NCC Pediatrics Continuity Clinic Curriculum: **Adolescent Addendum: STDs**

Overall Goal:
Identify key adolescent health issues and become comfortable interviewing an adolescent.

Overall Outline:

Adolescent I:	***Adolescent II:***	***Adolescent III:***
Contraception	Menstrual Irregularities	Acne

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Pre-Meeting Preparation:

- Diagnosis & Management of STDs Among Adolescents *(PIR, 2003)*
- Updated CDC 2010 STD Guidelines: *—full guidelines in Extra Credit*
    - AAP News *(Feb 2011; Oct 2012)*

Conference Agenda:

- Complete Adolescent Addendum Quiz
- Complete Adolescent Addendum Case

Post-Conference: *Board Review Q&A*

Extra Credit:

- STD Fact Sheets (CDC): *useful patient handouts*
- MMWR 2010 STD Treatment Guidelines: *also in pdf, here and* ***summary poster, HERE***
- HPV Vaccine Fact Sheet & CDC Links

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Edited 2012/14 by MAJ Patricia Kapunan, Dr. Harshita Saxena, and COL Jeff Hutchinson.

Diagnosis and Management of Sexually Transmitted Diseases Among Adolescents

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Objectives

After completing this article, readers should be able to:

1. List biologic and physiologic reasons for the disproportionate adolescent sexually transmitted disease susceptibility.
2. Describe clinical and laboratory findings on examination of a female who has mucopurulent cervicitis.
3. Describe the causative pathogens and etiologic evaluation for vaginitis.
4. List the criteria for diagnosis of pelvic inflammatory disease.
5. Describe the documentation and management of urethritis.

Introduction

Sexually transmitted diseases (STDs) are a major health problem among adolescents. The highest reported rates of gonorrhea and chlamydia are found among adolescents and young adults.

Adolescent susceptibility to STDs reflects both their biologic and behavioral stages of development. The adolescent cervix is more susceptible to infection compared with the adult cervix because of the presence of cervical ectopy. The young female introitus is small and subject to more trauma and exchange of body fluids during intercourse. Adolescents who have not been sexually active for an extended period of time are less likely to have any partial protective immunity against chlamydia from prior infections. Young adolescents' cognitive developmental stage may limit their ability to plan ahead for condom use. The adolescent personal fable, a belief of uniqueness and invulnerability, contributes to denial of STD risks.

Evaluation and management of an adolescent presenting with symptoms suggestive of an STD are acute care problems that can be addressed in the pediatric office. In this article, we describe the epidemiology, clinical presentation, and management of common STDs among adolescents.

Mucopurulent Cervicitis

Epidemiology

Mucopurulent cervicitis (MPC) is characterized by mucopurulent discharge from an inflamed cervix. *Chlamydia trachomatis* and *Neisseria gonorrhoeae* can cause MPC, but in most cases neither organism can be isolated. Other possible infectious pathogens include herpes simplex virus and *Trichomonas vaginalis.*

Clinical Presentation and Examination

The adolescent who has MPC may present with complaints of vaginal discharge, vaginal itching, irregular vaginal bleeding (especially after sexual intercourse), and dyspareunia. Pelvic inflammatory disease (PID) must be considered if there is lower abdominal pain.

Purulent or mucopurulent discharge from the cervical os, easily induced endocervical bleeding (ie, friability), and edema and erythema of the cervical zone of ectopy are found on physical examination. The presence of yellow mucopus collected from the endocervix and evident on a white swab is indicative of MPC. Friability alone does not constitute

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MPC. Findings of lower abdominal tenderness, cervical motion tenderness, or adnexal tenderness suggest an upper genital tract infection.

Differential Diagnosis

Diagnoses to consider upon findings of an inflamed cervix on examination include vaginitis, endometritis, PID, an inflamed ectropion due to allergies, trauma, or a foreign body, such as a tampon.

Laboratory Evaluation

Nucleic acid amplification tests (NAATs) are the gold standard for diagnosing gonorrhea or chlamydial infection as causes of MPC. NAATs are the most sensitive and specific combination gonorrhea and chlamydia test. Diagnostic tests to evaluate for STD coinfection should be performed, including tests for causes of vaginitis and syphilis. An human immunodeficiency virus (HIV) antibody test should be offered.

Management

MPC is not a sensitive predictor of gonorrhea or chlamydia, and most gonorrhea- and chlamydia-infected females do not have MPC. Therefore, the Centers for Disease Control and Prevention (CDC) recommend basing treatment of patients in whom gonorrhea or chlamydial infection is suspected on sensitive *C trachomatis* and *N gonorrhoeae* laboratory test results, unless there is a high prevalence of gonorrhea or chlamydia in the patient population or the patient is unlikely to return for follow-up. Table 1 lists CDC-recommended MPC treatment regimens. Fluoroquinolones have not been recommended for use among persons younger than 18 years because they damage articular cartilage in juvenile animal models. However, no joint damage attributable to fluoroquinolone therapy has been observed among children treated with the drugs. Patients should avoid sex with all partners until 7 days after beginning therapy.

Follow-up

Patients should return for diagnostic laboratory test results. All partners from the past 60 days of females who have MPC should be notified, evaluated, and treated for the suspected or identified STD.

Vaginitis

Epidemiology

Vaginitis is inflammation of the squamous epithelial tissues lining the vagina. Three conditions cause most cases of adolescent vaginitis: vulvovaginal candidiasis, bacterial vaginosis (BV), and trichomoniasis. All three treatable conditions can be diagnosed by examination of vaginal secretions during an office visit.

Table 1. The Centers for Disease Control and Prevention Recommended Treatment Regimens for Mucopurulent Cervicitis

Azithromycin 1 g orally in a single dose
OR
Doxycycline 100 mg orally twice daily for 7 days
PLUS
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

Adapted from the Centers for Disease Control and Prevention. 2002 Guidelines for treatment of sexually transmitted diseases. *Morb Mortal Wkly Rep MMWR*. 2002;51(No. RR-6):1–80.
*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.
†Fluoroquinolones should not be used for treatment of gonorrhea if the infection was acquired in Asia, the Pacific islands (including Hawaii), or California because the prevalence of fluroquinolone-resistant *N gonorrhoeae* is high in those areas.

Vaginal complaints in the postpubertal female are common, accounting for more than 10 million office visits annually. The presence of sexual activity influences the differential diagnosis, with trichomoniasis and BV more common in the sexually experienced adolescent. In the nonsexually active teenager, candidiasis remains the major cause of vaginal complaints and inflammation. Vaginitis also may be caused by local chemical or allergic irritants, such as douches and scented panty liners. Other less frequent causes include herpes simplex virus, bacterial infections caused by *Streptococcus* or *Staphylococcus* sp, trauma, and secondary bacterial infections from retained foreign bodies, most commonly tampons and condoms. Vaginitis may be observed rarely in cases of toxic shock syndrome in which the mucous membranes may be ulcerated.

Clinical Presentation and Examination

The adolescent who has vaginitis may present with complaints of vaginal discharge, which may be profuse or

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foul-smelling; vaginal pruritus; or irritation (Table 2). A history of vaginal discharge from a sexually active adolescent should trigger an evaluation for cervicitis.

The physical examination plays an important role in the diagnostic evaluation (Table 2). A thick, adherent, "cottage cheese-like" discharge suggests candidiasis. The clinician also may find erythema, edema, and excoriation of the vagina in a female who has candidiasis. A thin, homogeneous, gray-white, foul-smelling discharge suggests BV. A purulent, profuse, irritating, frothy green-yellow discharge often accompanies trichomoniasis.

Diagnosis

Although the standard bedside vaginitis evaluation offers the advantages of fast results and low cost, microscopy can present a logistic challenge if Clinical Laboratory Improvement Amendments (CLIA) or state licensing limits point-of-care testing. New diagnostic tools can substitute for microscopy and improve diagnostic sensitivity, but they increase cost and time to test results.

The bedside evaluation includes description of the vaginal discharge, measurement of vaginal pH, performance of a "whiff" test, and microscopic examination (Table 2). Care should be taken to obtain a vaginal swab that is not contaminated with alkaline cervical secretions. The vaginal pH can be determined by rubbing the specimen over a pH paper strip and matching the resulting color to the color chart. A specimen diluted in a drop of 10% potassium hydroxide (KOH), referred to as the "whiff test," has a "fishy" odor with BV and sometimes with trichominiasis.

Microscopy is critical to the diagnostic process (Table 2). On the wet preparation, the clinician should look for: 1) an excess number of white blood cells (WBCs) (>1:1 WBC:epithelial cell ratio or >10 cells per high-power field), which is evidence of inflammation often found with trichomoniasis and candidiasis; 2) motile or static trichomonads, which is diagnostic of trichomoniasis; and 3) budding yeast and pseudohyphae, which are diagnostic of candidiasis. Warming the solution to body temperature may improve identification of trichomonads and pseudohyphae. Because normal vaginal bacteria may be confused with yeast forms, the clinician should look for pseudohyphae to help identify true yeast. Adding 10% KOH solution to the vaginal fluid lyses other cells and bacteria and often improves pseudohyphae visualization.

Alternative diagnostic strategies can aid or substitute for the conventional evaluation just described. For BV, the FemExam® pH and Amines Test Card™ and the PIP Activity Test Card™ (Quidel® Corp, San Diego, CA) can substitute for the pH paper, the "whiff" test, and micro-

Table 2. Clinical and Laboratory Features of Vaginitis

Infection	Symptoms	Vaginal Discharge	Whiff Test	Microscopic Findings	pH	% Identified By Direct Microscopy	Enhanced Diagnosis
Bacterial Vaginosis	Foul-smelling discharge, ↑ after intercourse	Thin, homogenous, gray-white	Positive	>20% clue cells	>4.5	>90%	Gram stain Affirm VP III®*
Trichomoniasis	Frothy, foul-smelling discharge, pruritis, dysuria	Purulent, profuse, irritating, frothy, green-yellow	Variably positive	↑ WBCs Trichomonads	>4.5	~50% to 70%	Diamond media culture Inpouch TV Culture®† Affirm VP III®*
Vulvovaginal Candidiasis	Pruritis, burning, discharge	Thick, adherent, white	Negative	↑ WBCs Budding yeast Pseudohyphae	4 to 4.5	~50% to 60%	Affirm VP III®*

WBC = white blood cell.
*Becton Dickinson, Sparks, MD.
†BioMed Diagnostics, San Jose, CA.

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Table 3. The Centers for Disease Control and Prevention Recommended Treatment Regimens for the Most Common Causes of Vaginitis

Bacterial Vaginosis	Vulvovaginal Candiasis	Trichomoniasis
Metronidazole 500 mg orally twice daily for 7 days OR Metronidazole gel, 0.75%, one applicator (5 g) intravaginally once a day for 5 days OR Clindamycin cream, 2%, one applicator (5 g) intravaginally once a day for 7 days	Topical azole preparations OR Fluconazole 150 mg orally in a single dose	Metronidazole 2 g orally in a single dose

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

scopic examination on a vaginal specimen by detecting an elevated vaginal pH, trimethyl amines generated by BV-associated anaerobic bacteria, and an enzyme displayed by *Gardnerella vaginalis*. Although rarely performed as part of an office-based vaginitis evaluation, a Gram stain of vaginal fluid can provide a quantitative assessment (Nugent score) of BV-associated organisms.

For trichomaisis, the InPouch TV Culture® (BioMed Diagnostics, San Jose, CA) is an office-based self-contained culture kit. The clinician inoculates a culture medium-filled pouch with a vaginal fluid specimen from females or a first-void urine specimen from males and examines the contents for trichomonads by microscopy. The clinician can incubate and repeatedly examine the transparent culture pouch under the microscope for up to 5 subsequent days. The InPouch TV Culture® can be a valuable adjunct because the standard culture technique with Diamond medium usually is not performed by most clinical laboratories.

For offices that do not have microscopy available, a professional laboratory that offers the Affirm VP III Microbial Identification Test® (Becton Dickinson, Sparks, MD) provides a diagnostic option. The Affirm VP III®, a DNA probe performed on vaginal fluid specimens, offers the advantage of diagnosing BV, candidiasis, and trichomoniasis. Correlation with clinical symptoms and elevated vaginal pH is recommended.

Management

Treatment depends on the etiologic diagnosis of vaginitis based on information obtained from the history, physical examination, and laboratory tests (Table 3). Sexual partners of persons who have trichomoniasis need to be notified and treated. However, treatment is not indicated for sex partners of females diagnosed as having candidiasis or BV because partner treatment does not alter the risk of recurrence. Metronidazole-treated patients should avoid alcohol for 24 hours because of its disulfiramlike effect. Metronidazole can be used during pregnancy. Females who have recurrent vulvovaginal candidiasis may require longer treatment and continued prophylaxis.

Pelvic Inflammatory Disease (PID)

Epidemiology

PID is a serious consequence of STDs and an important cause of infertility, ectopic pregnancy, and chronic pelvic pain. It is a clinical syndrome caused by the spread of microorganisms from the lower genital tract (vagina or endocervix) to the upper genital tract (endometrium, fallopian tubes, and adjacent structures). PID is a polymicrobial infection. Sexually transmitted organisms, particularly *C trachomatis* and *N gonorrhoeae,* often are implicated. The alteration in vaginal flora that occurs with BV often can be found in the upper genital tracts of women in whom PID is diagnosed, implicating BV as an important cofactor in the development of PID (Table 4). No pathogen is identified in many PID cases. Adolescents have the highest rates of PID.

Clinical Presentation and Examination

PID is diagnosed on the basis of history and clinical findings. Specific genitourinary symptoms may include lower abdominal pain or cramping that is worse with movement and sexual intercourse, vaginal discharge, irregular vaginal bleeding, or dysuria. Although infrequent, systemic signs may be present and include anorexia, nausea, vomiting, fever, or generalized malaise.

Findings on abdominal examination may include lower abdominal tenderness, peritoneal signs (eg, rebound tenderness and guarding in severe cases), or right

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Table 4. Organisms Implicated in the Pathogenesis of Pelvic Inflammatory Disease

Sexually transmitted pathogens

- *Chlamydia trachomatis*
- *Neisseria gonorrhoeae*

Bacterial vaginosis-associated pathogens

- *Mycoplasma hominis*
- *Ureaplasma urealyticum*
- *Escherichia coli*
- *Gardnerella vaginalis*
- *Streptococcus* sp, including enterococci, and *Haemophilus influenzae*
- Anaerobes (anaerobic streptococci and staphylococci, *Bacteroides* sp, *Actinomyces* sp)

upper quadrant pain with associated perihepatitis (Fitz-Hugh–Curtis syndrome). Findings on pelvic examination may include abnormal cervical or vaginal discharge, uterine tenderness, adnexal tenderness, or cervical motion tenderness. Fever also may be present if the patient is severely ill.

Diagnosis

According to the CDC, lower abdominal tenderness, adnexal tenderness, or cervical motion tenderness is required to establish the diagnosis of PID (Table 5). Most affected females have mucopurulent cervical discharge or evidence of WBCs on a microscopic evaluation of a vaginal fluid saline preparation. If cervical discharge appears normal and no WBCs are found on the wet preparation, the diagnosis of PID is unlikely, and alternative causes of pain should be sought.

Laboratory Evaluation

Laboratory evaluations are used to support the clinical diagnosis and assist with management. Laboratory studies can help rule out pathology in the pelvis and abdomen that may be considered in the differential diagnosis (Table 6).

A test for genital gonorrhea and chlamydia should be performed, although negative test results are common because the specimen is not from the site of inflammation—the upper genital tract. Gonorrhea and chlamydia NAATs minimize the risk of a false-negative test result. Tests for other STDs should be performed because the patient is at high risk of having a coinfection. A pregnancy test should be performed because PID during pregnancy is an indication for hospital admission, and ectopic pregnancy can mimic PID.

Other optional tests that may help support the diagnosis include tests for elevated acute-phase reactants, such as WBCs, erythrocyte sedimentation rate, or C-reactive protein. Ultrasonography may be helpful if either the diagnosis is in question, ectopic pregnancy is a strong consideration, or tuboovarian abscess (TOA) is considered. Laparoscopy is not recommended routinely, although it may be required for evaluation of treatment failures, to exclude surgical emergencies, or if a TOA ruptures or does not respond to medical management within 48 to 72 hours.

Table 5. Pelvic Inflammatory Disease (PID) Diagnostic Criteria

Minimal requirements:

- Uterine or adnexal tenderness (unilateral or bilateral)

OR

- Cervical motion tenderness

Additional criteria to increase specificity:

- Presence of white blood cells (WBCs) on saline microscopy of vaginal secretions
- Oral temperature >101°F (38.3°C)
- Elevated erythrocyte sedimentation rate or C-reactive protein
- Gram-negative intracellular diplococci evident in Gram stain of endocervix
- Laboratory evidence of *N gonorrhoeae* or *C trachomatis* at cervix
- Abnormal cervical or vaginal mucopurulent discharge

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

Table 6. Differential Diagnosis for Pelvic Inflammatory Disease

- Ectopic pregnancy
- Ovarian cyst (with or without torsion)
- Acute appendicitis
- Endometriosis
- Pyelonephritis
- Septic or incomplete abortion
- Pelvic thrombophlebitis
- Functional pain

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Table 7. The Centers for Disease Control and Prevention Recommended Treatment Regimens for Pelvic Inflammatory Disease

Inpatient Regimens (one of the following):

- Cefotetan 2 g IV every 12 h OR Cefoxitin 2 g IV every 6 h PLUS Doxycycline 100 mg IV or PO every 12 h
- Clindamycin 900 mg IV every 8 h PLUS Gentamicin loading dose IV or IM (2 mg/kg body weight), followed by a maintenance dose (1.5 mg/kg) every 8 h
- Parenteral therapy may be discontinued 24 h after clinical improvement
  - —Doxycycline 100 mg PO twice a day OR Clindamycin 450 mg PO four times a day continued for 14 days of total therapy
  - —For tuboovarian abscess, addition of Metronidazole 500 mg PO twice a day, Doxycycline, or use of Clindamycin 450 mg PO four times a day provides better coverage against anaerobes

Outpatient Regimens (one of the following):

- Ofloxacin 400 mg PO twice a day or Levofloxacin 500 mg PO every day for 14 days WITH or WITHOUT Metronidazole 500 mg PO twice a day for 14 days
- Ceftriaxone 250 mg IM single dose OR Cefoxitin 2 g IM with Probenecid 1 g PO in a single dose once OR Other parenteral third-generation cephalosporin (Ceftizoxime or Cefotaxime) PLUS Doxycycline 100 mg PO twice a day for 14 days WITH or WITHOUT Metronidazole 500 mg po twice a day for 14 days

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

Table 8. Causes of Urethritis in Adolescents

Principal Bacterial Pathogens

- No pathogen identified
- *Chlamydia trachomatis*
- *Neisseria gonorrhoeae*

Other Pathogens

- *Ureaplasma urealyticum*
- *Mycoplasma genitalium*
- *Mycoplasma hominis*
- Herpes simplex virus
- *Trichomonas vaginalis*

Management

Antibiotic treatment for PID generally is empiric and must be broad-spectrum. All regimens should be effective against *N gonorrhoeae* and *C trachomatis*, even when endocervical test results are negative. Providing coverage against anaerobes and other gram-negative organisms is also important. A clinical diagnosis of PID presumes a bacterial infection of the pelvic deep soft tissue. Treatment should be initiated as soon as a presumptive diagnosis is made. Initiation of antibiotic treatment should not be delayed until laboratory results are available because this can affect long-term outcomes adversely. Table 7 lists the CDC-recommended antibiotic treatment regimens for PID. The addition of metronidazole or clindamycin to the oral doxycycline regimen improves anaerobic coverage at the risk of decreasing compliance.

PID often is treated in the outpatient setting. Indications for hospitalization include suspicion of a surgical emergency such as appendicitis or ovarian torsion, severe illness, pregnancy, TOA, and inability to tolerate or failure to respond to outpatient therapy.

Follow-up

Close follow-up of an adolescent in whom PID is diagnosed is essential. A repeat visit within 48 to 72 hours is necessary to ascertain adequate clinical improvement versus need for hospitalization. Sexual partners of patients who have PID should be evaluated and treated to reduce the risk of reinfection.

Urethritis

Epidemiology

Urethritis is an STD syndrome characterized by inflammation of the urethra. It is diagnosed more commonly in older adolescent and young adult males, but it may be an STD complication or primary infection site in adolescent females. Asymptomatic infection is common.

N gonorrhoeae and *C trachomatis* are the clinically important bacterial pathogens of adolescent urethritis that warrant diagnostic evaluation (Table 8). Specific diagnostic tests for less common pathogens usually are not performed. Nongonococcal urethritis (NGU) refers to urethritis caused by pathogens other than *N gonorrhoeae*; *C trachomatis* is the pathogen identified most frequently. However, the proportion of NGU cases caused by chlamydia has been declining over the past decade. Most NGU diagnostic evaluations do not identify a pathogen, especially in geographic areas that have active chlamydia control programs.

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Table 9. Diagnostic Criteria for Urethral Inflammation

Inflammation must be documented by at least one of the following:

- Observation of mucoid or purulent urethral discharge
- First-void urine positive leukocyte esterase test or microscopic examination demonstrating 210 white blood cells per high-power field
- At least 5 white blood cells per high-power field or gram-negative intracellular diplococci on Gram stain

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

Complications of urethritis among males (eg, epididymitis and Reiter syndrome) are less severe and occur far less frequently compared with sequelae of mucopurulent cervicitis among females. Evidence for a causal association between urethritis from an STD pathogen and male infertility is lacking.

Clinical Presentation and Examination

Males who have symptoms usually report urethral discharge, urethral itching, dysuria, and urinary burning and frequency. However, screening of sexually active adolescent males with urine-based NAATs identifies many asymptomatic infections. On examination, mucoid or purulent urethral discharge is the classic finding. Applying gentle pressure along the urethra from the base to the meatus three to four times and examination after a long interval without voiding (at least 2 h) increases the likelihood of finding urethral discharge.

Diagnosis

Objective clinical or laboratory evidence of urethral inflammation must be demonstrated to diagnose urethritis (Table 9). Patient complaint without objective examination or laboratory findings does not fulfill diagnostic requirements. However, highly sensitive NAATs identify STD pathogens in asymptomatic males who do not meet the diagnostic criteria for urethritis. Clinicians, therefore, should consider the possibility of a urethral infection with STD pathogens in asymptomatic sexually active males.

The CDC recommends testing of all males who meet the diagnostic criteria for urethritis for gonorrhea and chlamydial infection. NAATs for gonorrhea and chlamydia can be performed on a single urine or urethral specimen. Because of a high STD coinfection risk, tests for syphilis and HIV also should be performed.

Management

Treatment should be provided as soon as possible after diagnosing urethritis. However, empiric gonorrhea and chlamydia treatment of symptomatic patients in whom urethritis has not been documented by physical examination or laboratory testing is recommended only for males at risk for infection who are unlikely to return for a follow-up evaluation.

If possible, males who meet diagnostic criteria for urethritis (Table 9) should be tested for gonorrhea with a Gram stain in the office to differentiate between gonococcal urethritis and NGU. If gonorrhea is not ruled out at the office visit, patients should be treated for both gonorrhea and chlamydia. Patients who have NGU should be treated with either a single 1-g dose of azithromycin or doxycycline 100 mg twice daily for 7 days. Patients who have a positive gonorrhea or chlamydia test should be treated according to CDC recommendations (http://www.cdc.gov/nchstp/dstd/dstdp.html). All sexual partners of infected patients must be notified and treated. Patients and partners should abstain from sexual intercourse until 7 days after therapy initiation.

Patients should be instructed to return for evaluation if symptoms persist or recur after completion of therapy. Patients who have persistent or recurrent urethritis should be retreated with the initial regimen if noncompliance or re-exposure from an untreated partner is a possibility. If noncompliance or re-exposure is unlikely, a test for *Trichomonas vaginalis* should be performed and patients treated for recurrent/persistent urethritis (Table 10).

Arthritis Associated With STDs

Disseminated gonorrhea infection (DGI), the most common systemic complication of acute gonorrhea, occurs in 0.5% to 3% of patients who have untreated gonorrhea. More commonly diagnosed in females, DGI usually presents with arthritis, most often involving the wrist, metacarpophalangeal, ankle, or knee joints; tenosynovitis; and dermatitis presenting as papules, petechiae, pustules with a hemorrhagic component, and necrotic lesions. Although cultures from blood, joint fluid, and skin lesions are only positive in 20% to 30% of DGI cases, genital or pharyngeal cultures often reveal an asymptomatic gonococcal infection. Recommendations for parenteral therapy can be found in the CDC Guidelines for the Treatment of STDs.

Reiter syndrome, a reactive arthritis associated with *C trachomatis* infection, as well as certain enteric infec-

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Table 10. Centers for Disease Control and Prevention Recommended Treatment for Recurrent/Persistent Urethritis

Metronidazole 2 g orally in a single dose	PLUS	Erythromycin base 500 mg orally 4 times a day for 7 days OR Erythromycin ethylsuccinate 800 mg orally 4 times a day for 7 days

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

tions, is more common among males and patients who have human leukocyte antigen-B27 haplotypes. The pathogenesis is understood poorly, but most likely is immunologically mediated. Reiter syndrome manifestations of urogenital (urethritis, cervicitis), joint (tendonitis, synovitis, arthritis), ocular (conjunctivitis, uveitis), and mucocutaneous inflammation (balanitis, keratodermia blennorrhagica, painless ulcers) may not present simultaneously. Urethritis usually precedes other manifestations by 1 to 4 weeks. Blood and synovial cultures are usually negative. Most episodes resolve within 2 to 6 months, with a 15% risk of recurrence.

Resources

Clinician Information

The Center for Young Women's Health, Children's Hospital, Boston, MA
http://www.youngwomenshealth.org

Patient Information

ETR Associates for patient information brochures
831/438-4060
http://www.etr.org

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 the time of manuscript preparation. The list of Web sites is not inclusive

Suggested Reading

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

Holmes KK, Sparling PF, Mardh PA, et al, eds. *Sexually Transmitted Diseases*. 3rd ed. New York, NY: McGraw Hill; 1999

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What's new with 2010 STD treatment guidelines from CDC?

by **Gale Burstein, M.D., M.P.H., FAAP**, and **Kimberly Workowski, M.D.**

Updated guidelines from the Centers for Disease Control and Prevention (CDC) for the treatment of persons who have or are at risk for sexually transmitted diseases (STDs) include changes that are important for clinicians who care for adolescents.

Prevalence rates of many sexually acquired infections are highest among adolescents. The following recommendations for screening asymptomatic adolescents and prevention are included in the evidence-based guidelines "Sexually Transmitted Diseases Treatment Guidelines, 2010" (*MMWR*. 2010;59(RR12);1-110, www.cdc.gov/std/treatment/2010/default.htm).

Screening

All sexually active females ages 25 years and younger should be screened annually for *Chlamydia trachomatis*. Clinicians may consider screening adolescent/young adult males in clinical settings associated with high chlamydia prevalence (e.g., adolescent clinics, correctional facilities and STD clinics).

All sexually active females at risk for *Neisseria gonorrhoeae* infection should be screened annually. Females younger than 25 years are at highest risk for gonorrhea infection.

Discuss HIV screening with all adolescents and encourage testing for those who are sexually active or who use injection drugs.

Routinely screening adolescents who are asymptomatic for certain STDs (e.g., syphilis, trichomoniasis, bacterial vaginosis, herpes simplex virus, human papillomavirus, hepatitis A virus and hepatitis B virus) is not recommended. However, young men who have sex with men, and pregnant adolescent females, might require more thorough evaluation.

Cervical cancer screening should begin at age 21 years.

Prevention

Encourage immunizations, including human papillomavirus, and hepatitis A and B virus vaccines.

Provide information regarding HIV infection, testing, transmission and implications of infection to all adolescents as part of health care.

Integrate sexuality education into clinical practice. The U.S. Preventive Services Task Force recommends high-intensity behavioral counseling to prevent STDs for all sexually active adolescents.

Testing for gonorrhea, chlamydia

New *C. trachomatis* and *N. gonorrhoeae* laboratory specimen testing options are highlighted in the 2010 guidelines. Nucleic acid amplification tests (NAATs) are the most sensitive tests and recommended by the CDC. NAATs are Food and Drug Administration (FDA)-cleared for use with urine, cervical and urethral specimens. Some NAATs are cleared for use with either provider- or patient-collected vaginal swab specimens.

Although NAATs are not FDA-cleared for use with rectal or oropharyngeal swab specimens, some laboratories have met Clinical Laboratory Improvement Amendments requirements and have validated gonorrhea and chlamydia NAAT testing on rectal swab specimens and gonorrhea NAAT testing on oral swabs.

Treating gonorrhea

When considering treatment, it is important to realize that gonococcal antimicrobial resistance remains an issue in the United States. Penicillin, tetracycline or quinolones no longer are gonorrhea treatment options.

The recommended dual treatment regimen for uncomplicated gonococcal infections of the cervix, urethra and rectum is 250 milligrams (mg) of ceftriaxone intramuscularly in a single dose *plus* either 1 g of azithromycin orally in a single dose *or* 100 mg of doxycycline twice daily for seven days. If ceftriaxone is not an option, 400 mg of cefixime orally plus 1 g of azithromycin in a single dose or 100 mg of doxycycline twice daily for seven days is an alternative regimen. Although cefixime can be administered orally, there is limited efficacy of cefixime for pharyngeal infection, if infection at this site is suspected. Dual therapy for gonorrhea is recommended for all uncomplicated infections at all anatomic sites, due to concerns about the possible emergence of cephalosporin-resistant gonorrhea in the United States.

Additional changes in the guidelines include a new patient-applied treatment for genital warts, a new alternative treatment for bacterial vaginosis, and expanded diagnostic evaluation for cervicitis and trichomoniasis.

RESOURCES

The complete treatment guidelines, as well as information on webinars, ordering hard copies, wall charts and pocket guides, and downloading iPhone and eBook versions are available at cdc.gov/std/treatment/2010.


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MMWR in Review

by **Larry K. Pickering, M.D., FAAP**

Don't use oral cephalosporins as first-line treatment for gonorrhea

Editor's note: *This article summarizes key points from two Centers for Disease Control and Prevention (CDC) reports published in* Morbidity and Mortality Weekly Report (MMWR). *The comment sections might include information that did not appear in the original publications. To subscribe to* MMWR, *visit www.cdc.gov/MMWR.*

◆ "Update to CDC's *Sexually Transmitted Diseases Treatment Guidelines, 2010*: Oral Cephalosporins No Longer a Recommended Treatment for Gonococcal Infections." *MMWR.* 2012;61:590-594,www.cdc.gov/mmwr/preview/mmwrhtml/mm6131a3.htm?s_cid=mm6131a3_w.

Gonorrhea is a major cause of serious reproductive complications in women, can facilitate HIV transmission and is the second most frequently reported nationally notifiable disease.

Treatment of gonorrhea has become complicated by the ability of *Neisseria gonorrhoeae* to develop resistance to antimicrobial agents. This report updates the CDC's recommendations for treatment of gonorrhea.

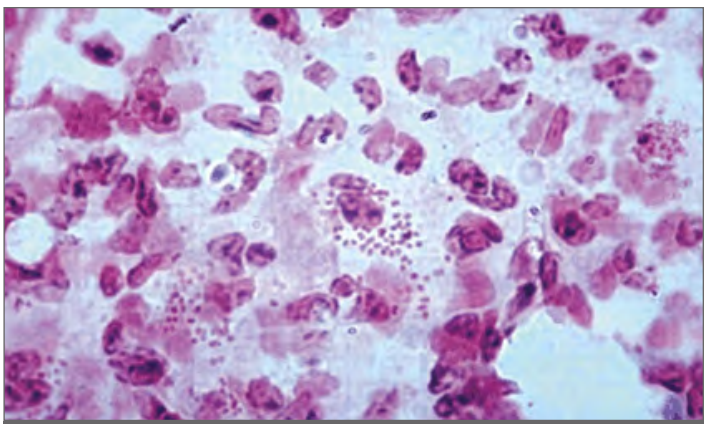
Study results

This report uses data from the CDC-supported Gonococcal Isolate Surveillance Project (GISP). This system has monitored antimicrobial susceptibilities since 1986 and is the only source of national and regional *N. gonorrhoeae* antimicrobial susceptibility data in the United States. GISP has provided laboratory evidence of declining cefixime susceptibility among urethral *N. gonorrhoeae* isolates collected from 2006-'11. This declining susceptibility is most notable in the West and in men who have sex with men.

Public health implications

Effective treatment is the cornerstone of U.S. gonorrhea control efforts. In 2010, the CDC treatment guidelines for sexually transmitted diseases recommended combination therapy for gonorrhea with a cephalosporin (ceftriaxone or cefixime) plus either azithromycin or doxycycline for treatment of *Chlamydia trachomatis.*

Based on GISP data demonstrating changing resistance patterns, the CDC now recommends the following for treatment of people with gonorrhea:



After observing resistance of *Neisseria gonorrhoeae* isolates to first-line drugs, officials are opting to change the recommended therapy.

- Combination of ceftriaxone 250 milligrams (mg) intramuscularly with either azithromycin 1 gram orally as a single dose or doxycycline 100 mg orally twice daily for seven days is the recommended therapy.
- Cefixime no longer is recommended at any dose as a first-line regimen for treatment of gonococcal infections.
- If cefixime is used as an alternative agent, the patient should return in one week for a test-of-cure with repeat culture from the initial infection site.
- Clinicians who diagnose gonorrhea in a patient with persistent infection after treatment (treatment failure) with the recommended combination therapy regimen should obtain relevant clinical specimens and perform antimicrobial susceptibility testing of *N. gonorrhoeae* isolates.
- Efforts should be made to ensure that a patient's sex partner(s) from the preceding 60 days are evaluated and appropriately treated for *N. gonorrhoeae.*

Comment

The increased number of isolates identified by GISP to have elevated minimum inhibitory concentrations (MICs) is of concern because these observed patterns may indicate early stages of development of

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clinically significant gonococcal resistance to cephalosporins. With the increasing use of nucleic acid amplification-based antimicrobial testing for diagnosis of gonorrhea, it is essential that laboratories maintain culture capacity to enable monitoring of antimicrobial susceptibility.

The CDC anticipates that rising cefixime MICs soon will result in declining effectiveness of cefixime for treatment of urogenital gonorrhea. As cefixime becomes less effective, continued use might hasten development of resistance to ceftriaxone, the last antimicrobial agent that is recommended and known to be highly effective in a single dose for treatment of gonorrhea at all anatomic sites of infection. Maintaining effectiveness of ceftriaxone for as long as possible is critical. Thus, the CDC no longer recommends the routine use of cefixime as a first-line regimen for treatment of gonorrhea in the United States.

Dr. Pickering *is editor of the 2012 AAP* Red Book.

Which of the following is the current CDC recommendation for treatment of gonorrhea?

A. Ceftriaxone or cefixime alone
B. Cefixime with azithromycin or doxycycline
C. Penicillin
D. Azithromycin plus doxycycline
E. Ceftriaxone with azithromycin or doxycycline

Answer: E

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Adolescent Addendum Quiz:

1. **Match the following 2010 CDC screening recommendations with the correct STD:**

1. C. trachomatis
2. N. gonorrhoeae
3. HIV
4. Syphilis
5. Trichomoniasis/BV
6. Cervical cancer

A. All sexually active females aged <25 years annually
B. Routine screening of adolescents who are asymptomatic not recommended
C. Screening should begin at age 21 years
D. Discuss screening and encourage testing for those who are sexually active and who use injection drugs
E. Young men who have sex with men and pregnant adolescent females require more thorough evaluation

2. **The recommended treatment for uncomplicated gonococcal infections is:**
   A. ceftriaxone 250 mg IM and azithromycin 1 gm PO
   B. ceftriaxone 250 mg IM and doxycycline 100 mg PO bid for 7 days
   C. cefixime 400 mg PO and azithromycin 1 gm PO
   D. cefixime 400 mg PO and doxycycline 100 mg PO bid for 7 days
   E. all of the above

3._____ are the most sensitive tests to detect C. trachomatis. Chlamydia and/or gonorrhea-infected female and males should be retested _____ months after treatment. The WR-B lab (is /is not) approved to screen NAAT rectal and oral samples, with handwritten order.

Adolescent Addendum Case:

Miranda is a 17 year-old female with no significant PMHx who presents for routine physical. During your HEADSS exam, you learn that she is sexually active with one partner for the past 7 months and has never used condoms. **How do you counsel your patient? What tests would you offer?** ***Do any require consent?***

After being counseled on risk of unplanned pregnancy, she states that she could not possibly get pregnant because her partner is a female. **How can you avoid being placed in this awkward situation in the future?**

As you move on to discuss STD testing, Miranda admits that she does in fact have some vaginal itching and vaginal discharge. **What is your differential diagnosis?**

Now what?

You quickly refresh AHLTA and see that your next patient has no-showed, so you will have sufficient time to do her pelvic exam. Unfortunately, you cannot find Nurse Kira to help you set up your room. **What supplies do you need and where can you find them in the WR-B clinic?**

The patient's pelvic exam showed normal external genitalia without any skin lesions. On speculum exam, you note no cervical motion tenderness but observe mucopurulent discharge from the endocervix, which you collect on a swab. Bimanual exam shows no uterine tenderness; you are unable to palpate the ovaries.

What is your working diagnosis? How would you manage the patient?

How will you follow-up? . . . Are there any other treatment considerations?

Adolescent Addendum Board Review:

1. An 18-year-old young man comes to your office with complaints of burning pain with urination over the past 24 hours. He has seen a small amount of yellowish discharge from his penis during this time. He also complains of some lower back pain over the past 48 hours. He denies fever or rashes, but his eyes are a little irritated. He is sexually active and uses condoms "most of the time." On physical examination, he is afebrile, his palpebral and bulbar conjunctivae are mildly injected, and his back is tender at the lower lumbar area, but there is no costovertebral angle tenderness. Genital examination reveals no scrotal tenderness and scant yellow discharge at the urethral orifice.

Of the following, the MOST likely cause of this patient's symptoms is
A. *Chlamydia trachomatis*
B. *Gardnerella vaginalis*
C. *Neisseria gonorrhoeae*
D. *Treponema pallidum*
E. *Trichomonas vaginalis*

2. A 16-year-old sexually active girl presents with lower abdominal pain of 2 days' duration. She finished her last menstrual period a few days ago and notes that it was heavier and more painful than usual. On physical examination, she is afebrile, has normal vital signs, and exhibits diffuse lower abdominal tenderness with no rebound or guarding. Bimanual examination elicits pain on movement of her cervix and palpation of her adnexa, with no palpable masses.

Of the following, the MOST appropriate next step is to obtain a
A. complete blood count and erythrocyte sedimentation rate
B. Gram stain of any cervical discharge
C. pelvic ultrasound
D. test for *Neisseria gonorrhoeae* and *Chlamydia trachomatis*
E. urine and blood culture

3. A 17-year-old young woman comes to your clinic after having been diagnosed with pelvic inflammatory disease the preceding day. She was prescribed doxycycline 100 mg orally twice a day for 14 days and given ceftriaxone 250 mg intramuscularly in a single dose at the time of diagnosis. Since this visit, she vomited the doxycycline, has been unable to retain any fluids, has developed a fever, and has had worsening abdominal pain. External genital examination findings are normal.

Of the following, the MOST appropriate next step is to
A. administer a repeat dose of the oral doxycycline and send the patient home
B. administer benzathine penicillin G 2.4 million units intramuscularly in a single dose and send the patient home
C. change the oral medication to azithromycin 1 g given in a single dose and send the patient home
D. hospitalize the patient and begin intravenous cefotetan 2 g plus doxycycline 100 mg every 12 hours
E. hospitalize the patient for observation and add acyclovir 400 mg orally TID for 7 to 10 days

4. A 16-year-old girl comes to your office with complaints of a thick white vaginal discharge. She is sexually active with one partner with whom she always uses condoms. She has no complaints of fever or abdominal pain, but she reports external "burning" of the vaginal area when she urinates. On physical examination, she is afebrile. Pelvic examination reveals fiery red labia majora and minora and an adherent white discharge on the vaginal walls, with a moderate amount of white discharge in the vaginal vault. The speculum examination is uncomfortable for her, but there is no cervical motion, uterine, or adnexal tenderness, and the cervix shows no friability or discharge.

Of the following, the MOST likely pathogen responsible for this patient's symptoms is
A. *Candida albicans*
B. *Chlamydia trachomatis*
C. group A *Streptococcus*
D. *Neisseria gonorrhoeae*
E. *Trichomonas vaginalis*

5. You are seeing a 16-year-old girl for complaints of a malodorous vaginal discharge. She has no abdominal pain or urinary or gastrointestinal symptoms. Results of routine screening for gonorrhea and chlamydia were negative 3 months ago, and she has not been sexually active since that time. She explains that she douches regularly. On pelvic examination, you note a homogenous gray discharge coating the vaginal walls, normal-appearing cervix, and no uterine or adnexal tenderness on bimanual examination. The pH of her vaginal secretions is 4.8. You obtain a saline wet mount which shows clue cells.

Of the following, the MOST likely diagnosis is
A. bacterial vaginosis
B. chemical vaginitis
C. chlamydial cervicitis
D. physiologic leukorrhea
E. vaginal candidiasis