NCC Pediatrics Continuity Clinic Curriculum:
Adolescent: STIs
Faculty Guide

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

Overall Outline:

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

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Pre-Meeting Preparation:

- "Diagnosis & Management of STDs Among Adolescents" *(PIR, 2003)*
- "CDC Releases 2015 Guidelines on the Treatment of Sexually Transmitted Diseases" *(AAFP, 2016)*

Conference Agenda:

- Complete Adolescent IV Quiz
- Complete Adolescent IV Case

Extra Credit:

- CDC **2015** STD Treatment Guidelines: *includes link for free app, pocket guide, & poster*
  - STD Fact Sheets (CDC): *useful patient handouts*
  - MMWR **2015** STD Treatment Guidelines: *140 pgs*
- Screening for Nonviral STIs in Adolescents (AAP Policy Statement- 2014)
- STD "Best Available Content" (AAFP): *hyperlinks for diagnosis, prevention, treatment*

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

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.

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

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

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.

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-

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

CDC Releases 2015 Guidelines on the Treatment of Sexually Transmitted Diseases

Key Points for Practice

- Serologic screening for HCV should be performed in all persons with HIV infection on initial assessment.
- Any of the HPV vaccines should be given to girls at 11 to 12 years of age, but boys 11 to 12 years of age should receive either the quadrivalent or the 9-valent vaccine.
- If point-of-care diagnostic tests for urethritis are unavailable, NAAT should be done and treatment given to cover gonorrhea and chlamydia.
- The recommended treatment for uncomplicated *N. gonorrhoeae* infection is a single 250-mg dose of intramuscular ceftriaxone plus a single 1-g dose of oral azithromycin.
- *M. genitalium* infection is one cause of urethritis, and the treatment is a single 1-g dose of azithromycin.

From the AFP *Editors*

Coverage of guidelines from other organizations does not imply endorsement by *AFP* or the AAFP.

This series is coordinated by Sumi Sexton, MD, Associate Deputy Editor.

A collection of Practice Guidelines published in *AFP* is available at http://www.aafp.org/afp/practguide.

The Centers for Disease Control and Prevention (CDC) has updated its 2010 recommendations to help guide physicians in preventing and treating sexually transmitted diseases (STDs). This summary practice guideline will focus on the updates, which include yearly screening for hepatitis C virus (HCV) in persons with human immunodeficiency virus (HIV) infection; vaccine recommendations and counseling for persons with human papillomavirus (HPV); diagnostic assessment of urethritis; nucleic acid amplification tests (NAATs) for diagnosing trichomoniasis; alternative treatments for *Neisseria gonorrhoeae* and genital herpes simplex virus (HSV); the role of *Mycoplasma genitalium* in urethritis and cervicitis and implications of treatment; STD management in persons who are transgendered; and retesting for repeat STDs.

New and Updated Recommendations

HCV SCREENING IN PERSONS WITH HIV INFECTION

Although HCV is most commonly transmitted through exposure to infected blood, it can also be transmitted through sexual contact, especially in persons with HIV infection. Serologic screening for HCV should be performed in all persons with HIV infection on initial assessment, and should be considered periodically thereafter, and at least annually in persons at high risk of HCV infection. Measurement of alanine transaminase is not recommended for testing; however, if a patient whose alanine transaminase levels are being monitored has increased levels, he or she should be tested for acute HCV infection. Additionally, because some persons with HIV infection do not have HCV antibodies, persons with liver disease of unknown etiology and who are anti-HCV negative should be evaluated for HCV infection using RNA testing.

VACCINES AND COUNSELING IN PERSONS WITH HPV

Vaccines. The bivalent vaccine (Cervarix) protects against HPV types 16 and 18, which are responsible for more than 65% of cervical cancers; the quadrivalent vaccine (Gardasil) protects against HPV types 6 and 11, which are responsible for 90% of genital warts, as well as types 16 and 18; and the 9-valent vaccine protects against HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58, which include the strains responsible for an additional 15% of cervical cancers. The vaccine is given in three doses over six months, with the second dose given one to two months after the first dose, and the third dose given six months after the first dose.

For girls, it is recommended that any of the vaccines be given at 11 to 12 years of age, but boys 11 to 12 years of age should receive the quadrivalent or the 9-valent vaccine. In both groups, the vaccine can be given as early as nine years of age. Females 13 to 26 years of age and males 13 to 21 years of age in whom the vaccine series was not provided ▶

or not completed should receive the vaccine. It should be noted that the vaccine is not licensed or recommended for persons older than 26 years.

Counseling. When providing counseling to persons with HPV infection, there are many important points of discussion. Most persons who are sexually active will be infected with HPV at some point; however, many will not be aware of it. The infection typically resolves spontaneously, with no associated health problems; however, when symptoms and problems do occur, they can lead to genital warts, precancers, and cancers of the cervix, anus, penis, vulva, vagina, head, and neck. An HPV infection that causes genital warts is not the same as the infection that causes cancers. These conditions can be treated; however, HPV itself has no treatment. There are also no tests to help determine which infections will resolve and which will progress. In some cases, however, a test can help detect if a woman is at increased risk of developing cervical cancer, but these tests do not identify other problems associated with HPV infection, and are not helpful in women younger than 25 years or men.

Many kinds of HPV are transmitted through anogenital (vaginal and anal sex) and genital to genital contact and oral sex. Anogenital infection is common and can affect other parts of the body (e.g., mouth, throat).

HPV does not cause difficulty in achieving or maintaining pregnancy, but some cancers caused by HPV, as well as their treatments, may decrease a woman's ability to get pregnant or to have an uncomplicated delivery. Rarely, HPV can be passed from an infected mother to her infant during delivery.

If a patient and his or her partner both have HPV, it may not be feasible to determine where the infection originated, and it should be noted that infection does not necessarily mean that one or both partners are having a sexual relationship outside the existing one.

Condoms, if used correctly, can also lower the risk of HPV infection and its related conditions, but it should be noted that HPV can infect other areas that a condom would not cover. Abstinence from sexual activity is the most reliable way to avoid HPV infection; limiting the number of sex partners can reduce risk, but even persons with only one partner can be infected.

DIAGNOSIS OF URETHRITIS

When diagnosing what is suspected to be urethritis, physicians should assess the patient for urethral inflammation. If point-of-care diagnostic tests such as Gram stain are unavailable, NAAT should be performed, and the patient should receive medications that treat gonorrhea and chlamydia. Urethritis can be diagnosed based on the presence of mucoid, mucopurulent, or purulent discharge; at least two white blood cells per oil immersion field on Gram stain or methylene blue/gentian violet stain of urethral secretions; or positive findings on a leukocyte esterase test of first-void urine or first-void urine with at least 10 white blood cells per high-power field on microscopic examination of sediment from a spun first-void urine sample.

Men who are determined to have urethritis based on Gram or methylene blue/gentian violet stain (suspected gonococcal negative) and those who have at least one criterion for urethritis, should be tested for chlamydia or gonorrhea with NAAT and treated as nongonococcal urethritis. Those who meet urethritis criteria without the use of Gram or methylene blue/gentian violet stain, should be tested with NAAT and treated for both gonorrhea and chlamydia. If a patient has symptoms, but no inflammation, testing with NAAT for chlamydia and gonorrhea might help to determine if these infections are present.

Nongonococcal urethritis can have many causes, and can be diagnosed in men who present with symptoms and stains of urethral secretions that suggest inflammation without gram-negative or purple diplococci. If nongonococcal urethritis is confirmed, testing for chlamydia and gonorrhea should be performed, with NAATs preferred. Testing for *Trichomonas vaginalis* should be considered in locations with a high prevalence of the infection.

NAATS FOR TRICHOMONIASIS

NAATs are highly sensitive and are preferred for diagnosing *T. vaginalis*. In women, NAATs can be performed on vaginal, endocervical, and urine specimens and can typically identify three to five times more infections compared with wet-mount microscopy.

ALTERNATIVE TREATMENTS FOR GONORRHEA

The recommended treatment for uncomplicated *N. gonorrhoeae* infection is a single 250-mg dose of intramuscular ceftriaxone plus a single 1-g dose of oral azithromycin (Zithromax). Several regimens of injectable cephalosporins are considered safe and effective to treat uncomplicated urogenital and anorectal gonococcal infections. These include a single 500-mg dose of intramuscular ceftizoxime (Cefizox); a single 2-g dose of intramuscular cefoxitin combined with 1 g of oral probenecid; and a single 500-mg dose of intramuscular cefotaxime (Claforan). None of these have a specific advantage over ceftriaxone, and coverage against pharyngeal infections is not fully known.

Only if ceftriaxone is unavailable, a single 400-mg dose of oral cefixime combined with a single 1-g dose of oral azithromycin can be considered as an alternative treatment option. ▶

ALTERNATIVE TREATMENTS FOR GENITAL HERPES

Antiviral chemotherapy is beneficial in most persons with symptoms of genital herpes and is the main treatment used. Signs and symptoms of first and recurrent episodes of genital herpes can be somewhat controlled with systemic antiviral medications; these medications are also beneficial when used as daily suppressive therapy. Acyclovir, valacyclovir (Valtrex), and famciclovir (Famvir) have been shown to provide benefit; however, it should be noted that, after discontinuation, they do not eliminate latent virus or have an effect on the risk, frequency, or severity of recurrent infection. Topical therapy is generally discouraged.

If treatment with antivirals fails in persons with HSV, they should be managed with guidance from an infectious disease expert and receive an alternative treatment; 40 to 80 mg per kg of intravenous foscarnet every eight hours until clinical resolution is typically beneficial for genital herpes with resistance to acyclovir. Also, 5 mg per kg of intravenous cidofovir (Vistide) once weekly may be an option. Topical imiquimod (Aldara) and cidofovir 1% are also options, although cidofovir must be compounded at a pharmacy.

M. GENITALIUM IN URETHRITIS AND CERVICITIS

M. genitalium is one cause of male urethritis, and can also be found in the vagina, cervix, and endometrium. Infections in women typically cause no symptoms. In persons with persistent or recurrent urethritis or cervicitis, *M. genitalium* may be suspected. Antibiotics aimed at cell-wall biosynthesis (e.g., penicillins, cephalosporins) are not effective.

The seven-day doxycycline treatment recommended for urethritis is generally not effective for *M. genitalium* infection (median cure rate of 31%); the single 1-g dose of azithromycin is more effective and is preferred over doxycycline. It should be noted, however, that azithromycin resistance is quickly developing, with the latest study indicating a median cure rate of 40% (down from 85%). Longer treatment with azithromycin (500 mg initially, then 250 mg per day for four days) may be slightly better than the single-dose regimen; however, those persons in whom the single dose is not effective are not likely to experience benefits from the longer course.

Moxifloxacin (Avelox), in a dosage of 400 mg per day for seven, 10, or 14 days, has been effective for *M. genitalium* infection in patients in whom treatment failed previously. It should be noted, however, that moxifloxacin has been used for treatment in only a couple of cases and it has not been evaluated in clinical trials. Although moxifloxacin has been considered generally effective, treatment failures have been reported after the seven-day regimen in Japanese, Australian, and U.S. studies.

PERSONS WHO ARE TRANSGENDERED

Physicians should know about each patient's anatomy and sexual behaviors before providing STD and HIV prevention counseling. Because the surgical affirming procedures, hormone use, and sexual behaviors vary in persons who are transgendered, physicians should know the symptoms of common STDs and should perform STD screening in asymptomatic persons based on history of behavior and sexual practices (e.g., women may retain a functional penis, men may have a vagina and cervix).

RETESTING

Retesting for chlamydia, gonorrhea, and trichomoniasis should be performed a few months after diagnosis; this assists with identifying repeat infection. Men and women who have chlamydia or gonorrhea, and women who test positive for trichomoniasis should be rescreened three months after being treated. Persons with syphilis should have follow-up testing based on current recommendations.

Guideline source: Centers for Disease Control and Prevention

Evidence rating system used? No

Literature search described? Yes

Guideline developed by participants without relevant financial ties to industry? No

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Available at: http://www.cdc.gov/std/tg2015/tg-2015-print.pdf

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Adolescent IV: STI Quiz:

1. **Match the following 2015 CDC screening recommendations with the correct STD:**

1. C. trachomatis – **A**
2. N. gonorrhoeae – **A**
3. HIV - **D**
4. Syphilis – **B/E**
5. Trichomoniasis/BV – **B/E**
6. Cervical cancer - **C**
7. HSV-- **F**

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. Screening for all who seek treatment for other STIs, as well as all individuals 13-64 years old (opt-out)
E. Young men who have sex with men and pregnant adolescent females require more thorough evaluation
F. Consider type-specific serologic testing in patients with other STIs

** The CDC 2015 guidelines were amended due to declining sensitivity of N. gonorrhea. **Oral cephalosporins, and any penicillins, tetracyclines, and older macrolides are no longer recommended as first-line therapy.** Gentamicin and gemifloxacin with **2** grams mycin are options for cephalosporin allergic patients.

2. **The treatment for uncomplicated GC infections is:**
   A. ceftriaxone 250 mg IM and azithromycin 1 gm PO
   B. cefixime 400 mg PO and azithromycin 1 gm PO
   C. gentamicin 240 mg IM and azithromycin 2 gm PO
   D. gemifloxacin 320 mg PO and azithromycin 2 mg PO
   E. **all of the above**

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

4. What additional screening does the 2015 CDC Guidelines on Treatment of STDs recommend for patients with HIV?
Serologic screening for **Hepatitis C Virus** on initial assessment, periodically thereafter, and at least annually in persons at high risk of HCV infection

5. TRUE or (FALSE)? The 2015 CDC Guidelines recommend topical therapy for genital herpes.

Topical therapy with antiviral drugs offers minimal clinical benefit and is discouraged. In contrast, systemic antiviral drugs can partially control the signs and symptoms of genital herpes when used to treat first clinical and recurrent episodes or when used as daily suppressive therapy. Randomized trials have shown that **acyclovir, valacyclovir** (enhanced PO absorption), and **famciclovir** provide clinical benefit for genital herpes. However, these drugs neither eradicate latent virus nor affect the risk, frequency, or severity of recurrences after the drug is discontinued.

Adolescent IV: STI 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?***
* Counsel patient on **safe sex practices** (see Adolescent I Module for contraception options) and risk of STDs and pregnancy with unprotected sex. ***Faculty—****Consider role-play with residents demonstrating how to deliver this sensitive counseling.*

* Consider the following **tests**: beta hCG, NAAT GC/Chlamydia, RPR (rapid plasma reagin) and TPHA (treponema pallidum hemagluttination) for syphilis, Hepatitis B serologies, HIV. For WR-B orders are "RPR-reflex" and "HIV 0/1/2". **Consent is not needed** but patients should be given the opportunity to assent and opt out.

1. Partners
   - "Do you have sex with men, women, or both?"
   - "In the past 2 months, how many partners have you had sex with?"
   - "In the past 12 months, how many partners have you had sex with?"
   - "Is it possible that any of your sex partners in the past 12 months had sex with someone else while they were still in a sexual relationship with you?"
2. Practices
   - "To understand your risks for STDs, I need to understand the kind of sex you have had recently."
   - "Have you had vaginal sex, meaning 'penis in vagina sex'?" If yes, "Do you use condoms: never, sometimes, or always?"
   - "Have you had anal sex, meaning 'penis in rectum/anus sex'?" If yes, "Do you use condoms: never, sometimes, or always?"
   - "Have you had oral sex, meaning 'mouth on penis/vagina'?"
   - For condom answers:
   - If "never": "Why don't you use condoms?"
   - If "sometimes": "In what situations (or with whom) do you use condoms?"
3. Prevention of pregnancy
   - "What are you doing to prevent pregnancy?"
4. Protection from STDs
   - "What do you do to protect yourself from STDs and HIV?"
5. Past history of STDs
   - "Have you ever had an STD?"
   - "Have any of your partners had an STD?"

Additional questions to identify HIV and viral hepatitis risk include:
   - "Have you or any of your partners ever injected drugs?"
   - "Have your or any of your partners exchanged money or drugs for sex?"
   - "Is there anything else about your sexual practices that I need to know about?"

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?**
When asking about sexual practices, stay **gender neutral:** "are you in a relationship with anybody?" Then, get more specific: "do you like men, women, or both?" For younger adolescents it may be more appropriate to ask about "girls or boys" and give the option of "still thinking about it". The 2015 CDC Guidelines note that sexual identity and practices of WSW are diverse; most (53-97%) report having had sex with men. In general, the guidelines recommend the "**5 P Approach".** (*See Inset)*

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?**
- **Vaginitis**: *T. vaginalis*, bacterial vaginosis (BV), candidal vulvovaginitis (see Table 2)

- **Cervicitis**: *C. trachomatis*, *N. gonorrhoaeae*

- **Urethritis** (typically assoc with cervicitis): gonococcal or NGU (see Table 8)

- 2015 CDC Guidelines note that *M.genitalium* is more commonly a cause of male urethritis, but can also be a cause of cervicitis, if persistent.

Now what? This patient requires further examination (sexually active + vaginal discharge). A **modified pelvic exam** may involve visualization of the external genitalia and sampling of discharge for microscopy. If she has s/s of PID, a **bimanual exam** to assess for CMT is indicated. You may not need to do an internal exam if she has no constitutional symptoms, symptoms referable to the upper tract, and no abdominal tenderness to palpation.

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?**
- Speculum, light, Gen-Probe NAAT, test tube, saline, and lubricant.
- You can find these in the Adolescent Exam Rms. *Ask Adolescent Staff for assistance!*

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?
* **Mucopurulent cervicitis (MPC):** may present with c/o vaginal discharge, vaginal itching, irregular vaginal bleeding, dyspareunia, foul odor. The presence of mucopurulent discharge from the endocervix is diagnostic.

* Can be caused by ***N. gonorrhoaeae***, ***C. trachomatis***, ***T. vaginalis***, and **HSV**; although in most cases no organism is identified.

* An **NAAT** (nucleic acid amplification test) is the gold standard for diagnosing gonorrhea or chlamydia infection as causes of MPC. Diagnostic tests to evaluate for **STI co-infection** should also be performed (e.g. cause of vaginitis—see Table 2, syphilis, and HIV Ab).

* See Table 1 & 2015 CDC Guidelines for treatment recommendations: **azithromycin 1 gm PO** *AND* **ceftriaxone 250 mg IM**.

How will you follow-up? . . . Are there any other treatment considerations?
* According to the 2015 Treatment Guidelines, since Chlamydia or gonorrhea re-infection rates are high, infected females and males should be **retested approximately 3mo after treatment**.

* Expedited Partner Therapy (EPT): All partners from the past 60 days — male and female! — should be evaluated and treated for the suspected or identified STD. However, **there is no EPT in the military.** Encourage non-military dependent partners to seek medical care.

* Many STI's (including Chlamydia and Gonorrhea) are reportable diseases. At WR-B there are no additional reporting steps, but at other institutions you may need to file a report with the state, or report to the department who handles this (e.g., epidemiology, preventive health).

You are about to send Miranda off to follow the giant red arrows to the pediatric pharmacist when you remember the 2015-16 Green Team PI Project. You decide to quickly check the Immunizations Module and see that, while Miranda received her Tdap and Menactra on time at age 11, she has only had 1 Gardasil-4 vaccine. **What will you recommend?**

ACIP (Advisory Committee on Immunization Practices) recommends that all three shots of the HPV vaccine series be given over six months; the 2nd shot should be given 1-2mo after the 1st, and the 3rd dose should be given 6mo after the 1st dose. **However, if someone waits longer than that between shots, they do not need to restart the series.** Would also recommend completing the series with the **9-valent vaccine**, which protects against HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58—strains responsible for 80% of cervical cancers and 90% genital warts.

Adolescent IV: STI 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*

Urethritis can have infectious and noninfectious causes. Symptoms include mucopurulent or purulent discharge, dysuria, and urethral pruritus. Several organisms, including *Neisseria gonorrhoeae* and *Chlamydia trachomatis*, cause urethritis. *Ureaplasma urealyticum*, *Mycoplasma genitalium*, *Gardnerella vaginalis*, HSV, adenovirus, and *T. vaginalis* are implicated in nonchlamydial, nongonococcal urethritis (NGU), but they are more difficult to detect.

The constellation of conjunctivitis, urethritis, and arthritis reported for the young man in the vignette represents the classic symptoms of a form of reactive arthritis once called Reiter syndrome. The term reactive arthritis refers to rheumatic disorders that appear after an infection, but in which the responsible pathogen is not detected in the affected joint. *C trachomatis* is the only genital pathogen commonly accepted to be a cause of reactive arthritis.

N gonorrhoeae can cause septic arthritis or disseminated gonococcal infection (ie, a rash and tenosynovitis) but does not produce reactive arthritis. Although *T vaginalis* and *G vaginalis* may cause urethritis, they do not produce the other symptoms exhibited by the boy described in the vignette. Syphilis, caused by infection with *Treponema pallidum*, may affect bones congenitally (osteochondritis) or in late stages of the disease (with gummas, granulomatous lesions that involve bones as well as soft tissue or viscera) but does not produce urethral discharge or conjunctivitis.

Reactive arthritis caused by *C trachomatis* is treated with a single 1-g oral dose of azithromycin or with 100 mg doxycycline orally twice a day for 7 days, after testing for both *N gonorrhoeae* and *C trachomatis* is completed. This is also the recommended regimen for all NGUs. First-line treatment of uncomplicated gonococcal urethritis is accomplished with ceftriaxone 125 mg intramuscularly or cefixime 400 mg orally, both in a single dose.

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

Pelvic inflammatory disease (PID) is difficult to diagnose because of the spectrum of symptoms and signs. Many women have mild or nonspecific symptoms or signs. Laparoscopic examination is the most precise method to make the diagnosis but is invasive and not indicated for most patients. In a woman complaining of lower abdominal pain, the

minimum criterion to make the diagnosis on pelvic examination is cervical motion tenderness, uterine tenderness, or adnexal tenderness. The girl described in the vignette meets the criterion for PID. Additional criteria used to support the diagnosis include an oral temperature greater than 38.4°C, mucopurulent cervical discharge, presence of numerous white blood cells on saline microscopy of vaginal secretions, an elevated erythrocyte sedimentation rate, elevated C-reactive protein value, and laboratory documentation of cervical infection with *N. gonorrhoeae* or *C. trachomatis*.

To reduce damage to the reproductive tract, empiric treatment for PID should be initiated in sexually active young women at risk for sexually transmitted infections if they are experiencing pelvic or lower abdominal pain, no cause of the illness other than PID can be identified, and they have the minimum criteria outlined previously.

The identification of *N gonorrhoeae* or *C trachomatis* from a cervical specimen would support the diagnosis of PID in the girl described in the vignette. Newer tests, employing nucleic acid amplification of DNA or RNA from these organisms, are more sensitive than cultures and are specific. In addition to cervical swab specimens, these tests can be performed on urine and vaginal swab specimens. Transcription-mediated amplification also can be used to test self-obtained vaginal swabs for *C trachomatis* and *N gonorrhoeae*.

Findings on complete blood count and erythrocyte sedimentation rate are nonspecific. Pelvic ultrasonography generally is performed if the diagnosis of PID is in question or a complication is suspected. Ultrasonography may yield normal findings, particularly early in the disease process, or reveal thickened or fluid-filled fallopian tubes, with or without free fluid in the pouch of Douglas. Pelvic ultrasonography also can identify a tubo-ovarian complex, suggesting pelvic infection. Gram stain of cervical discharge to detect gonococcal infection provides nonspecific information because gram-negative diplococci may represent *N vaginalis*, part of the normal flora. Urine and blood cultures are only helpful to rule out other diagnoses.

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

Pelvic inflammatory disease (PID) treatment regimens must provide broad-spectrum coverage of likely pathogens, including *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. Oral therapy can be used for women who have mild-to-moderately severe acute PID; the Centers for Disease Control and Prevention (CDC) report that clinical outcomes of women treated with oral therapy are similar to those seen in women treated with parenteral therapy. The young woman described in the vignette was treated appropriately as an outpatient, but subsequently was unable to tolerate an outpatient regimen and did not appear to respond clinically to an oral regimen (eg, doxycycline and azithromycin). In addition, a single dose of benzathine penicillin is not adequate therapy for PID.

These are two of the criteria suggested by the CDC that indicate the need for hospitalization of women who have PID. Other criteria for hospitalization include when surgical emergencies (such as appendicitis) cannot be excluded; the patient is pregnant; the patient has a severe illness, nausea and vomiting, or high fever; and the patient has a tuboovarian abscess. Although many practitioners may prefer to hospitalize adolescents who have PID, no available evidence exists to support this strategy. Younger women who have mild-tomoderate acute PID have similar outcomes in response to outpatient or inpatient therapy, and clinical response to outpatient treatment is similar for older and younger women. The CDC states that the decision to hospitalize adolescents who have acute PID should be based on

the same criteria, as stated above, used for older women. Because the patient has no signs or symptoms of herpes simplex virus infection, oral acyclovir with hospitalization is not indicated.

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*

Candidal vulvovaginitis is a common problem for young women and usually is caused by *Candida albicans*, although other candidal species also may be involved. Typical symptoms of vulvovaginal candidiasis include a thick, white, creamy vaginal discharge; pruritus; vaginal discomfort; dyspareunia; and external dysuria. The diagnosis is suggested clinically by the previously noted symptoms and the presence of vulvar swelling, erythema, and fissures or erosions, as described for the girl in the vignette. The diagnosis may be confirmed by a wet preparation or Gram stain showing pseudohyphae or yeasts or by culture.

Chlamydia trachomatis and *Neisseria gonorrhoeae*, both of which may present with abnormal vaginal discharge, produce cervical, not vaginal infections. *C trachomatis* and *N gonorrhoeae* infections can be asymptomatic, but they often present with a yellowish purulent or mucopurulent endocervical discharge, friability of the endocervix, and cervical motion tenderness; vulvar inflammation does not occur. Group A *Streptococcus* (S pyogenes) is a respiratory pathogen that can cause vaginitis in prepubertal girls, but rarely causes vaginal discharge in the adolescent. Infection with *Trichomonas vaginalis* usually causes a diffuse, malodorous, yellow-green vaginal discharge with vulvar irritation, although some affected women can have minimal or no symptoms.

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

The patient described in the vignette has bacterial vaginosis, based on the presence of three of the four Amstel diagnostic criteria. The four criteria are: a thin, homogenous, gray-white discharge uniformly adherent to the vaginal walls; a vaginal pH greater than 4.5; a positive whiff test (fishy or amine odor on addition of 10% potassium hydroxide); and more than 20% clue cells on microscopic examination. Clue cells are epithelial cells that are coated

with bacteria, creating a granular appearance. The presence of three or more of the criteria indicates the presence of bacterial vaginosis.

Bacterial vaginosis is not sexually transmitted, although it is associated with sexual activity. Because it is not inflammatory, no white blood cells are seen on microscopy. It is caused by overgrowth of several anaerobic bacterial species (eg, *Mobiluncus* and *Gardnerella vaginalis*) and a decrease in hydrogen peroxide-producing *Lactobacillus*. Although often asymptomatic, affected patients may complain of a malodorous discharge. Douching may increase the risk of bacterial vaginosis by causing changes in the vaginal flora and disturbing the vaginal protective systems, which are based on hydrogen peroxide-producing lactobacilli. Such disruption of the vaginal microbiology permits overgrowth of the anaerobic and aerobic bacteria responsible for bacterial vaginosis. Because bacterial vaginosis has been linked to the acquisition of human immunodeficiency virus, preterm delivery, pelvic inflammatory disease, and other adverse effects, douching could play an important role in multiple health problems among sexually active women.

When examining a patient who complains of a vaginal discharge, it is important to view the cervix. Purulent discharge at the cervical os and easy bleeding of the cervix when swabbed (friability) suggests cervicitis rather than vaginitis. Cervicitis is caused by *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and herpes simplex virus. Vaginal candidiasis usually presents as a pruritic, thick, white or milky discharge. Physiologic discharge, (leucorrhea) is asymptomatic and associated with normal findings on microscopy. Contact of the vaginal mucosa with certain chemicals (eg, soaps or bubble baths) may result in complaints of vaginal burning or swelling. These symptoms also may be related to an allergic reaction (eg, to latex) or to irritation as with tight clothing.