadvantages
Culture	Specificity nearly 100%	Expensive Technically demanding Time-consuming Labor-intensive Sensitivity of about 80% Requires cervical or urethral specimens
EIA	Inexpensive Technically straightforward	Sensitivity of about 60% Requires cervical or urethral specimens
DNA Probe	Inexpensive Easier transport	Sensitivity of about 65% Requires cervical or urethral specimens
Nucleic Acid Amplification	Sensitivity of 85% Specificity of 97% to 99% Can perform on urine specimens	Expensive

N gonorrhoeae resistance to penicillin and tetracycline caused by plasmid-producing beta-lactamase and other antibiotic-resistant mediators, the CDC advises against use of these antibiotic classes for treatment of gonorrhea infection. Although it is an effective treatment for *C trachomatis* infection, a single 1-g azithromycin dose is associated with suboptimal gonorrhea cure rates. A single 2-g dose provides adequate therapy, but a high frequency of gastrointestinal adverse effects and high cost prohibit its practical use. Accordingly, single-dose azithromycin should not be used as monotherapy for both gonorrheal and chlamydial genital infection.

Fluoroquinolones have not been recommended for persons younger than 18 years of age because they damage articular cartilage in juvenile animal models. However, no joint damage attributable to therapy has been observed among children treated with flouroquinolones. Currently, quinolones should not be used to treat gonorrheal infections acquired in Asia, the Pacific, California, or Hawaii, due to documented resistance in those areas.

Follow-up

A "test of cure" is not recommended routinely following treatment of adolescent gonorrheal or chlamydial infection. However, clinicians should advise all females to be rescreened 3 to 4 months after treatment. Some experts recommend chlamydial testing for all females every 6 months because the risk of infection is high.

Table 3. Advantages and Disadvantages of Specific Laboratory Tests for *Neisseria gonorrhoeae*

Test	Advantages	Disadvantages
Culture	Sensitivity of approximately 85% Specificity of nearly 100% Inexpensive Low labor demands Technically straightforward Rectal specimens Can determine antimicrobial susceptibility	Transport in CO_2 medium Requires cervical or urethral specimens
DNA Probe	Sensitivity of about 85% Inexpensive Easy transport	Requires cervical or urethral specimens
Gram Stain	Inexpensive Easy transport Rectal specimens Sensitivity of 85% for urethral specimens	Requires cervical or urethral specimens Sensitivity of 55% for cervical specimens
Nucleic Acid Amplification	Sensitivity of 80% to 90% Specificity of 97% to 99% Can be performed on urine specimens	Expensive

Table 4. The Centers for Disease Control and Prevention Recommended Treatment for Uncomplicated Genital *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections*

Pathogen	Treatment
C trachomatis	Azithromycin 1 g orally in a single dose OR Doxycycline 100 mg orally twice daily for 7 days
N gonorrhoeae	Cefixime† 400 mg orally in a single dose OR Ciprofloxacin 500 mg orally in a single dose OR Ofloxacin 400 mg orally in a single dose OR Levofloxacin 250 mg orally in a single dose OR Ceftriaxone 125 mg IM in a single dose AND Treatment for *C trachomatis*††

*Adapted from the Centers for Disease Control and Prevention, 2002 Guidelines for treatment of sexually transmitted disease. *Morbid Mortal Weekly Rep MMWR*. 2002;51(No. RR-6):32–42.
†In July 2002, Wyeth Pharmaceuticals (Collegeville, PA) discontinued manufacturing cefixime in the United States. No other pharmaceutical company manufactures or sells cefixime tablets in the United States.
††The Centers for Disease Control and Prevention recommends treating persons who have a positive gonorrhea test result for both gonorrhea and chlamydial infection unless a negative result has been obtained with a sensitive nucleic acid amplification chlamydia test.

Bacterial Vaginosis

Epidemiology

Bacterial vaginosis (BV) is a sexually associated noninflammatory disturbance of the normal vaginal ecosystem. It is characterized by an overgrowth of several anaerobic bacterial species usually found in the vagina, including *Mobiluncus* sp, *Prevotella* sp, *Gardnerella vaginalis,* and *Mycoplasma hominis,* and a decrease in H_2O_2-producing *Lactobacillus* sp. It occurs more frequently among sexually active than sexually inexperienced females. BV is not an infection and is not accompanied by local vaginal inflammation visible on clinical examination or by microscopy. However, it has been associated with an increase in preterm labor, perinatal morbidity, PID, and risk of HIV infection, suggesting that BV may play an important role in several major women's reproductive health problems.

Diagnosis

BV is diagnosed by the presence of a gray-white, homogenous, nonviscous vaginal discharge. It is not associated with the usual signs or symptoms of inflammation (eg, itching, abdominal pain, or dysuria). BV is diagnosed clinically by the presence of at least three of the four criteria listed in Table 5.

New commercial tests are available for the diagnosis of BV. These tests can be used to document pH, a positive "whiff" test, and microscopy. The FemExam® pH and Amines Test Card™ (Quidel® Corp, San Diego, CA) can detect an elevated vaginal pH and the presence of trimethylamine. The FemExam® PIP Activity Test Card™ (Quidel® Corp, San Diego, CA) can identify an enzyme expressed by *G vaginalis*. The Affirm VP III Microbial Identification Test® (Becton Dickinson, Sparks, MD) is a DNA probe for the etiologic diagnosis of vaginitis: BV, candidiasis, and trichomoniasis. Correlation with clinical symptoms and elevated vaginal pH is recommended with this test. Ordinary cultures are neither recommended nor clinically helpful in diagnosing BV.

Management

The goal of treatment is to decrease symptoms and signs and to eliminate excess reproductive risks. Treatment is recommended for symptomatic nonpregnant and all pregnant patients. Options for treatment include oral and vaginal regimens (Table 6). Abstinence from alcohol during treatment with metronidazole and for 24 hours afterward should be stressed because of the disulfiramlike

Table 5. Amsel Criteria for Diagnosis of Bacterial Vaginosis

- Vaginal discharge: thin, homogenous, white, uniformly adherent
- Vaginal pH >4.5
- Positive "whiff" test: fishy odor after mixing discharge with 10% KOH
- >20% "clue" cells on microscopic examination: bacteria-coated squamous epithelial cells in which both the periphery (cell membrane) and cytoplasm have a granular, irregular "moth-eaten" appearance

Table 6. Recommended Bacterial Vaginosis Treatment Regimens*

Nonpregnant Females

- Metronidazole 500 mg orally twice daily for 7 days
  OR
- Metronidazole gel, 0.75%, one full applicator (5 g) intravaginally once a day for 5 days
  OR
- Clindamycin cream, 2%, one full applicator (5 g) intravaginally once a day for 5 days

Pregnant Females

- Metronidazole 250 mg orally three times daily for 7 days
  OR
- Clindamycin 300 mg orally twice daily for 7 days
  OR
- Clindamycin ovules 100 g intravaginally at bedtime for 3 days

*Adapted from the Centers for Disease Control and Prevention. 2002 Guidelines for treatment of sexually transmitted diseases. *Morbid Mortal Weekly Rep MMWR*. 2002;51(No RR-6):42–44

effect of that drug. Clindamycin cream and ovules are oil-based and should not be used by women who use latex barrier contraceptives, such as condoms and diaphragms.

The same treatments are used in HIV-positive individuals. Follow-up and tests of cure are not indicated for nonpregnant patients. No treatment of partners is indicated. Possible future developments include prevention or treatment of BV by restoration of vaginal ecology with H_2O_2-producing lactobacilli in vaginal suppositories.

Trichomoniasis

Epidemiology

Trichomoniasis is a sexually transmitted infection of squamous epithelial tissues that is caused by a pathogenic, flagellated, single-celled, parasitic protozoan, *Trichomonas vaginalis*. It causes an impressive inflammatory response in females and infects the urethra, exocervix, and periurethral glands as well as the vagina.

Trichomoniasis classically presents in a postpubertal female with an irritating, profuse, yellow-green vaginal discharge accompanied by vulvovaginal itching and discomfort. Pelvic discomfort occurs in about 15% of infected individuals. Trichomoniasis may cause vaginitis, urethritis, and cervicitis and, thus, may present with abnormal vaginal or postcoital bleeding or dysuria. Skene and Bartholin glands also may harbor infection. The vulva may be edematous, excoriated, and erythematous. Discharge often is visible at the introitus. Similarly, the vagina may appear red and inflamed. The cervix may be red and swollen, with punctate hemorrhagic ulcerations looking like a "strawberry," a finding that is highly specific for trichomoniasis and can be seen with a colposcope in 50% of infected females. In males, trichomoniasis usually is asymptomatic, with fewer organisms and less inflammation. However, it is increasingly recognized and identified as a cause of urethritis that is not responsive to the usual antibiotic regimens for nonspecific urethritis.

Diagnosis

Trichomoniasis is diagnosed by microscopic visualization of the organism on a wet preparation that is identified by the characteristic erratic twirling motion caused by the flagellae. Phase-contrast microscopy is helpful, but at best, microscopy is 50% to 70% sensitive. Staining does not improve the detection rate. The vaginal pH usually is high ($pH \geq 6.0$). The inflammatory response may be so overwhelming that large numbers of white blood cells (WBCs) surround and obscure the trichomonads. In this case, dilution of the saline preparation with nonbacteriostatic saline and warming of the solution to body temperature may improve identification of motile organisms.

More sensitive diagnostic alternatives include laboratory culture with Diamond modified media, which establishes the "gold standard" for identification. InPouch TV Culture® (BioMed Diagnostics, San Jose, CA) is a United States Food and Drug Administration (FDA)-approved self-contained culture medium-filled bag that can be inoculated and incubated with a vaginal fluid specimen from females or a first-void urine specimen from males in the office and viewed under the microscope for up to 5 subsequent days. The Affirm VP III Microbial Identification Test® (Becton Dickinson, Sparks, MD) also tests for trichomoniasis. A positive test may be obtained with at least 5×10^3 trichomonads. For men, the maximum yield from cultures may combine specimens from the urethra and spun urine. Reports of trichomonads on Papanicolaou smears have high false-positive and false-negative rates that preclude their use for diagnosis.

Management

Trichomoniasis is treated easily in about 85% to 95% of infected patients with a single 2-g dose of metronidazole accompanied by concurrent partner treatment with the same regimen regardless of the partner's clinical picture.

To avoid reinfection, abstinence is recommended until both partners have taken their medication and are asymptomatic. Abstinence from alcohol for 24 hours should be stressed because of the disulfiramlike effect of metronidazole. Topical treatments are not effective because the anatomic extent of the infection in many individuals includes the urethra and periurethral glands. Nonresponders should be retreated with a 7-day course of 500 mg metronidazole twice daily. If this regimen fails, an alternative is 2 g metronidazole daily for 3 to 5 days. However, nonadherence to partner treatment or abstinence always should be explored because these behaviors commonly cause reinfections. For patients who have laboratory-documented infection, do not respond to the 3- to 5-day treatment regimen, and in whom reinfection has been excluded, determination of *T vaginalis* susceptibility and consultation with an expert should be sought. (Consultation is available from the CDC at 404-639-8363.)

HIV-infected individuals should receive the same regimens. Metronidazole treatment is complicated by an unpleasant metallic taste and nausea in approximately 10% of patients taking the single-dose regimen. Because no teratogenic effects have been demonstrated, treatment with a single 2-g metronidazole dose is recommended during pregnancy.

Candida Vulvovaginitis

Epidemiology

Candidiasis or yeast vaginitis is an infection that develops in the estrogenized, low pH, vaginal environment. It is not transmitted sexually and rarely is acquired from a colonized partner.

Candidiasis presents commonly with acute vulval pruritis and vaginal discharge of varying character and consistency. Other signs and symptoms include "external" dysuria, vaginal soreness and irritation, vulvar burning, and painful intercourse. The physical examination may demonstrate redness and swelling of the vagina and vulva. Sometimes, papular satellite lesions are apparent. Symptoms often escalate before the menses. Only some patients have a classic vaginal thrush, characterized by clumps of adherent thick white discharge. Local adenopathy may be present. Self-diagnosis based on vaginal complaints has been shown to be unreliable in many studies.

Diagnosis

Microscopic evaluation of vaginal discharge may support the diagnosis of candidiasis, but simultaneous evaluation for other causes of vaginal discharge is necessary. Vaginal pH usually is normal (4 to 4.5), germinated yeast (pseudohyphae) can be identified in the saline or KOH preparations, and a modest increase in WBCs may be noted. Large numbers of WBCs suggest other causes or concomitant infection. Yeast and pseudohyphae may be seen under low or high power, but direct microscopy may miss as many as 50% of infections. Rapid tests are probably no better than microscopy and are more expensive. After microbiologic cure, 20% to 25% of women are reinfected with the same strain 30 days posttreatment.

Management

Candidiasis is treated with many topical azole preparations that have as their active agent clotrimazole, miconazole, butoconazole, terconazole, or tioconazole. Most regimens result in clinical and microbiologic cure rates of 80% to 90%. Oral fluconazole in a 150-mg single dose is as effective as the topical treatments. Local relief may be delayed with oral treatments. Local irritation may occur from the topical agents, although this complaint may be difficult to differentiate from the disease. Effective over-the-counter vaginal agents are available, and "azoles" are more effective than nystatin. Topical antifungal preparations may weaken latex barrier contraceptives, such as condoms and diaphragms. Single-dose treatments are prepared in vehicles that keep the antifungal agent active in the vagina for several days, but they may be less effective in the treatment of recurrent infections. All topical azoles can be used in pregnancy. A longer duration of treatment (10 to 14 d) may be needed in pregnancy and for severe and recurrent infections. Treatment of acute vulvovaginal candidiasis in the HIV-positive patient employs the same recommended treatment regimens.

Partner Notification

Sexual partners of adolescents infected with chlamydia, gonorrhea, or trichomoniasis must be notified and treated; otherwise, the patient is likely to become reinfected. Partners are usually asymptomatic and unlikely to seek screening and treatment without notification. Because many health departments do not have resources to support partner notification (PN) services, the responsibility often falls on the clinician and patient.

Various clinician PN strategies have varying success rates and challenges. Patients directly advising their partners to be evaluated and treated for an STD has some advantages, although both patient and partner barriers often render this an ineffective strategy. Patient barriers include poor self-efficacy, denial, and fear of partner violence. Partner barriers to evaluation and treatment

Table 7. Resources*

Health Care Clinician Information

- Centers for Disease Control and Prevention, Division of STD Prevention
  - http://www.cdc.gov/nchstp/dstd/dstdp.html
- Holmes KK, Sparling PF, March PA, et al, eds. *Sexually Transmitted Diseases.* 3rd ed. New York, NY: McGraw Hill; 1999
- Neinstein LS, ed. *Adolescent Health Care.* 5th ed. Baltimore, Md: Williams & Wilkins; 2002

Patient Information

- American Social Health Association (ASHA) for patient information brochures, STD and AIDS Hotline telephone number, and online STD and HIV information
- 800-783-9877
- http://www.ashastd.org

Adolescent-appropriate STD Information Web Sites

- http://www.iwannaknow.org
- http://www.itsyoursexlife.com
- http://www.teenwire.com
- http://www.kidshealth.org

*The authors and publishers take no responsibility for the content of the Web sites mentioned in this article. These sites are recommended on the basis of their content at time of manuscript preparation. This list of sites is not inclusive.

include their health-seeking behaviors and clinicians failing to offer partner treatment. Scheduling the partner to be seen in the practitioner's clinic is one option, but reimbursement issues, especially in a managed care setting, present a challenge. Some advocate providing patients with prescriptions for their partners to fill. However, in some states, prescribing medications to patients never examined can result in legal sanctions. Low-cost clinical settings, such as STD clinics, offer options for STD care of sex partners. Although family planning and Planned Parenthood® clinics traditionally have limited their services to only females, some have begun offering clinical services for male partners of infected females.

Despite the challenges, treating asymptomatic partners who otherwise would never receive treatment reduces the risk of reinfection for the patient. Pediatricians can significantly contribute to STD control in their communities by ensuring PN and treatment.

Conclusion

Fifty percent of United States high school students are sexually experienced. The simple question, "Have you ever had sexual intercourse?" can identify many of the adolescent patients in need of reproductive health services. Assumptions of sexual activity status among adolescent patients could result in devastating sequelae from untreated STDs. Technology has simplified the procedures for STD diagnosis and treatment. Pediatricians have the opportunity to maintain good reproductive health and prevent chronic disease for their patients by providing these services at the adolescent preventive care visit. Suggested resources for patients and clinicians are listed in Table 7.

Suggested Reading

American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine. Recommendations for preventive pediatric health care. *Pediatrics.* 2000;105:pullout

Burstein GR, Gaydos CA, Diener-West M, Howell MR, Zenilman JM, Quinn TC. Incident. *C. trachomatis* infections among inner city adolescent females. *JAMA.* 1998;280:521–526

Centers for Disease Control and Prevention. 2001 Guidelines for treatment of sexually transmitted diseases. *Morbid Mortal Wkly Rep MMWR.* 2002;51(No. RR-6):1–80

Elster A, Kuznets N. *AMA Guidelines for Adolescent Preventive Services (GAPS): Recommendations and Rationale.* Baltimore, Md: Williams & Wilkins; 1994

Eng TR, Butler WT, eds. *The Hidden Epidemic: Confronting Sexually Transmitted Diseases.* Washington, DC: National Academy Press; 1997

Green M, ed. *Bright Futures: Guidelines For Health Supervision of Infants, Children, and Adolescents.* Arlington, Va: National Center for Education in Maternal and Child Health; 1994: 195–258

Kamb ML, Newman D, Peterman TA, et al. Most bacterial STDs are asymptomatic. Presented at Sexually Transmitted Infections at the Millennium Conference, Baltimore, Md; May 3–7, 2000

Kann L, Kinchen SA, Williams BI, et al. Youth risk behavior surveillance — United States, 1999. *Morbid Mortal Weekly Rep MMWR.* 2000;49(SS05):19

Scholes D, Stergachis A, Heidrich FE, Andrilla H, Holmes KK, Stamm WE. Prevention of pelvic inflammatory disease by screening for cervical chlamydial infection. *N Engl J Med.* 1996; 334:1362–1366

PIR Quiz

Quiz also available online at www.pedsinreview.org.

1. Which of the following statements regarding chlamydial and gonorrheal infections in adolescents is *true*?

   A. Both agents cause vaginitis.
   B. Infertility is a common sequela in both males and females.
   C. Most infections are asymptomatic and are discovered on routine screening examinations.
   D. Proctitis and urethritis occur exclusively in males.
   E. Severe sequelae are more common in males than in females.

2. You are seeing a 15-year-old female for a health supervision visit. She reports being sexually active, but she denies any vaginal discharge or abdominal pain. She reports only occasional use of condoms, and she has had several sexual partners, but she never has had a sexually transmitted disease. You wish to screen her for the presence of chlamydial infection and gonorrhea. Which of the following statements regarding laboratory testing for these agents is *true*?

   A. A Gram stain is more sensitive for cervical specimens than for urethral specimens.
   B. Chlamydia cell cultures require cervical or urethral specimens and have poor sensitivity and specificity.
   C. Chlamydia DNA probes have a high sensitivity when performed on vaginal secretions.
   D. Nucleic acid amplification tests have excellent sensitivity and specificity for both agents but are expensive tests.
   E. Nucleic acid amplification tests using first-void urine specimens are not yet licensed for use.

3. In the previously described patient, you identify a positive DNA probe for *Neisseria gonorrhoeae*. The DNA probe for *Chlamydia trachomatis* was negative. You call her back to your office and counsel her on management and future implications. Which of the following statements will you be *most* likely to tell her?

   A. Because she has no symptoms, she can be treated with a single dose of cefixime.
   B. Her partners need to be treated only if they have symptoms of urethritis or proctitis.
   C. She does not need to abstain from sexual activity for 7 days if both she and her partners are treated.
   D. She is not at increased risk for pelvic inflammatory disease because this is her first sexually transmitted disease.
   E. She should be treated for both gonorrheal and chlamydial infection.

4. Which of the following is *most* typical of bacterial vaginosis?

   A. Dysuria.
   B. Thin, white vaginal discharge.
   C. Vaginal erythema.
   D. Vaginal itching.
   E. Vaginal pH <4.5.

5. You are evaluating a 17-year-old girl in the emergency department whose chief complaint is vaginal discharge and dysuria. On physical examination, you note a thick, white vaginal discharge and intense vulvar erythema. Vaginal pH is 4, and pseudohyphae are present on a KOH preparation. You diagnose *Candida* vulvovaginitis. Which of the following is *true* regarding the management of this infection?

   A. Human immunodeficiency virus-positive patients require intravenous antifungal therapy.
   B. Pregnancy may necessitate a longer treatment course with topical azole therapies.
   C. Reinfection after successful treatment is rare.
   D. Topical creams do not interfere with barrier contraceptive methods.
   E. Topical preparations are not as effective as oral preparations.

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