A Quick Reference Guide for Clinicians®

Hot Topics in Sexually Transmitted Infections and Associated Conditions

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Introduction

Despite decades of available prevention methods and treatment for most sexually transmitted infections (STIs), these infections continue to affect large numbers of youth and adults. More than 400 million cases of treatable STIs occur worldwide every year. In the United States, there are about 20 million new infections each year, with a total prevalence of about 110 million, estimated from 2008 data. These infections cost the US health care system almost $16 billion each year in direct medical costs. In addition to financial costs, STIs exact an enormous personal toll on quality of life, sexual health, and reproductive health—and increase the risk of infection with human immunodeficiency virus (HIV).

Significant racial and ethnic disparities persist in STI rates in the United States. For example, almost half of Black adolescents had one or more STIs, compared with only one in five White or Mexican American adolescents, even when adjusted for income level and the number of sexual partners, and the rates of chlamydial infection, gonorrhea, and syphilis are several fold higher in Blacks than in Whites or Asian Americans.

Many STIs remain undiagnosed and therefore untreated. In some cases, the gap exists because the STI is asymptomatic, as is often the case with chlamydial infection in women. In other cases, it is because providers have not considered the possibility of STI or are unaware of the guidelines for screening of asymptomatic individuals. Other STIs, such as genital infection with human papillomavirus (HPV) and herpes simplex virus (HSV), are incurable, although symptoms can be controlled and serious outcomes prevented. Untreated STIs can result in chronic pelvic pain, infertility, pregnancy complications, cancer, and death. It is estimated that untreated STIs are responsible for infertility in more than 24,000 women each year.

This Quick Reference Guide provides a focused, clinically oriented resource for managing the aspects of STIs that practicing clinicians often find difficult or perplexing. It provides essential practical information, or “clinical pearls,” about screening, diagnosis, and treatment of the most common STIs: chlamydial infections, gonorrhea, genital herpes, HIV infection, genital HPV infections, syphilis, and trichomoniasis. The Guide also discusses bacterial vaginosis (BV), a common sexually associated condition. This Guide is not meant to be a comprehensive resource for STI treatment and management. Its guidance is based largely on recommendations of the Centers for Disease Control and Prevention’s (CDC’s) Sexually Transmitted Diseases Treatment Guidelines.

Abbreviations and acronyms used in this Guide:

- ASC-US: atypical squamous cells of undetermined significance
- BCA: bichloroacetic acid
- BV: bacterial vaginosis
- CDC: Centers for Disease Control and Prevention
- CIN: cervical intraepithelial neoplasia
- CT: Chlamydia trachomatis
- ELISA: enzyme-linked immunosorbent assay
- EPT: expedited partner therapy
- GC: Neisseria gonorrhoeae or gonococcus
- HIV: human immunodeficiency virus

The term sexually transmitted infection is used; in this Guide it is synonymous with sexually transmitted disease, with no intended significant difference in meaning.
• HPV: human papillomavirus
• HSV: herpes simplex virus
• HSV-1: herpes simplex virus type 1
• HSV-2: herpes simplex virus type 2
• LSIL: low-grade squamous intraepithelial lesion
• MSM: men who have sex with men
• NAAT: nucleic acid amplification test
• PID: pelvic inflammatory disease
• POCT: point-of-care test
• STI: sexually transmitted infection
• USPSTF: United States Prevention Services Task Force

Counseling Patients about Sexually Transmitted Infections

• The National Network of STD/HIV Prevention Training Centers recommends these steps for providing patient-centered counseling on STIs:7
  • Speak with, rather than to, the patient.
  • Ask questions that focus on issues that the patient identifies, accept the patient’s ideas about changing his or her behavior, and acknowledge the patient’s feelings as important.
  • Maintain a nonjudgmental attitude.
  • Use open-ended questions (e.g., “What are your concerns about condom use?” rather than “Are you concerned about asking your partner to use condoms?”).
  • Support positive risk-reduction behaviors the patient has taken.
  • Assist the patient in identifying barriers to risk reduction.
  • Set a realistic risk-reduction plan, with steps that are acceptable to the patient, explicit, and achievable.
  • Offer options, not directives.
• Other steps include the following:
  • Provide key counseling messages about specific STIs as relevant, and provide basic information about STIs. (For downloadable fact sheets about specific STIs in English and Spanish, see www.cdc.gov/std/healthcomm/fact_sheets.htm.)
  • Focus on the positive aspects of sexual health, and share counseling messages that normalize sexual health.
  • Encourage the evaluation of sex partners, and arrange for therapy of partners with treatable STIs.
  • Do not make assumptions about a patient’s sexual orientation.
Counseling tips for the adolescent patient include the following:

- Become familiar with slang terms that adolescents use to talk about sex.
- Dispel common myths, such as “only vaginal sex spreads STIs” and “the pill protects against STIs.”
- Address STIs and their importance to sexual health during annual well-adolescent exams, sports physicals, and evaluations for amenorrhea or dysmenorrhea, and include evaluation for possible STIs.
- Consider talking about sexual health in general with the adolescent with his or her parent present, but then meet with the adolescent alone to discuss sexual habits, activity, and preferences.

Management of Sex Partners

- The goals of partner management in STI clinical services include the following:
  - Increasing the number of individuals with STIs who access treatment
  - Preventing re-infection of the index patient
  - Interrupting transmission networks

- Partner notification is a central but often neglected aspect of STI management and is carried out either by the care providers of the index patient or public health authorities. It includes identification of sex partners of the index patient and arranging for their evaluation and treatment.

- Traditionally, partner management for treatable STIs has involved treatment of the index patient’s partner(s) in a clinical setting.

- Clinicians should encourage individuals with treatable STIs to notify their sex partners and urge them to seek treatment. Clinicians can also request that patients bring their partners when they return for treatment or follow-up.

- Expedited partner therapy (EPT) is the treatment of the sex partners of index patients with STIs outside of the clinical setting, that is, without medical evaluation or prevention counseling. When partner referral is not likely to be successful, EPT may be helpful. EPT is meant to supplement other partner management strategies, such as provider-assisted referral, which may be limited by available resources. EPT should be considered a routine practice when it is the best option to ensure partner treatment for gonorrhea or chlamydial infection and where legally permissible.

  - EPT is used most commonly for partners of patients diagnosed with Chlamydia trachomatis (CT) or Neisseria gonorrhoeae (GC) and may also be considered for the partners of patients with trichomoniasis.
  - EPT is legally permitted in most states but still prohibited by law in some. To check on the legal status by state, see www.cdc.gov/std/ept/legal.
  - EPT should be accompanied by instructions and warnings about the medication (including allergy or pregnancy), general health counseling, and the advice that partners seek medical evaluation themselves, especially in the presence of STI symptoms.
  - Generally EPT should not be used for men who have sex with men (MSM), because of the high risk for coexisting STIs, including undiagnosed HIV infection.
<table>
<thead>
<tr>
<th>STI or Associated Condition</th>
<th>Recommended Partner Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>BV</td>
<td>Treatment of sex partners is not recommended.</td>
</tr>
<tr>
<td>Heterosexual men or women with CT or GC</td>
<td>All sex partners within preceding 60 days should be evaluated and treated. EPT should be considered, where allowable by law, if the sex partner is unlikely to present for treatment.</td>
</tr>
<tr>
<td>Genital herpes</td>
<td>Providers should ask symptomatic sex partners about previous history of genital lesions and should offer type-specific HSV serologic testing.</td>
</tr>
<tr>
<td>HIV</td>
<td>Partners not previously diagnosed with HIV should be tested and counseled; selected partners may be candidates for post-exposure prophylaxis (PEP) with antiretroviral drugs (see CDC guidelines at <a href="http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm">www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm</a>).</td>
</tr>
<tr>
<td>HPV</td>
<td>Patients should be encouraged to inform partners, and counseling about communication with sex partners may be helpful in the adoption of prevention strategies; clinical evaluation is optional for asymptomatic partners.</td>
</tr>
<tr>
<td>Syphilis</td>
<td>Patients should receive a clinical exam and serologic testing; partners of patients with syphilis less than a year in duration should be treated without awaiting diagnostic test results (for specific regimens, see CDC guidelines at <a href="http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm">www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm</a>).</td>
</tr>
<tr>
<td>Trichomoniasis</td>
<td>Male partners of infected women should be treated; EPT may be considered where legally permissible.</td>
</tr>
<tr>
<td>Cervicitis</td>
<td>Partners should receive treatment for the same STI(s) as the index patient.</td>
</tr>
<tr>
<td>Women with pelvic inflammatory disease (PID)</td>
<td>Sex partners should be treated with regimens that are effective against both CT and GC, regardless of the etiology of PID.</td>
</tr>
</tbody>
</table>
Bacterial Vaginosis

- Key facts about the condition
  - It is not clear whether BV is sexually acquired, but the condition is associated with STI risk factors and with elevated risk for other STIs.⁹
  - BV involves loss of indigenous *Lactobacillus* species with overgrowth of anaerobes.
  - BV is the most common cause of abnormal vaginal discharge or odor.¹⁰
  - BV is linked to premature rupture of membranes, preterm labor, preterm birth, and complications after gynecologic surgery.⁹,¹¹,¹²

- Typical symptoms
  - Vaginal malodor, often more prominent following vaginal intercourse
  - Increased vaginal discharge, typically thin, white or gray, usually without itching or irritation

- Screening and diagnosis
  - Screening for BV is not recommended in asymptomatic women, even in pregnancy.
  - In symptomatic women, BV can be diagnosed clinically by the presence of at least three of the following:⁹
    - Homogeneous, thin, white discharge that smoothly coats the vaginal walls
    - Clue cells on microscopic examination of vaginal fluid
    - Positive “whiff” or amine test (characteristic fishy odor after the addition of 10 percent potassium hydroxide)
    - pH > 4.5
  - In lieu of wet mount microscopy, Gram stained vaginal fluid can be examined microscopically by experienced and trained clinicians to identify clue cells and evaluate vaginal bacteria.

- Treatment and management
  - See the following recommended regimens.

<table>
<thead>
<tr>
<th>Table 2: Recommended Regimens for the Treatment of Bacterial Vaginosis⁹</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medication</strong></td>
</tr>
<tr>
<td>Metronidazole tablets</td>
</tr>
<tr>
<td>Metronidazole gel 0.75%</td>
</tr>
<tr>
<td>Clindamycin cream 2%</td>
</tr>
</tbody>
</table>
• Patients should be advised to avoid the consumption of alcohol while taking metronidazole and for 24 hours after completing treatment.

• Clindamycin cream is oil based and might weaken latex condoms and diaphragms for 5 days after use (refer to clindamycin product labeling for additional information).

• Treatment of asymptomatic sex partners has not been demonstrated to prevent recurrent BV and is not recommended.

**Chlamydia**

• Key facts about infection
  
  • Genital infections caused by CT are the most frequently reported infectious disease in the United States, with 1.4 million cases reported in 2011.\(^{13}\)
  
  • Chlamydial infection can cause urethritis and cervicitis but is often asymptomatic in both men and women.
  
  • Genital chlamydial infections are associated with several adverse consequences, including PID, ectopic pregnancy, infertility, and chronic pelvic pain.\(^{9}\)
  
  • Co-infection with gonorrhea is common\(^{14,15}\)

• Screening and diagnosis
  
  • Routine laboratory screening is recommended in asymptomatic sexually active women who have the following risk factors:
    
    • Age ≤ 25 years
    
    • Age ≥ 26 years with
      
      • New sex partner
      
      • Multiple sex partners
      
      • Inconsistent use of condoms (unless in monogamous relationship)
      
      • New diagnosis of other STI

<table>
<thead>
<tr>
<th>Table 3: Testing Options for Chlamydia(^{9,16})</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nucleic Acid Amplification Test (NAAT)</strong></td>
</tr>
<tr>
<td>Test method of choice—higher sensitivity than culture</td>
</tr>
<tr>
<td>Allows the widest variety of testing sites, but specific test kits vary in the specimen types for which they are FDA cleared</td>
</tr>
</tbody>
</table>

• Anatomical sites for testing
  
  • In women
    
    • Vaginal swab is the preferred site for NAAT screening and may be collected by either clinician or patient; vaginal swab detects more infections than endocervical swab, which is no longer recommended for routine screening or diagnostic testing.
• A urine specimen ("first catch" rather than midstream "clean catch") is acceptable when logistical considerations preclude vaginal swab (e.g., screening in nonclinical settings).

• Rectal swab is recommended if anal sexual exposure has occurred.

• CT testing of the pharynx is generally not recommended, even in women who perform oral sex, but is usually bundled with GC testing by NAAT.

• In men
  
  • Either a first-catch urine specimen or a urethral swab can be used for screening and diagnostic testing.

  • Specimens from the rectum should be tested if sexual exposure has occurred.

  • Pharyngeal CT testing is not recommended, but bundled testing may accompany GC testing by NAAT.

• NAATs are not FDA cleared for nongenital sites such as the pharynx, although some laboratories have created performance specifications that allow NAATs to be used for these sites. Clinicians should check product inserts or check with their laboratories for specific information.

• Laboratories may require different types of swabs for different collection sites (e.g., vaginal, male urethral, pharyngeal) for NAATs. Clinicians should ensure use of the correct collection kits.

• Treatment and management

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose and Duration</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azithromycin</td>
<td>1 g orally, single dose</td>
<td>The usual treatment of choice</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>100 mg orally twice daily for 7 days</td>
<td>For patients who do not tolerate azithromycin or who are likely to comply with 7 days’ treatment; contraindicated in pregnancy</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>500 mg orally once daily for 7 days</td>
<td>When neither azithromycin nor doxycycline can be used; contraindicated in pregnancy</td>
</tr>
</tbody>
</table>

*For alternative regimens or for treatment of children or individuals with complicated infection, coexisting HIV infection, or infection at nongenital sites, see CDC treatment guidelines.

• Treatment is recommended for all opposite-sex partners within the preceding 60 days. EPT is a routine option when the partner may not seek clinical treatment and where allowed by local/state regulations.

• Clinicians should report cases of confirmed chlamydia to the local or state health department as required by law.
Gonorrhea

- Key facts about infection
  - Gonorrhea, or gonococcal infection, is the second most common reportable infection in the United States, with 321,849 cases reported in 2011, although the actual number of cases is estimated to approximate 600,000.9,13
  - Almost all men with urethral gonorrhea (> 95 percent) are symptomatic, typically with prominent urethral discharge and often dysuria. However, infection is disproportionately transmitted by the minority who are without symptoms, who ignore symptoms, or whose symptoms begin after transmission.9
  - In contrast, women may develop urethritis or cervicitis but often are asymptomatic until PID or other complications have developed.9
  - Chlamydial co-infection is present in 20 to 40 percent of patients with GC.14,15
  - Drug resistance in N. gonorrhoeae is a growing problem.16

- Screening and diagnosis
  - No official criteria for GC screening have been proposed.
  - CDC does not recommend widespread screening of asymptomatic women; however, targeted screening of women ages ≤ 25 years with risk factors is suggested.
  - Risk factors for GC recognized by the United States Prevention Services Task Force (USPSTF) include the following:17
    - History of GC infection
    - Other STIs
    - New sex partner
    - Multiple sex partners
    - Inconsistent condom use
    - Transactional sex

- Testing options

<table>
<thead>
<tr>
<th>Table 5: Testing Options for Gonorrhea9,16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NAAT</strong></td>
</tr>
<tr>
<td>Higher sensitivity than culture—the usual test of choice</td>
</tr>
<tr>
<td>Allows the widest variety of testing sites, but specific test kits vary in the specimen types for which they are FDA cleared</td>
</tr>
</tbody>
</table>
• Anatomical sites for testing
  • In women
    • Vaginal swab is the preferred site for NAAT screening and may be collected by either clinician or patient.
    • Endocervical swab is an acceptable alternative source for NAAT for either gonorrhea or chlamydia.
    • A urine specimen (first catch rather than midstream clean catch) is acceptable for screening when vaginal or endocervical testing are impractical (e.g., in nonclinical settings).
    • Specimens from the pharynx and rectum should be tested if sexual exposure has occurred.
  • In men
    • Either a first-catch urine specimen or a urethral swab can be used for testing.
    • Specimens from the pharynx and rectum should be tested if sexual exposure has occurred.
  • NAATs are not FDA cleared for nongenital sites such as the pharynx, although some laboratories have created performance specifications that allow NAATs to be used for these sites. Clinicians should check product inserts or check with their laboratories for specific information.
  • Laboratories may require different types of swabs for different collection sites (e.g., vaginal, male urethral, oropharyngeal) for NAATs. Clinicians should ensure use of the correct collection kits.

• Treatment and management

<table>
<thead>
<tr>
<th>Table 6: Recommended Regimens for Treatment of Uncomplicated Genital or Oropharyngeal Gonorrhea Infection in Adults*9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication Dose and Duration Comment</td>
</tr>
<tr>
<td>Ceftriaxone PLUS 250 mg intramuscular, single dose All patients should receive dual therapy with ceftriaxone plus either azithromycin or doxycycline, whether or not CT co-infection is documented or suspected</td>
</tr>
<tr>
<td>Azithromycin 1 g orally, single dose</td>
</tr>
<tr>
<td>Ceftriaxone PLUS 250 mg intramuscular, single dose</td>
</tr>
<tr>
<td>Doxycycline 100 mg orally twice daily for 7 days Contraindicated in pregnancy</td>
</tr>
<tr>
<td>For severe cephalosporin allergy</td>
</tr>
<tr>
<td>Azithromycin 2 g orally, single dose Perform test of cure at 1 week**</td>
</tr>
</tbody>
</table>

*For alternative regimens or for treatment of children or individuals with complicated infection, coexisting HIV infection, or infection at other sites, see CDC treatment guidelines and update.
www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm
www.cdc.gov/mmwr/preview/mmwrhtml/mm6131a3.htm?s_cid=mm6131a3_w

**NAAT may remain positive for up to three weeks despite successful treatment; for earlier test-of-cure, culture is recommended.
• Treatment is recommended for all sex partners within the preceding 60 days. EPT is a routine option when the partner may not seek clinical treatment and where allowed by local/state regulations.

• Clinicians should report cases of confirmed gonorrhea to the local or state health department as required by law.

• Drug-resistant GC
  • Because of increasing resistance of GC, CDC no longer recommends cefixime at any dose as a first-line regimen for treatment of confirmed gonorrhea. However, cefixime plus azithromycin remains the recommended regimen for EPT.16
  • If a clinician suspects treatment failure due to antimicrobial resistance, cultures of relevant clinical specimens with antimicrobial susceptibility testing should be requested.
  • Following apparent treatment failure, most patients will respond to repeat treatment with ceftriaxone plus azithromycin or doxycycline. However, clinicians also should consult an infectious disease specialist, a STD/HIV Prevention Training Center consultant (www.nnptc.org), or CDC (telephone: (404) 639-8659).
  • Report all drug-resistant cases to the local or state health department within 24 hours of diagnosis.
  • Following suspected treatment failure, ensure that all the patient’s sex partners from the preceding 60 days are evaluated (with culture, in addition to NAAT, with antimicrobial sensitivity testing if culture is positive) and treated with ceftriaxone (unless a severe cephalosporin allergy is suspected) plus azithromycin or doxycycline.

Genital Herpes
• Key facts about infection
  • HSV causes mucocutaneous infection, retrograde infection along sensory nerves, latent infection in cranial nerve or dorsal spinal ganglia, and mucocutaneous recurrences.9
  • Herpes simplex virus type 1 (HSV-1)
    • HSV-1 causes mostly orolabial infection with recurrences (“cold sores,” “fever blisters”).
    • Owing to rising frequencies of oral-genital sexual exposures, HSV-1 has grown to account for 50 to 70 percent of initial genital herpes infections in the United States.18
    • The frequency of overt recurrent outbreaks and asymptomatic viral shedding, and therefore the risk of sexual transmission, is substantially lower for HSV-1 than for herpes simplex virus type 2 (HSV-2).19,20,21 Suppressive therapy is less likely to be necessary or helpful in the management of genital herpes due to HSV-1 compared with HSV-2.
- **HSV-2**
  - Infections are almost always in the genital area; oral HSV-2 is relatively uncommon.
  - In the United States, more than 24 million individuals have HSV-2 infection.²
  - The prevalence of HSV-2 infection varies by race/ethnicity. A national survey found an HSV-2 seroprevalence rate for non-Hispanic Blacks that was approximately three times the rate for non-Hispanic Whites and nearly four times that for Mexican Americans.²²
  - Most people with HSV-2 are unaware that they are infected, owing to asymptomatic infection and failure to recognize or understand mild symptoms.⁹
  - Asymptomatic viral shedding, the potential for sexual transmission, and recurrences are more common with HSV-2.²⁰,²¹

- **Timeline for genital herpes infection**

  **Figure 1: Timeline of Primary HSV-2 Infection**¹⁹,²³,²⁴

  - If lesions develop, they appear 2 to 14 days after exposure and last about 3 weeks if antiviral therapy is not used.¹⁹
  - Viral shedding lasts an average of 12 days (but duration varies widely), stopping a few days before lesions heal, if they are present.¹⁹
  - Seroconversion (i.e., the development of measurable HSV antibodies) usually will occur within 2 to 12 weeks after the infection.¹⁹
  - Research suggests that by six weeks, more than 60 percent of patients with new HSV-2 infections will have developed antibodies and by 12 weeks more than 70 percent will have seroconverted.²³,²⁴
  - Although the antibody response is lifelong, it does not protect against local recurrence.¹⁹
  - Most cases of genital herpes are due to transmission from a partner who is asymptomatic at the time of transmission or is unaware he or she is infected.
• The classic presentation of primary infection begins with papules, which transform into vesicles, pustules, and ulcers over the course of 1 to 2 weeks.

• Most individuals do not have the classic presentation but may have pain at the location of lesions and adenopathy.

• Women may have cervicitis or urethritis; pharyngitis can occur with oral infection.

• **Diagnosis**

  • Test all patients with genital ulcers, including those that seem atypical for herpes, unless there is another definitive diagnosis.

  • Because of the important differences between HSV-1 and HSV-2 in clinical course, transmission risk, and management, virus type should be determined in all patients with genital herpes.*

  • Two basic types of tests are available for genital herpes diagnosis:
    • Virologic (direct) tests of mucocutaneous lesions
      • NAAT (usually polymerase chain reaction) to detect HSV DNA: the test of choice, substantially more sensitive than culture; readily distinguishes HSV-1 from HSV-2, often routinely (without specific request); now widely available
      • Viral culture: less sensitive than NAAT (more false negative results), longer turnaround time, may require specific request and higher cost to determine virus type

*Your laboratory may require a specific request to distinguish HSV-1 from HSV-2, sometimes at increased cost.

<table>
<thead>
<tr>
<th>Table 7: Virologic Tests for Genital Herpes</th>
<th>9,25,26</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Viral culture</strong></td>
<td><strong>NAAT</strong></td>
</tr>
<tr>
<td>Reference standard for diagnosis of genital herpes—can be used if NAAT is unavailable</td>
<td>Preferable due to higher sensitivity</td>
</tr>
<tr>
<td>High specificity but poor sensitivity</td>
<td>Sensitivity is 98–100% and specificity is 80–97% (sensitivity and specificity vary depending on the clinical setting, specimen type, and other factors)</td>
</tr>
<tr>
<td>More stringent requirements for specimen management, i.e. transport medium, refrigeration</td>
<td>Polymerase chain reaction–based tests are most commonly used</td>
</tr>
<tr>
<td>Yield is best early in course: requires swab from base of vesicular lesion</td>
<td>Results in 2 hours compared with 1–5 days for culture</td>
</tr>
</tbody>
</table>

• **Serologic tests**

  • Detect the presence of antibodies to HSV and can indicate past exposure

  • Are useful in symptomatic individuals to determine whether lesions represent initial infection or recurrence, to assess past infection with both virus types, and to diagnose in the presence of a false negative culture (e.g., in patients with recurrent genital herpes or healing lesions in whom culture is less sensitive)

  • Are useful for selective screening of an asymptomatic individual at high risk or the partner of a person with HSV infection (although specific criteria for screening are controversial)
• Are useful if neither NAAT nor culture is performed or if one is performed but is negative

• Include three types
  • Enzyme-linked immunosorbent assay (ELISA)–based serologic assays
  • Point-of-care tests (POCTs) or rapid serologic assays
  • Western blot

| Table 8: Serologic Tests for Genital Herpes | Sensitivity of 94–100% and specificity of 94–98% | Provide rapid results with sensitivity of at least 91% and specificity of at least 94% | Useful for confirmation in selected cases (only available in research applications) |
| ELISA-based assays | POCTs or Rapid Serologic Assays | Western Blot |
| Cross-reactivity between types can be an issue and may result in incorrect typing (HSV-1 vs. HSV-2) | Detect viral antigen |  |
| | More expensive than ELISA tests |  |

• Older serologic tests (e.g., enzyme immunoassay) could not differentiate between types 1 and 2 and should not be used.

• Useful serologic tests measure immunoglobulin G (IgG) antibody to HSV-1 and HSV-2.

• Immunoglobulin M (IgM) antibody tests are discouraged, even when routinely offered by laboratories:
  • There is a high rate of false positive results.
  • Theoretically IgM antibody develops before IgG and indicates recently acquired infection, but in fact it performs poorly in distinguishing early from late HSV infection.
  • Currently available tests do not distinguish the HSV-1 from HSV-2 antibody.

• Treatment and management
  • Initial genital herpes
    • Antiviral therapy speeds resolution of initial genital herpes.
    • It is recommended for all patients with an initial genital herpes unless healing is well under way at presentation.
    • Intravenous therapy can be used for severe infection requiring hospitalization.
Table 9: Recommended Treatment for Primary Genital Herpes*9

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acyclovir</td>
<td>400 mg orally three times a day</td>
<td>7 to 10 days or longer as needed until healing of lesions</td>
</tr>
<tr>
<td>Famciclovir</td>
<td>250 mg orally three times a day</td>
<td></td>
</tr>
<tr>
<td>Valacyclovir</td>
<td>1 g orally twice a day</td>
<td></td>
</tr>
</tbody>
</table>

*For guidance on therapy for patients with HIV infection or women who are pregnant, see CDC treatment guidelines. www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm

- Recurrent genital herpes
  - Ongoing suppressive therapy reduces the frequency of recurrences and of asymptomatic viral shedding and decreases the risk of transmission to partners.
  - Self-initiated episodic therapy of recurrent episodes, if started early, modestly speeds resolution. Episodic therapy should be initiated as soon as symptoms begin or during the prodrome that some patients experience before lesion outbreaks.
  - Topical antivirals are minimally effective and not recommended.
  - See CDC guidelines for information about treatment in pregnancy and for individuals with coexisting HIV infection.

Table 10: Suppression Therapy for Recurrent Genital Herpes*9

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acyclovir</td>
<td>400 mg orally twice daily</td>
<td></td>
</tr>
<tr>
<td>Valacyclovir</td>
<td>500 mg orally once daily</td>
<td></td>
</tr>
<tr>
<td>Valacyclovir</td>
<td>1 g orally once daily</td>
<td>The higher dose is recommended for patients with frequent outbreaks (≥ 9 per year) and is preferred by some experts for all patients.</td>
</tr>
</tbody>
</table>

*Examples of suggested regimens are shown. For additional options, see CDC treatment guidelines. www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm

Table 11: Self-Initiated Episodic Therapy for Recurrent Genital Herpes*9

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valacyclovir</td>
<td>500 mg orally twice daily</td>
<td>3 days</td>
</tr>
<tr>
<td>Acyclovir</td>
<td>400 mg orally three times a day</td>
<td>5 days</td>
</tr>
</tbody>
</table>

*Examples of suggested regimens are shown. For additional options, see CDC treatment guidelines. www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm

Note: All regimens shown are for HSV-2 infection. HSV-1 is less susceptible to these drugs than HSV-2 and may require higher doses, although no specific studies or recommendations are available.
HIV

- Key facts about infection
  - Prevalence
    - Over the past 30 years, more than 25 million people in the world have died from HIV/AIDS.29
    - As of 2011, about 34 million people were living with HIV worldwide.29
    - In the United States, more than one million individuals ages 13 and older have HIV infection; approximately one fifth are unaware they have been infected.30
    - The number of new infections in the United States has remained stable over the past decade, although the rate of new infection has increased substantially among certain populations and the total number of people living with HIV in the United States has increased.30
  - Risk
    - By risk group
      - MSM of all racial/ethnic groups remain the population at highest risk for HIV infection.30 MSM comprise approximately 4 percent of the male population in the United States but account for 63 percent of all new infections and 52 percent of people living with HIV.31,32,33
      - New infections in women are primarily related to heterosexual contact (84 percent); the remainder is related to injection drug use (16 percent).30
    - By race/ethnicity
      - Blacks/African Americans have experienced the greatest burden of disease from HIV. Although approximately 12 percent of the US population, Blacks/African Americans represent 44 percent of people with HIV infection.31,32
      - An even smaller proportion of the US population, Native American/Alaska Native women are almost three times as likely to be diagnosed with HIV infection than Caucasian women.34
      - Recent research shows that the risk of acquiring HIV and other STIs for a specified level of risky behaviors varies across social-sexual networks. Using data from a national survey of 18- to 26-year-olds, researchers divided individuals into 16 risk categories based on degree of risk of sexual behaviors and substance use. For Blacks, the prevalence of HIV and other STIs was higher than the average prevalence for the population in every one of the 16 categories, even those with the least risky behaviors. For Whites, the prevalence was lower than the average for all except the 4 highest risk categories.35
Figure 2: Estimated Rate of New HIV Infections, 2009, by Gender and Race/Ethnicity

![Figure 2: Estimated Rate of New HIV Infections, 2009, by Gender and Race/Ethnicity]

Source: Adapted from Prejean 2011

- By age
  - Individuals ages 50 and older account for 15 percent of new HIV/AIDS diagnoses. Many do not perceive themselves to be at risk and are less likely to use condoms and obtain HIV testing.
  - Older women may be at greater risk because of age-related thinning of the vaginal wall, which may increase the chance of viral acquisition through tears in the mucosa.
  - Young people ages 15 to 29 account for about 39 percent of new HIV infections in the country, although they constitute only 21 percent of the population. Of the high school youth reporting sexual intercourse in the previous three months, almost 40 percent did not use a condom the last time they had sex. Youth with older sex partners and those who have experienced sexual abuse are at higher risk.

- With comorbid STIs
  - Both non-ulcerative STIs (such as chlamydia) and ulcerative STIs (such as genital herpes and chancroid) increase the risk of HIV infection through mechanisms that appear to increase both infectiousness and susceptibility. When individuals are exposed to HIV, those with other existing STIs are two to five times more likely to acquire HIV infection than individuals without STIs. In addition, an individual with HIV infection and another coexisting STI is more likely to transmit HIV than an individual with HIV but without an additional STI.
  - Ulcerative STIs create breaks in the skin than can serve as portals for entry of HIV. Both ulcerative and non-ulcerative STIs cause local inflammation, which can increase the number of cells in genital secretions that can be targeted by HIV.
• Screening and diagnosis
  • Some populations are known to be at greater risk; however, clinicians should consider the possibility of HIV infection in patients who fall outside these high-risk groups rather than assume that a patient is HIV free because of history or demographics (e.g., young woman who reports a monogamous relationship, 80-year-old woman).
  • Clinicians should avoid “siloed” thinking regarding HIV and other STIs; they should consider HIV when seeing patients with other STIs and associated infections (both the common infections, such as BV and multiple bouts of candidiasis, and the less common infections, such as chancroid).
  • USPSTF now recommends that all adolescents and adults ages 15 to 65 years be screened for HIV; in addition, younger and older individuals who are at increased risk should be screened. USPSTF recommends that all pregnant women be screened for HIV, even if they present in labor without prior screening.
  • CDC recommends opt-out HIV testing, meaning that unless a patient who meets the criteria for screening specifically declines, he or she should be informed about and undergo testing.
  • For specific information about screening and diagnosis, see www.cdc.gov/hiv/testing/clinical.

• Treatment and management
  • Refer individuals newly diagnosed with HIV infection to an experienced facility or provider for comprehensive HIV care, and assist them in navigating access issues.
  • Educate and counsel patients about the infection and how to reduce the risk of transmitting the infection. For downloadable patient education materials available in a number of languages, see www.aids.gov/hiv-aids-basics.
  • Obtain initial lab studies. The National Institutes of Health recommends the following tests for individuals newly diagnosed with HIV infection:
    • HIV antibody testing (if prior documentation is not available or if HIV RNA is below the assay’s limit of detection)
    • CD4 T-cell count (CD4 count)
    • Plasma HIV RNA (viral load)
    • Complete blood count, chemistry profile, transaminase levels, blood urea nitrogen, and creatinine
    • Urinalysis
    • Serologies for hepatitis A, B, and C viruses
    • Fasting blood glucose and serum lipids
    • Genotypic resistance testing at entry into care, regardless of whether antiretroviral therapy will be initiated immediately
• Use screening questions to assess for risk of domestic or partner abuse. For example,49
  • “Do you ever feel unsafe at home?”
  • “Are you in a relationship in which you have been physically hurt or felt threatened?”
  • “Have you ever been or are you currently concerned about harming your partner or
    someone close to you?”
• If a patient reveals a concern about domestic violence, express support and concern and help him or her access support services. Express concern with statements such as the following:
  • “I believe you.”
  • “I am concerned about your safety and well-being.”
  • “I imagine this situation must be very difficult for you.”
  • “You are not alone.”
  • “There are options and resources available.”
• Take steps to engage the patient and increase the chance of retention in treatment.
  • Be aware of the patient’s emotional state—he or she is likely to be upset, frightened, and aware of the stigma associated with HIV infection.
  • Ensure cultural sensitivity of care providers and staff to increase the patient’s comfort with accessing care services.
  • Ensure that all care providers and staff treat the patient with dignity and respect, respond to questions with language he or she can understand, demonstrate interest in the patient as a person, and take time to listen to his or her concerns.

**Human Papillomavirus**

• Key facts about infection
  • There are >100 types of HPV, of which >40 can cause genital infection and are sexually transmitted.9
  • Within 2 years, about 90 percent of HPV infections are cleared by the immune system, although viral DNA may persist for prolonged periods, with risk of later reactivation. The remaining 10 percent of infections with high-risk types that persist are strongly linked to a high risk of a precancer diagnosis.50,51
  • HPV infection is ubiquitous; nearly all sexually active men and women will be infected with at least one type of HPV at some point in their lives.52
  • Of low-risk HPV types, two (HPV 6 and HPV 11) cause 90 percent of external genital and anal warts, with low-grade cervical lesions.53
  • High-risk types, such as HPV 16, HPV 18, and several others, are associated with cervical, anorectal, vulvovaginal, and penile cancers and may be cofactors in oropharyngeal, skin, and other cancers.9
  • The most prevalent high-risk types are HPV 16 and HPV 18; together they cause 60 to 70 percent of cervical and anal cancers. HPV 16 causes some pharyngeal cancers.54
<table>
<thead>
<tr>
<th>Table 12: Comparison of HPV Vaccines⁵⁵–⁶⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Targeted HPV types</strong></td>
</tr>
<tr>
<td>- Quadrivalent (Gardasil) 6, 11, 16, 18</td>
</tr>
<tr>
<td>- Bivalent (Cervarix) 16, 18</td>
</tr>
<tr>
<td><strong>HPV-related diseases potentially prevented</strong></td>
</tr>
<tr>
<td>- Cervical cancer and precancer, vulvar and vaginal cancer and precancer, penile, anal, and oropharyngeal cancers, low-grade lesions.</td>
</tr>
<tr>
<td>- External genital warts.</td>
</tr>
<tr>
<td>- Cervical cancer and precancer, vulvar and vaginal cancer and precancer, penile, anal, and oropharyngeal cancers, low-grade lesions.</td>
</tr>
<tr>
<td><strong>Indication</strong></td>
</tr>
<tr>
<td>- Females ages 9 to 26 for prevention of cervical cancer; cervical, vaginal, vulvar, and cancer precursors; and genital warts related to the four HPV types targeted by the vaccine.</td>
</tr>
<tr>
<td>- Males ages 9 to 26 years for prevention of anal cancer and anal cancer precursors and genital warts.</td>
</tr>
<tr>
<td>- Data are not available on the efficacy for prevention of penile and oropharyngeal cancers.</td>
</tr>
<tr>
<td>- Females ages 9 to 25 for prevention of cervical cancer and cervical cancer precursors.</td>
</tr>
<tr>
<td><strong>Dosing and administration</strong></td>
</tr>
<tr>
<td>- Intramuscular injection of three separate 0.5-mL doses at 0, 2, and 6 months.</td>
</tr>
<tr>
<td>- Intramuscular injection of three separate 0.5-mL doses at 0, 1, and 6 months.</td>
</tr>
<tr>
<td><strong>Efficacy</strong></td>
</tr>
<tr>
<td>- Among young women (ages 16–26 years) who previously had not been exposed to any of the four HPV types in the vaccine:</td>
</tr>
<tr>
<td>- 98% efficacy in preventing CIN2/3 caused by the targeted HPV types</td>
</tr>
<tr>
<td>- 100% efficacy in preventing vulvar and vaginal precancers caused by the targeted HPV types</td>
</tr>
<tr>
<td>- 99% efficacy in preventing genital warts caused by the targeted HPV types</td>
</tr>
<tr>
<td>- In men (ages 16 to 26 years) not previously exposed to the four HPV types in the vaccine, there was 90% vaccine efficacy in preventing genital warts and 75% efficacy in preventing anal precancers.</td>
</tr>
<tr>
<td>- Among young women (ages 15–25 years) who previously had not been exposed to either of the two HPV types in the vaccine:</td>
</tr>
<tr>
<td>- 100% efficacy in preventing CIN3+ caused by the targeted HPV types</td>
</tr>
<tr>
<td><strong>Most common adverse events</strong></td>
</tr>
<tr>
<td>- Syncope (fainting), injection site pain and redness, dizziness, nausea, headache. Itchiness at the injection site and mild or moderate fever have also been reported.</td>
</tr>
<tr>
<td>- To reduce fainting, prescribing information recommends that patients remain seated for 15 minutes after vaccination.</td>
</tr>
<tr>
<td><strong>Other adverse events</strong></td>
</tr>
<tr>
<td>- Rates of serious adverse events similar between placebo and treated groups in clinical trials; vaccine-related serious adverse events occurred in 0.1% of more than 29,000 female and male participants.</td>
</tr>
<tr>
<td>- Since 2006, 6% of all reports described serious adverse events. No current evidence suggests that the HPV vaccine caused the adverse events.</td>
</tr>
<tr>
<td>- Low rates of events in more than 30,000 females in clinical trials.</td>
</tr>
<tr>
<td>- Rates of serious adverse events similar between placebo and treated groups in clinical trials; no subject withdrawals due to serious adverse events.</td>
</tr>
</tbody>
</table>
• The primary indication for males is prevention of penile and anal cancer.
• Immunization of men contributes to protection of women and male partners, although this is not a formal indication for immunization.
• Brief education about HPV and the vaccine can increase acceptance rates.\textsuperscript{67}
• Male latex condoms reduce but do not completely eliminate transmission; even with consistent condom use, most sexually active men and women can expect to acquire one or more anogenital HPV infections.\textsuperscript{68}

• Screening and diagnosis

  • HPV tests
    • Available tests detect viral nucleic acid (DNA or RNA) or capsid protein.
    • Tests are FDA approved for women only, for testing of cervical and vaginal specimens.
      • Age > 30 years undergoing cervical cancer screening
      • Age > 21 years with ASC-US result on Pap test (Note: HPV reflex testing for ASC-US is optional for women ages 21 to 24 years)
    • HPV testing is not recommended for women ≤ 20 years of age, as a general test for STIs, or to determine HPV status before vaccination.\textsuperscript{69}

<table>
<thead>
<tr>
<th>Table 13: FDA-Cleared Tests for High-Risk HPV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test</strong></td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Aptima HPV</td>
</tr>
<tr>
<td>Cervista HPV High-Risk</td>
</tr>
<tr>
<td>Cobas HPV</td>
</tr>
<tr>
<td>Hybrid Capture II High-Risk HPV</td>
</tr>
</tbody>
</table>

• Clinicians should know which tests are available at the laboratories from which they obtain HPV testing and should understand the process for ordering genotyping when needed.

• Cytology

  • Screening guidelines are available for specific guidance on the use of Pap tests, colposcopy, and cervical biopsy and the management of abnormal cytology results (see the algorithms at \url{www.asccp.org/Portals/9/docs/Algorithms%207.30.13.pdf}

  • Important recent changes to screening recommendations:\textsuperscript{70}
    • HPV testing is no longer recommended in women 21 to 24 years old due to the high prevalence of HPV infection and because management is based solely on cytology or histology, regardless of HPV test result.
    • The recommended age for an initial Pap test is 21, regardless of sexual history and timing of sexual debut; this change will avoid the attendant harm of overtreatment of abnormal cytology related to HPV infection in young women.
• The recommended frequency of Pap testing is every three years as long as results are normal.

• Alternatively, women ages 30 to 65 may be screened with cytology combined with HPV (co-testing) every five years.

• Women with certain risk factors may need more frequent screening or to continue screening beyond age 65.

• See guidance for specific details www.asccp.org/Portals/9/docs/Algorithms%207.30.13.pdf.

• Evaluation for genital warts
  • Visual examination, sometimes aided by a hand-held magnifier, usually is sufficient for reliable diagnosis by experienced clinicians.
  • Acetic acid (3–5 percent) to highlight HPV-infected tissues (acetowhitening) is nonspecific, insensitive, and generally not recommended.

• Treatment and management
  • HPV vaccines are among the most biologically effective of all vaccines, with nearly 100 percent efficacy in preventing infection with the types included in the vaccine; they have no effect on established infection and no role in therapy.
  • Treatment is not recommended for
    • Subclinical genital HPV infection whether diagnosed by colposcopy, acetic acid application, or laboratory tests for HPV DNA
    • Mild cytological or histological findings on Pap smear (ASC-US, LSIL) or cervical biopsy (CIN1)

• For management of cervical cytology abnormalities, see the algorithms at www.asccp.org/Portals/9/docs/Algorithms%207.30.13.pdf.

• For management of genital warts, see the following available treatments:
<table>
<thead>
<tr>
<th>Medication</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Podofilox 0.5% solution or gel</td>
<td>Patient should apply to visible warts twice a day for 3 days, followed by 4 days of no therapy; cycle can be repeated for up to four cycles if needed. Safety during pregnancy has not yet been established.</td>
</tr>
<tr>
<td>Imiquimod 5% cream</td>
<td>Patient should apply once daily at bedtime, three times a week for up to 16 weeks. Treated area should be washed with soap and water 6 to 10 hours after application. May weaken condoms and diaphragms. Safety during pregnancy has not yet been established.</td>
</tr>
<tr>
<td>Sinecatechins 15% ointment</td>
<td>Patient should apply three times daily for no longer than 16 weeks. When medication is on the skin, the patient should avoid sexual contact. May weaken condoms and diaphragms. Safety during pregnancy has not yet been established.</td>
</tr>
<tr>
<td>Cryotherapy with liquid nitrogen or cryoprobe</td>
<td>Repeat applications every 1 to 2 weeks. Adequate training required, as over- and under-treatment can lead to complications or low efficacy.</td>
</tr>
<tr>
<td>Podophyllin resin 10% to 25% in compound tincture of benzoin</td>
<td>Apply to each wart and allow to dry before any contact with clothing; can be repeated weekly, if necessary. Application should be limited to &lt; 0.5 mL of podophyllin or an area of &lt; 10 cm² of warts per session. Area treated should not contain any open lesions or wounds. Instruct the patient to thoroughly wash area 1 to 4 hours after application to reduce local irritation. Safety during pregnancy has not yet been established.</td>
</tr>
<tr>
<td>Bichloroacetic acid (BCA) 80% to 90%</td>
<td>Apply a small amount only to the warts and allow area to dry before the patient sits or stands. If needed for pain, BCA can be neutralized with soap or sodium bicarbonate. Can be repeated weekly, if necessary.</td>
</tr>
<tr>
<td>Trichloroacetic acid (TCA) 80% to 90%</td>
<td>Same comments as for BCA, plus TCA has a low viscosity and can spread rapidly to surrounding areas if applied excessively.</td>
</tr>
<tr>
<td>Surgical removal with tangential scissor excision, tangential shave excision, curettage, or electrosurgery</td>
<td>For patients with a large number or area of warts. This usually eliminates warts in one visit but requires substantial training, additional equipment, and longer office visit than other modalities.</td>
</tr>
</tbody>
</table>

*For specific guidance regarding the use of these therapies or for treatment of vaginal, cervical, anal, or urethral meatus lesions, see CDC guidelines. [www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm)*

- Treatment choice should be based on the preference of the patient, available resources, and the experience of the provider with the different treatment regimens.
- Research has not shown any treatment to be superior to the others, and more than one type of treatment may be required to eradicate warts.

---

**Table 14: Available Treatments for Genital Warts**

*9*
Syphilis

- Key facts about infection
  - Syphilis is caused by the spiral-shaped bacterium *Treponema pallidum*.
  - The clinical course is divided into four stages, which may overlap.

<table>
<thead>
<tr>
<th>Table 15: Four Stages of Syphilis⁹</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage</strong></td>
</tr>
<tr>
<td>Primary stage</td>
</tr>
<tr>
<td>Secondary stage</td>
</tr>
<tr>
<td>Neurosyphilis</td>
</tr>
<tr>
<td>Tertiary stage</td>
</tr>
</tbody>
</table>

- Patients may also present without symptoms (i.e., diagnosed via serology), which is defined as latent infection.

- Early syphilis refers to primary syphilis, secondary syphilis, and latent syphilis of less than 1 year’s duration.

- The incidence of infection is increasing among MSM, who now account for more than 70 percent of all cases; up to 4 percent of HIV-infected MSM acquire syphilis annually.¹³

- The risk of acquiring HIV is two to five times higher among individuals with syphilis infection.⁷¹

- Screening and diagnosis
  - *Treponema pallidum* cannot be cultured in the laboratory, which makes diagnostic testing for syphilis challenging.

- **Direct testing**
  - Includes dark-field microscopy examination and tests to detect *T. pallidum* in lesion exudate or biopsied tissue.
  - Direct testing is the main method for diagnosing syphilis with mucocutaneous lesions (primary syphilis, occasional secondary syphilis).
• Serologic testing
  • Serologic testing can be used to make presumptive diagnosis, based on the detection of antibodies to the bacterium.
  • A newly positive serology is strong evidence for infection with syphilis. Thus, it is helpful to know whether a patient has been tested previously and determine the results of prior testing if possible.
  • The use of two types of tests is necessary because each type has limitations, including false positive results.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Examples</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nontreponemal tests</td>
<td>Rapid Plasma Reagin; Venereal Disease Research Laboratory test</td>
<td>Sensitive but nonspecific (risk of false positive results); all positives need confirmation by a treponemal test; titer (strength of positive result) indicates disease activity, declines with effective treatment and used to follow success of therapy</td>
</tr>
<tr>
<td>Treponemal tests</td>
<td>Fluorescent treponemal antibody-absorbed test; T. pallidum particle agglutination assay and others; enzyme immunoassay; chemiluminescence immunoassays</td>
<td>Once positive, usually remain positive for life and thus cannot be used to assess treatment response; when used for initial screening, follow-up testing should be performed by a nontreponemal test so treatment response can be followed</td>
</tr>
</tbody>
</table>

• Treatment and management
  • Penicillin is the preferred antibiotic for all stages of syphilis.\textsuperscript{9} The formulation and dose depend on the stage and duration of infection and whether the central nervous system is involved.
    • For adults with early syphilis: benzathine penicillin G 2.4 million units IM in a single dose.
    • Alternative for severely penicillin-allergic patients: Doxycycline 100 mg orally twice daily for 2 weeks.
    • For treatment of other stages and of pregnant women, children, or individuals with penicillin allergy, see CDC treatment guidelines.\textsuperscript{9} www.cdc.gov/mmwr/preview/mmwrhtml/rr5912a1.htm
**Trichomoniasis**

- **Key facts about infection**
  - It is caused by the protozoan *Trichomonas vaginalis*.
  - It is one of the most common STIs in the United States, with an estimated 148,000 new cases each year and a prevalence of about 500,000.²
  - Typical symptoms in women include a diffuse, malodorous, yellow-green vaginal discharge with vulvar irritation; however, infection is common.
  - Men are generally asymptomatic but may have nongonococcal urethritis (NGU).

- **Screening and diagnosis**
  - Women presenting with vaginal discharge should be tested for *T. vaginalis*.
  - Asymptomatic women at high risk for infection should be considered for screening, especially in pregnancy.
  - Risk factors include⁹,⁷²
    - new or multiple sex partners
    - current diagnosis of or suspicion of any STI
    - history of transactional sex
    - injection drug use
    - African American race/ethnicity
  - Oral infection and isolated rectal infection are rare; testing of extragenital sites is not recommended.⁹,⁷³
  - Testing options for women include the following:
    - NAATs are maximally sensitive and are the preferred method for both screening and diagnostic testing. Two assays are currently available:
      - Polymerase chain reaction (Amplicor, Roche)
      - Transcription-mediated amplification (APTIMA *T. vaginalis*, Hologic Gen-Probe)
    - Preferred samples: vaginal swab in women, urine in men
    - Same-day or next-day result
    - Culture
      - Previously the gold standard; misses 20 to 30 percent of vaginal infections.
      - Vaginal swab or fluid, very insensitive for male urine.
      - Results take up to five days.
• Saline microscopy (wet prep)
  • Historically the most common test, but only 50 to 60 percent sensitive, that is, misses half of all symptomatic infections in women and almost all asymptomatic ones
  • Useful for rapid diagnosis by clinicians (where microscopy is CLIA-approved)
  • Not suitable for testing males

• POCT
  • Antigen tests
    • Example: OSOM (Sekisui Diagnostics), uses immunochromatographic capillary flow dipstick technology
    • Results available in about 10 minutes
  • Nucleic acid probe tests
    • Example: Affirm VP III (Becton Dickenson), simultaneously evaluates for T. vaginalis, Gardnerella Vaginalis (an aid to diagnosis of BV), and Candida albicans
    • Results available in about 45 minutes

• Testing options for men include the following:
  • No POCTs or NAATs are currently FDA approved for use in men.
  • Wet prep and culture are currently the only approved testing modalities, but they miss most infections.
  • Thus, practically speaking, there are no tests available for men that are both sensitive and cost-effective.

• Treatment and management
  • Recommended regimens include the following:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage and Duration</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metronidazole (Flagyl® and generics)</td>
<td>2 g orally, single dose</td>
<td>Approximate efficacy 90–95%</td>
</tr>
<tr>
<td>Tinidazole (Tindamax®)</td>
<td>2 g orally, single dose</td>
<td>Approximate efficacy 86–100%</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>500 mg orally twice daily for 7 days</td>
<td>Improved efficacy for patients who will comply with complete regimen; preferred in HIV-infected patients</td>
</tr>
<tr>
<td>Tinidazole</td>
<td>500 mg orally twice daily for 5 days</td>
<td></td>
</tr>
</tbody>
</table>
• Multidose regimens (i.e., 5–7 days) have superior efficacy compared with single-dose regimens. Single-dose treatment is preferred if compliance with multiple dose therapy is uncertain.74

• Patients should be advised to avoid the consumption of alcohol while taking either drug and for 24 hours after completing metronidazole or 72 hours after completing tinidazole.

• Note that both drugs are nitroimidazoles and allergic cross-reactivity may exist; there is no evidence that tinidazole can be safely used in patients with metronidazole allergy.

• Intravaginal treatment (e.g., metronidazole gel) is unreliable and not recommended.

References


Appendix: Additional Resources

- **CDC 2010 STI Treatment Guidelines:**

- **ASCCP Guidelines:**

- **U.S. Preventive Services Task Force:**
  www.uspreventiveservicestaskforce.org/recommendations.htm

- **ARHP’s HPV QRG:**
  www.arhp.org/ManagingHPV
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