# Sexually Transmitted Infections: A Pharmacist's Guide to Prevention, Screening, and Treatment

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iCARE PHARMACY SERVICES

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## Goal

- Upon completion of this activity, the pharmacist should be able to recommend an appropriate treatment regimen for each discussed sexually transmitted infection (STI).

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## Learning Objectives

- At the conclusion of this presentation, the student pharmacist should be able to:
  - Identify recent epidemiological trends of sexually transmitted infections
  - Describe the 5 “Ps” approach to interviewing patients about sexually transmitted infections
  - Determine appropriate screening criteria for chlamydia, gonorrhea, and syphilis
  - Identify the most common etiologies of sexually transmitted infections
  - Recognize signs and symptoms of common sexually transmitted infections
  - Given patient-specific information, design the most appropriate antimicrobial regimen for the treatment of each discussed sexually transmitted infection
  - Assess efficacy and safety of commonly used regimens in the treatment of sexually transmitted infections
  - Devise strategies to prevent sexually transmitted infections

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## Outline

- Assessment
- Chlamydia
- Gonorrhea
- Pelvic inflammatory disease
- Syphilis
- Genital herpes
- Human papillomavirus infection
- Trichomoniasis
- Expedited partner therapy
- Adverse effects
- Prevention

https://www.cdc.gov/std/prevention/NextSteps-GonorrheaOrChlamydia.htm

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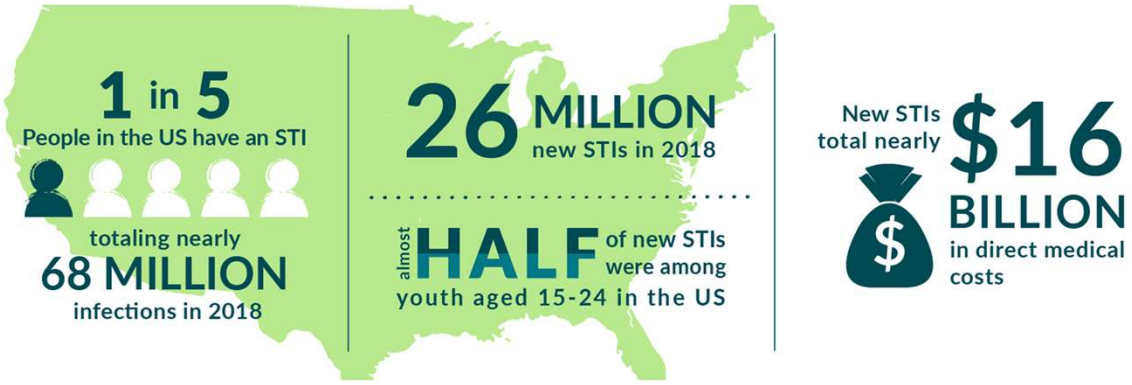


https://www.cdc.gov/std/statistics/prevalence-2020-at-a-glance.htm

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# Assessment

| Domains | Questions |
|---|---|
| **P**artners | Are you currently having sex of any kind?<br>What is/are the gender(s) of your partner(s)? |
| **P**ractices | What kind of sexual contact do you have or have you had?<br>- Genital?<br>- Anal?<br>- Oral? |
| **P**rotection from STIs | Do you and your partner(s) discuss getting tested?<br>What protection methods do you use?<br>In which situations do you use condoms? |
| **P**ast history of STIs | Have you ever been tested for STIs and HIV?<br>Have you been diagnosed with an STI in the past?<br>Has any of your partner(s) had an STI? |
| **P**regnancy intention | Would you like to talk about ways to prevent pregnancy? |

https://www.cdc.gov/std/treatment/sexualhistory.pdf

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## Chlamydia

- Epidemiology
- Screening
- Etiology
- Clinical presentation and complications
- Diagnostic considerations
- Treatment

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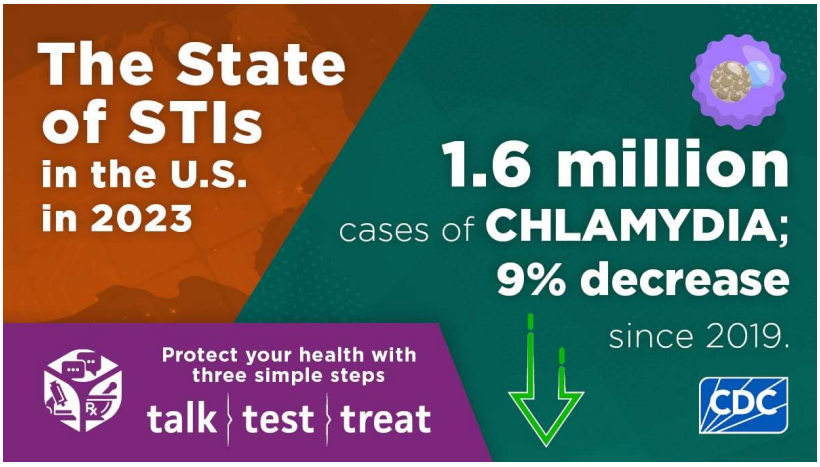
## The State of Chlamydia in 2023




https://www.cdc.gov/sti/media/pdfs/2024/10/StateOfSTIs508.pdf

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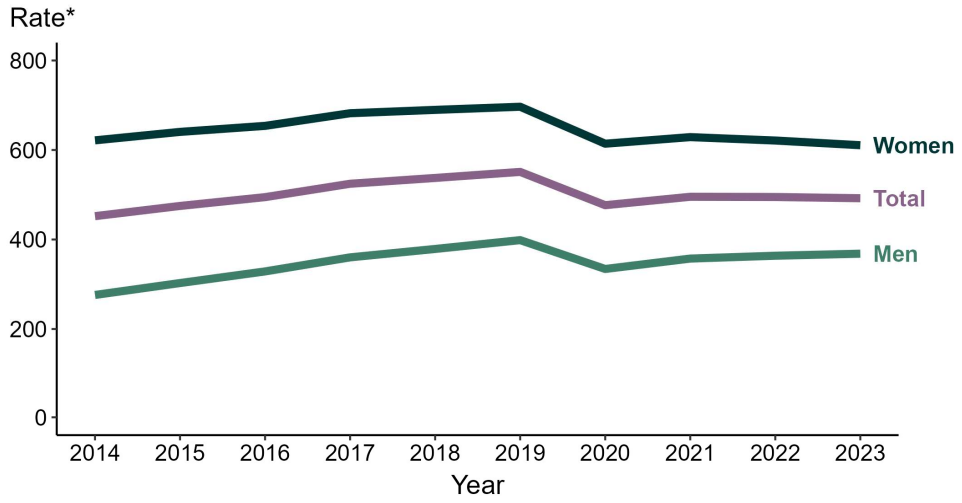
## Rates of Reported Cases by Sex, Per 100,000




https://www.cdc.gov/sti-statistics/annual/slides.html

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## Screening

- Sexually active women <25 years of age
- Sexually active women ≥25 years of age who are at increased risk
- All pregnant women <25 years of age
- Pregnant women ≥25 years of age who are at increased risk
- MSM
- PWH

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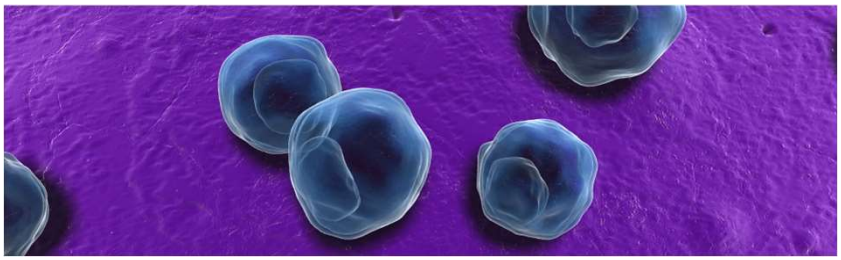
## Etiology

- *Chlamydia trachomatis*
  - Atypical
  - Bacteria-like properties
  - Virus-like properties



https://www.cdc.gov/std/chlamydia/default.htm

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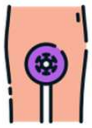
## Clinical Presentation and Complications



- Men
  - Epididymitis
- Women
  - Cervicitis
  - Endometritis
  - Salpingitis
  - Pelvic inflammatory disease
  - Ectopic pregnancy
  - Infertility
- Both men and women
  - **Asymptomatic**
  - Urethritis
  - Localized pain
  - Discharge
  - Proctitis
  - Pharyngitis
  - Conjunctivitis
  - Reactive arthritis

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## Diagnostic Considerations

**Nucleic acid amplification tests (NAATs)**

| Women | Men | Both |
|---|---|---|
| • Vaginal swab preferred over urine specimen<br>• Cervical swab | • Urethral swab or first-catch urine | • Rectal swab<br>• Oropharyngeal swab |

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## Treatment

| Recommended regimen | Alternative regimens |
|---|---|
| • Doxycycline 100 mg PO BID for 7 days | • Azithromycin 1 g PO x1<br>• Levofloxacin 500 mg PO daily for 7 days<br>• Amoxicillin 500 mg PO TID for 7 days |

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## Treatment During Pregnancy

| Recommended regimen | Alternative regimen |
| --- | --- |
| • Azithromycin 1 g PO x1 | • Amoxicillin 500 mg PO TID for 7 days |

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## Case Presentation

- Y.Z. is a 30-year-old woman who presents to your clinic with signs and symptoms of uncomplicated chlamydial infection.
- Her vaginal swab NAAT is positive for chlamydia and negative for gonorrhea.
- Her pregnancy test is negative.
- Allergy: tetracycline (hives).

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## Question

- What is the best treatment regimen for Y.Z.?
  - **A) Azithromycin 1 g PO single dose**
  - **B) Ceftriaxone 500 mg IM single dose**
  - **C) Doxycycline 100 mg PO BID for 7 days**
  - **D) Erythromycin base 500 mg PO every 6 hours for 7 days**

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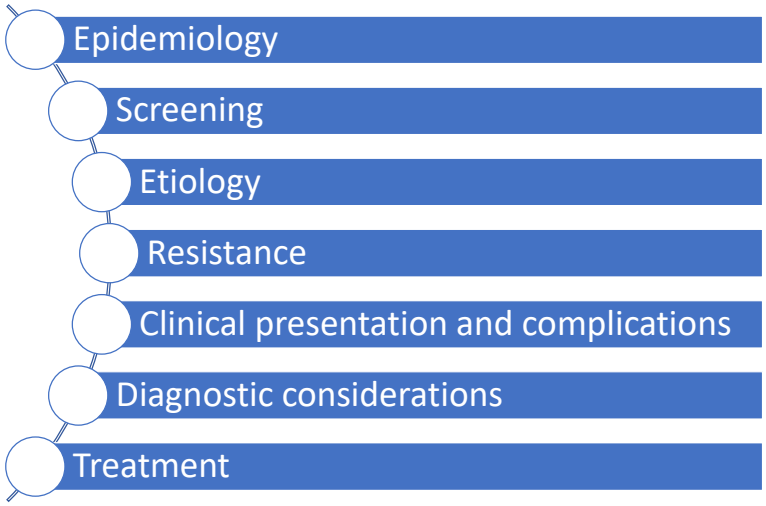
## Gonorrhea

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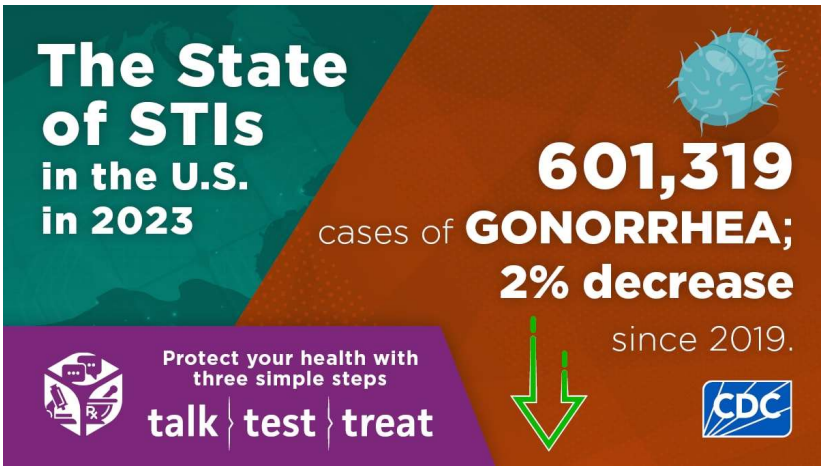
## The State of Gonorrhea in 2023

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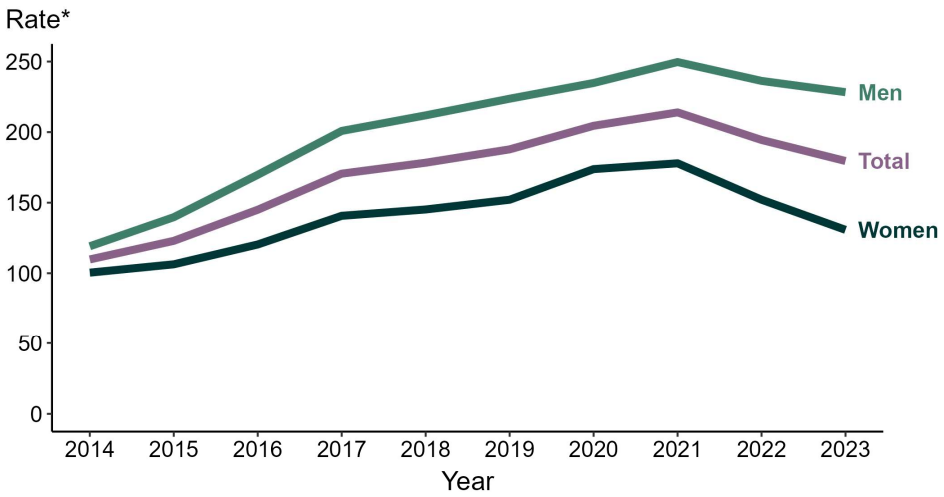
## Rates of Reported Cases by Sex, Per 100,000




https://www.cdc.gov/sti-statistics/annual/slides.html

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## Screening

- Sexually active women <25 years of age
- Sexually active women ≥25 years of age who at increased risk
- All pregnant women <25 years of age
- Pregnant women ≥25 years of age who at increased risk
- MSM
- PWH

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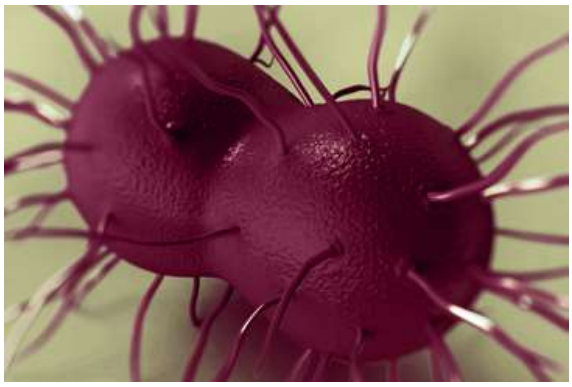
## Etiology



- *Neisseria gonorrhoeae*
  - Gram-negative
  - Diplococcus
  - Has progressively developed resistance to antibiotics

https://www.cdc.gov/std/gonorrhea/default.htm

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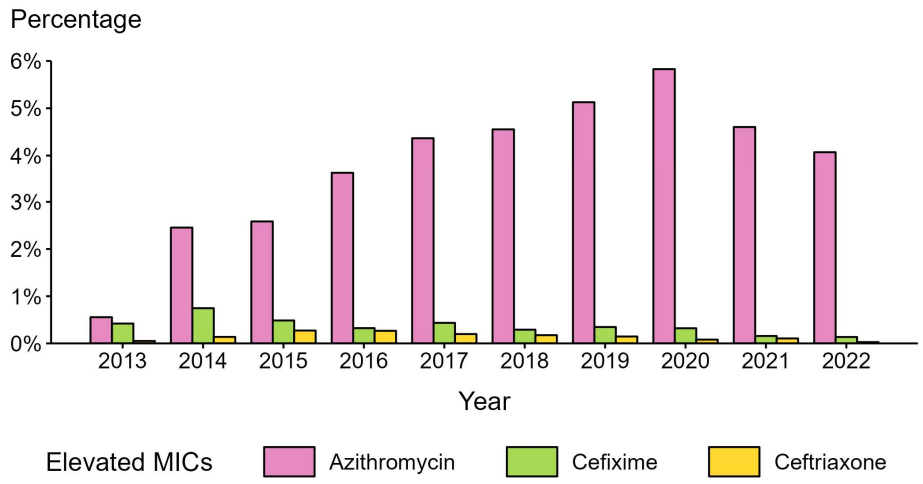
## Resistance




https://www.cdc.gov/std/statistics/2022/default.htm

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## Question

- Which antibiotic is the most active against *N. gonorrhoeae*?
  - **A) Azithromycin**
  - **B) Cefixime**
  - **C) Ceftriaxone**
  - **D) Ciprofloxacin**

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## Clinical Presentation and Complications

- Men
  - Mucopurulent discharge
  - Rectal discharge
  - Epididymitis
- Women
  - Cervicitis
  - Vaginal discharge
  - Uterine bleeding
  - Lower abdominal pain
  - Pelvic inflammatory disease
  - Ectopic pregnancy
  - Infertility
- Both
  - Asymptomatic
  - Urethritis
  - Dysuria
  - Localized pain
  - Proctitis
  - Pharyngitis
  - Conjunctivitis
  - Disseminated gonococcal infection

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## Diagnostic Considerations

**NAATs or Gram Stain**

| Women | Men | Both |
|---|---|---|
| • Vaginal swab preferred over urine specimen<br>• Cervical swab | • Gram stain from urethral sample if symptomatic<br>• Urethral swab or first-catch urine | • Rectal swab<br>• Oropharyngeal swab |

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## Treatment of Cervicitis/Urethritis/Proctitis

| Recommended regimens | Alternative regimens |
|---|---|
| Ceftriaxone 500 mg IM x1 for wt <150 kg<br>OR<br>Ceftriaxone 1 g IM x1 for wt ≥150 kg | Cefixime 800 mg PO x1<br>OR<br>Gentamicin 240 mg IM x1 + azithromycin 2 g PO x1 |
| If chlamydial infection has not been excluded, treat for chlamydia:<br><br>Doxycycline 100 mg PO BID for 7 days<br>OR<br>Azithromycin 1 g PO x1 during pregnancy | |

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## Treatment of Pharyngitis

| Recommended regimens | Alternative regimens |
|---|---|
| Ceftriaxone 500 mg IM x1 for wt <150 kg<br>OR<br>Ceftriaxone 1 g IM x1 for wt ≥150 kg<br><br>If chlamydial infection has not been excluded, treat for chlamydia:<br><br>Doxycycline 100 mg PO BID for 7 days<br>OR<br>Azithromycin 1 g PO x1 during pregnancy | No alternative treatments are available for pharyngeal gonorrhea<br><br>For persons with a history of allergy to beta-lactam, conduct a thorough assessment of the reaction<br><br>For persons with an anaphylactic or other severe reaction to ceftriaxone, consult an infectious disease specialist |

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## Treatment of Conjunctivitis

| Recommended regimen | Adjunctive treatment |
| --- | --- |
| • Ceftriaxone 1 g IM x1 | • One-time lavage of the infected eye with saline solution |

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## Case Presentation

- Z.Z. is a 21-year-old man who recently returned from a Spring Break trip in the Florida Keys.
- Two days after returning, he reports to your clinic complaining of purulent urethral discharge, dysuria, and urinary frequency.
- Z.Z. never experienced such symptoms before.
- A NAAT performed on a urethral swab is positive for gonorrhea and negative for chlamydia.
- All: penicillin (itching).
- Ht: 6’1’’; Wt: 220 lbs.

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## Question

- What is the best treatment regimen for Z.Z.?
  - **A) Azithromycin 1g PO as a single dose**
  - **B) Ceftriaxone 500 mg IM as a single shot**
  - **C) Ceftriaxone 1 g IM as a single shot**
  - **D) Ciprofloxacin 500 mg PO BID for 3 days**

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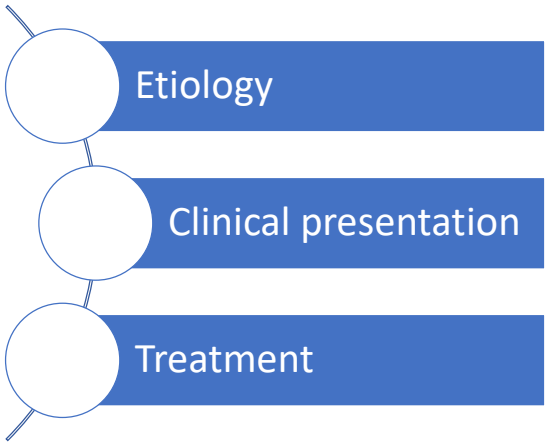
## Pelvic Inflammatory Disease

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## Etiology

**STI pathogens**

- *Chlamydia trachomatis*
- *Neisseria gonorrhoeae*

**Vaginal flora**

- **Anaerobes**
- *Gardnerella vaginalis*
- *Haemophilus influenzae*
- Enteric gram-negative rods
- *Streptococcus agalactiae*

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## Clinical Presentation

- Cervical motion tenderness
- Uterine tenderness
- Adnexal tenderness

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## Treatment

| Recommended parenteral regimens for severe infections |
|---|
| Cefotetan 2 g IV q12h + doxycycline 100 mg PO/IV q12h |
| Cefoxitin 2 g IV q6h + doxycycline 100 mg PO/IV q12h |
| Ceftriaxone 1 g IV daily + doxycycline 100 mg PO/IV q12h + metronidazole 500 mg PO/IV q12h |
| **Alternative parenteral regimens** |
| Ampicillin/sulbactam 3 g IV q6h + doxycycline 100 mg PO/IV q12h |
| Clindamycin 900 mg IV q8h + gentamicin 2 mg/kg IV/IM LD, followed by 1.5 mg/kg IV/IM q8h |
| **Recommended intramuscular/oral regimens for mild or moderate infections** |
| Ceftriaxone 500 mg IM x1 + doxycycline 100 mg PO q12h + metronidazole 500 mg PO q12h for 14 days |
| Cefoxitin 2 g IM x1 + probenecid 1 g PO x1 + doxycycline 100 mg PO q12h + metronidazole 500 mg PO q12h for 14 days |

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## Syphilis

- Epidemiology
- Screening
- Etiology
- Classification and clinical presentation
- Diagnostic considerations
- Treatment

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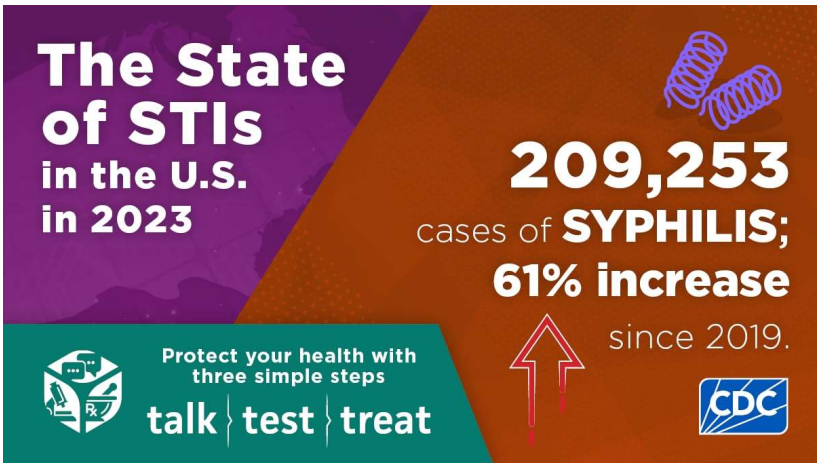
## The State of Syphilis in 2023

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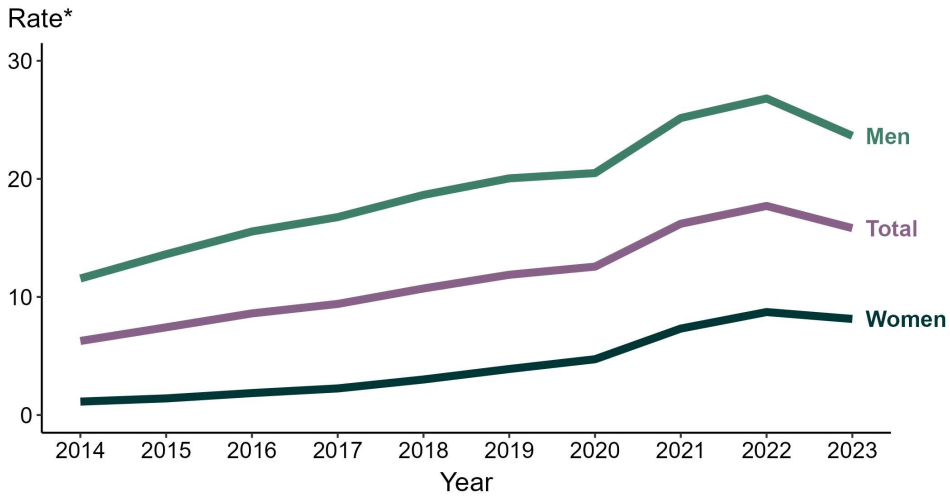
## Rates of Reported Cases by Sex, Per 100,000




https://www.cdc.gov/sti-statistics/annual/slides.html

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## Screening

- Screen adults who are at increased risk
  - History of incarceration
  - History of transactional sex work
  - Male <29 years of age
- All pregnant women at the first prenatal visit
- MSM
- PWH

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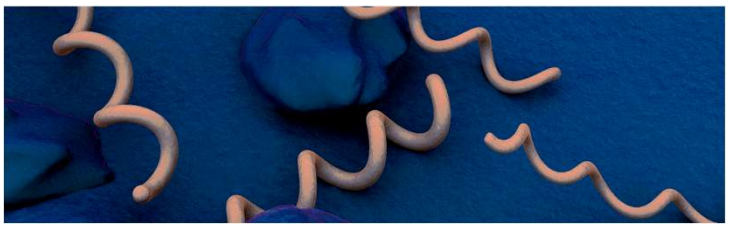
## Etiology

- *Treponema pallidum*
  - Spirochete
  - Slender
  - Tightly coiled
  - Unicellular
  - Helical



https://www.cdc.gov/std/syphilis/default.htm

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## Classification and Clinical Presentation

| Stages | Descriptions |
|---|---|
| Primary | Incubation ~10 to 90 days<br>Painless chancre on the external genitalia, perianal region, mouth, or throat that resolves spontaneously in 2 to 6 weeks |
| Secondary | Develops ~2 to 8 weeks after primary infection<br>Pruritic or nonpruritic rash including on the palms and soles<br>Mucocutaneous lesions, lymphadenopathy, flulike symptoms<br>Early latent begins when all symptoms have resolved<br>Late latent >1 year in duration or unknown duration; dormant multisystem involvement |
| Tertiary | Develops 10 years or more after initial infection if left untreated<br>Characterized by granulomatous lesions called gummas; affects the heart (aortic insufficiency and aortitis), bones, and joints. |
| Neurosyphilis | Infection of the central nervous system – can occur at any stage of syphilis |

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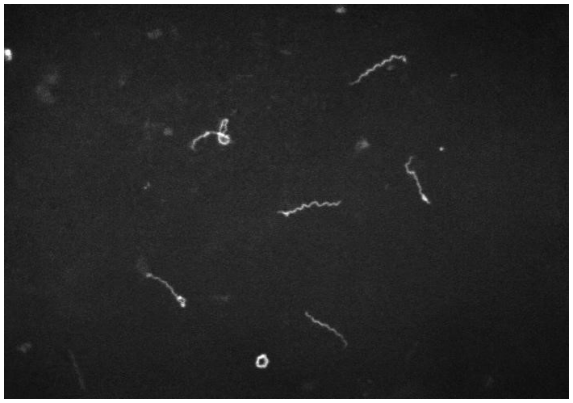
## Diagnostic Considerations

- Darkfield microscopy or direct fluorescent antibody



CDC/ W.F. Schwartz

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## Diagnostic Considerations

- Nontreponemal tests
  - Detect serum concentrations of antibody to cardiolipin
    - Venereal Disease Research Laboratory (VDRL) slide test
    - Rapid plasma reagin (RPR) card test
- Treponemal tests
  - Detect antibodies to *T. pallidum*
    - Fluorescent treponemal antibody absorption (FTA-ABS)
    - *T. pallidum* particle agglutination assay (TP-PA)
    - *T. pallidum* enzyme immunoassay (ELISA)

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## Treatment

| Stages | Recommended regimens | Alternative regimens |
|---|---|---|
| Primary<br>Secondary<br>Early latent (< 1 year) | Penicillin G benzathine 2.4 million units IM x1 | Doxycycline 100 mg PO BID for 2 weeks |
| Late latent (>1 year)<br>Unknown duration<br>Tertiary syphilis | Penicillin G benzathine 2.4 million units IM weekly x3 | Doxycycline 100 mg PO BID for 4 weeks |
| Neurosyphilis, ocular syphilis, and otosyphilis | Aqueous penicillin G 3 to 4 million units IV q4h or as a continuous infusion for 10 to 14 days | Penicillin G procaine 2.4 million units IM daily + probenecid 500 mg PO q6h for 10 to 14 days |

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## Question

- The Jarisch-Herxheimer reaction is an acute febrile reaction accompanied by headache and myalgia that occurs within 24 hours of initiating treatment for syphilis. It is an allergic reaction.
  - **A) True**
  - **B) False**

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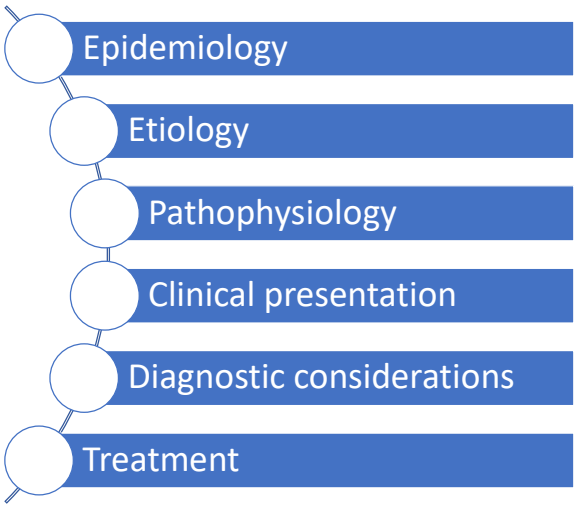
## Genital Herpes

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## Epidemiology

- Genital herpes is common in the United States
- 12% of persons aged 14–49 years are estimated to be infected
- Most cases are transmitted by persons:
  - Unaware that they have the infection
  - Who are asymptomatic when transmission occurs
- HSV is associated with an increased risk of acquiring HIV

https://www.cdc.gov/std/treatment-guidelines/herpes.htm

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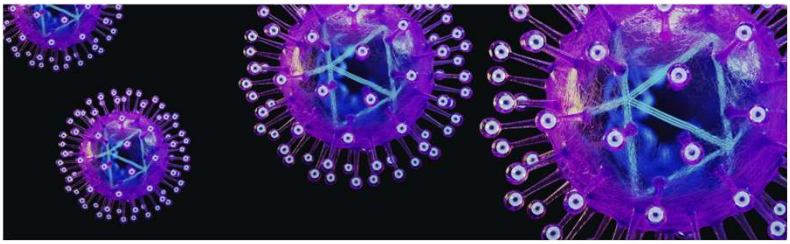
## Etiology

- HSV-1
  - Oropharyngeal disease
  - Some cases of genital herpes
- HSV-2
  - Genital disease
  - Most cases of recurrent genital herpes
  - Some cases of oropharyngeal disease



https://www.cdc.gov/std/herpes/default.htm

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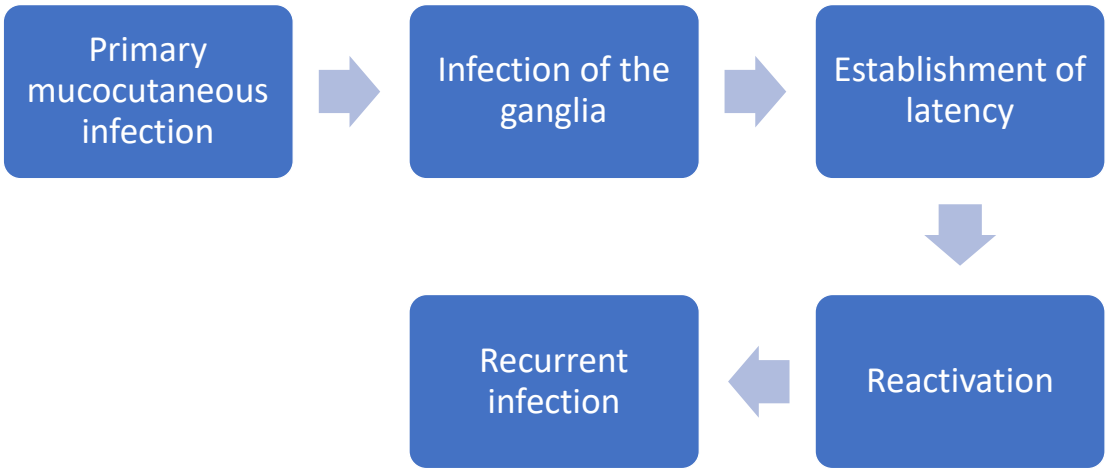
## Pathophysiology

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## Clinical Presentation

- First-episode infections
  - Asymptomatic
  - Minimally symptomatic
  - Painful vesicular and ulcerative lesions
  - Local itching, pain, or discomfort
  - Vaginal or urethral discharge
  - Flu-like symptoms
  - Severity of symptoms greater in females

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## Clinical Presentation

- Recurrent infections (50% to 80% of patients)
  - Prodrome of burning, itching, or tingling
  - Fewer lesions
  - Milder symptoms
  - Shorter duration of active infection
  - Severity of symptoms greater in females
  - Symptoms more severe in patients living with HIV

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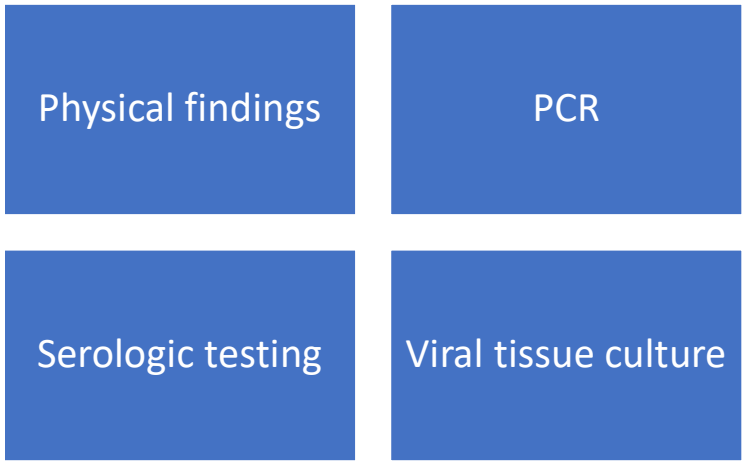
## Diagnostic Considerations

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## Treatment of First Clinical Episode

- Acyclovir 400 mg PO TID for 7 to 10 days
- Famciclovir 250 mg PO TID for 7 to 10 days
- Valacyclovir 1 g PO BID for 7 to 10 days

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## Treatment of Recurrent Infection

- Acyclovir 800 mg PO BID for 5 days
- Acyclovir 800 mg PO TID for 2 days
- Famciclovir 125 mg PO BID for 5 days
- Famciclovir 500 mg PO x1, followed by 250 mg PO BID for 2 days
- Famciclovir 1 g PO BID for 1 day
- Valacylovir 500 mg PO BID for 3 days
- Valacylovir 1 g PO daily for 5 days

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## Suppressive Treatment

- Acyclovir 400 mg PO BID
- Famciclovir 250 mg PO BID
- Valacyclovir 500 mg PO daily
- Valacyclovir 1 g PO daily (if ≥ 10 episodes)

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## Treatment of Severe Disease

- Severe disease
  - Disseminated infection
  - Pneumonitis
  - Hepatitis
  - Meningitis/encephalitis
- Parenteral therapy
  - Acyclovir 5 to 10 mg/kg IV q8h until clinical improvement
  - Followed by oral therapy for > 10 days of total therapy
  - Longer duration for CNS infections

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## Case Presentation

- Y.Y. is a 19-year-old woman who recently returned from a Spring Break trip in Cancun, Mexico.
- Two days after returning, she reports to the city of West Palm Beach Health Department with a one-day history of pain upon urination, vaginal itching, and multiple painful genital lesions.
- Y.Y. never experienced such lesions before.
- The clinician suspects genital herpes.

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## Question

- What is the best treatment regimen for Y.Y.?
  - **A) Acyclovir 400 mg PO TID for 7 days**
  - **B) Acyclovir 800 mg PO TID for 7 days**
  - **C) Famciclovir 250 mg PO BID for 5 days**
  - **D) Valacyclovir 1 g PO BID for 3 days**

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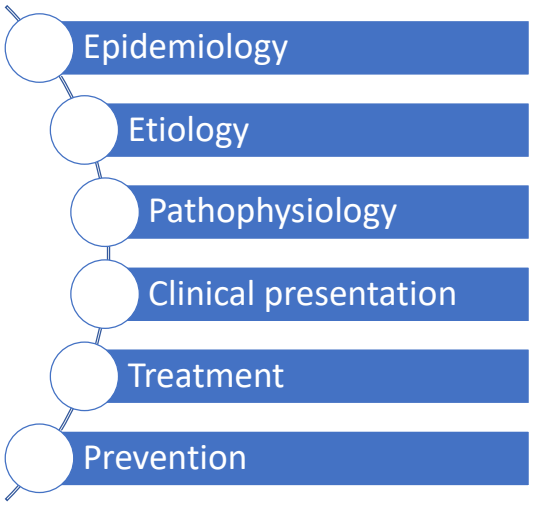
## Human Papillomavirus Infection

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## Epidemiology

- HPV infections are very common
- Nearly everyone will get HPV at some point in their lives
- >42 million people are infected
- ~13 million people, including teens, become infected each year
- HPV causes about 36,000 cases of cancer in both men and women

https://www.cdc.gov/hpv/about/index.html

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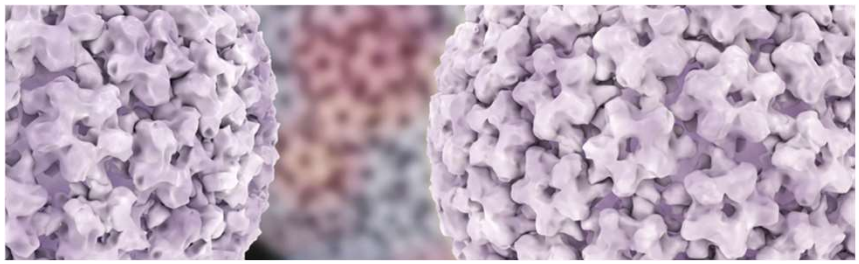
## Etiology

- HPV-6 and HPV-11
  - Low-grade dysplasia
  - Genital warts
- HPV-16 and HPV-18
  - Cervical neoplasia
  - Cervical cancer



https://www.cdc.gov/std/hpv/default.htm

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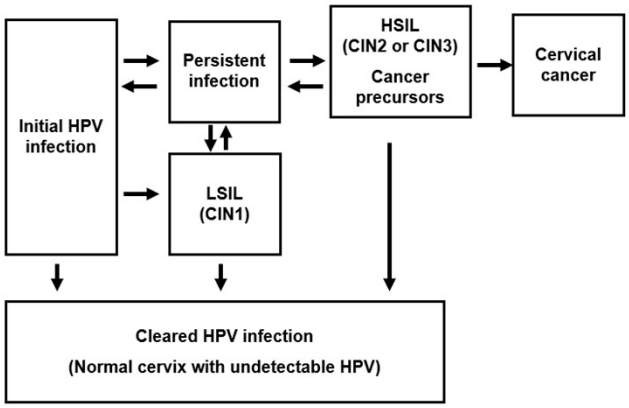
## Pathophysiology




CIN = cervical intraepithelial neoplasia
HSIL = high-grade squamous intraepithelial lesions
LSIL = low-grade squamous intraepithelial lesions

https://www.cdc.gov/vaccines/pubs/pinkbook/images/hpv-fig-1.PNG

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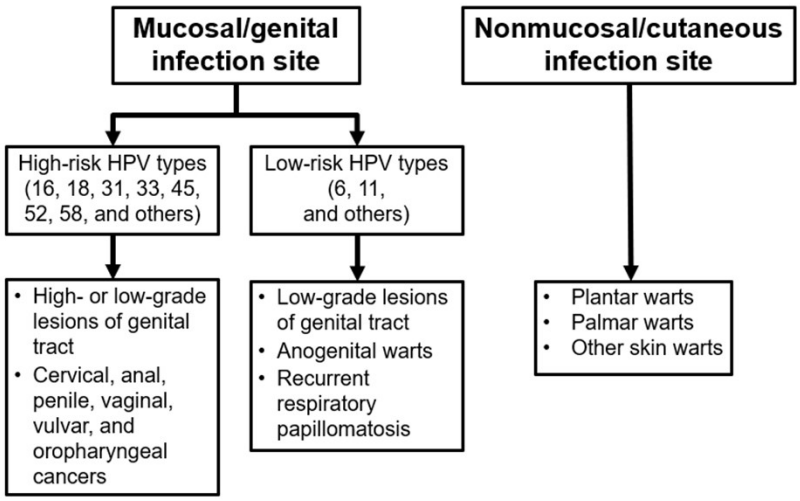
## Clinical Presentation




https://www.cdc.gov/vaccines/pubs/pinkbook/images/hpv-fig-1.PNG

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## Treatment

| Patient-applied | Provider-administered |
|---|---|
| • Imiquimod 3.75% at bedtime daily or 5% cream at bedtime 3 times a week up to 16 weeks<br>• Podofilox 0.5% solution or gel twice a day for 3 days, followed by 4 days of no therapy, this cycle can be repeated for up to four cycles<br>• Sinecatechins 15% ointment 3 times daily until complete clearance of warts is achieved (max 16 weeks) | • Cryotherapy with liquid nitrogen or cryoprobe<br>• Surgical removal by excision, curettage, laser, or electrosurgery<br>• Trichloroacetic acid or bichloracetic acid 80-90% solution |

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## Prevention


- Human papillomavirus vaccine: HPV or Gardasil 9
- Females and males: Start at 11 or 12 years old, up to 26 years old if not previously immunized
- Persons aged 27 to 45 years old also can receive HPV for catch-up immunization, up to age 45 with shared clinical decision making
- Dose: 2- or 3-dose series with second and third doses 1-2 months and 6 months after first dose, respectively
  - Age 9 to 14 years: 2-dose series is recommended
  - Age >15 years: 3-dose series is recommended
  - Persons who are immunocompromised should also receive the 3-dose series

https://www.gardasil9.com/

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## Question

- What is the most common adverse effect of Gardasil 9®?
  - **A) Erythema at injection site**
  - **B) Pain at injection site**
  - **C) Swelling at injection site**
  - **D) Syncope**

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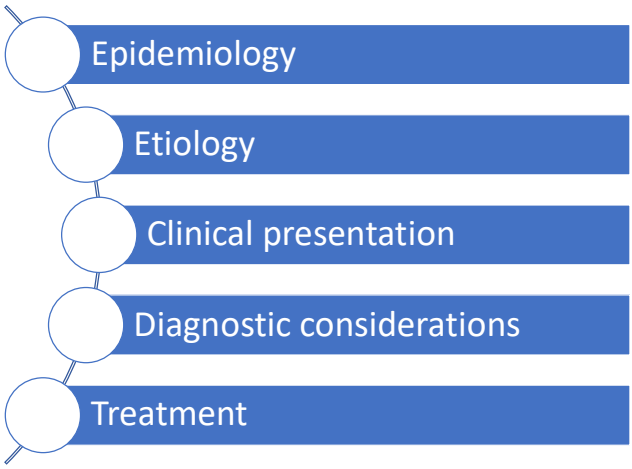
## Trichomoniasis

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## Epidemiology

- >2 million trichomoniasis infections in 2018
- Only about 30% develop any symptoms of trich
- Infection is more common in women than in men
- Older women are more likely than younger women to have the infection

https://www.cdc.gov/trichomoniasis/about/index.html

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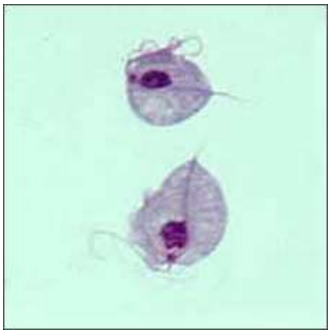
## Etiology

- *Trichomonas vaginalis*
  - Protozoan
  - Flagellated
  - Motile



https://www.cdc.gov/std/trichomonas/stdfact-trichomoniasis.htm

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## Clinical Presentation

- Men
  - **Asymptomatic**
  - Dysuria
  - Pruritus
  - Urethritis
  - Epididymitis
  - Prostatitis
- Women
  - **Asymptomatic**
  - Dysuria
  - Dyspareunia
  - Vaginal discharge
  - Vaginal odor

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## Diagnostic Considerations

- NAAT
- Wet-mount microscopy
- Antigen detection
- Culture

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## Treatment

| Recommended regimen for women | Recommended regimen for men | Alternative regimens for men and women |
|---|---|---|
| • Metronidazole 500 mg PO BID for 7 days | • Metronidazole 2 g PO x1 | • Tinidazole 2 g PO x1<br>• Secnidazole 2 g PO x1 |

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## Treatment

- If allergy to metronidazole
  - Desensitize
- If treatment failure in a woman and no reexposure
  - Metronidazole 2 g PO daily for 7 days
  - Tinidazole 2 g PO daily for 7 days
- If treatment failure in a man and no reexposure
  - Metronidazole 500 mg PO BID for 7 days

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## Case Presentation

- J.J. is a 30-year-old sexually active woman who is in your clinic complaining of itching, burning, redness, and soreness of the genitals.
- She also reports discomfort with urination and a thin yellow green discharge with an unusual smell.
- Her boyfriend W.W. feels itching and irritation inside the penis.
- NAATs for chlamydia and gonorrhea are negative.

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## Question

- What is the most likely diagnosis?
  - **A) Genital herpes**
  - **B) Genital wart**
  - **C) Trichomoniasis**
  - **D) Vulvovaginal candidiasis**

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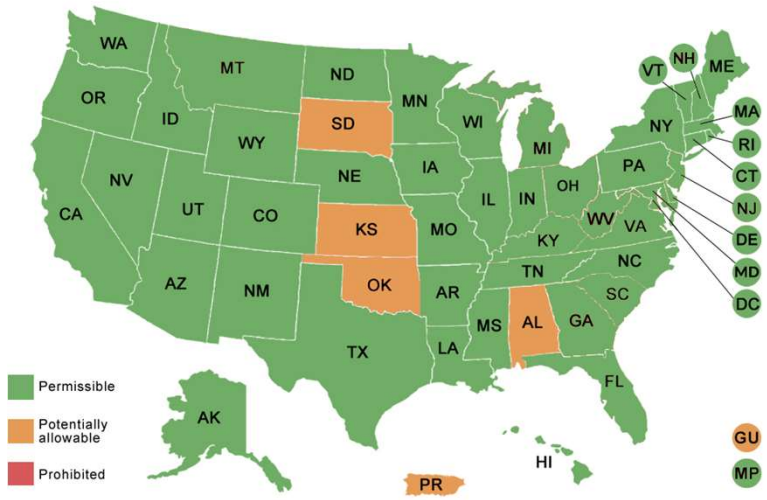
## Expedited Partner Therapy




https://www.cdc.gov/std/ept/legal/default.htm

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## Adverse Effects

| Antimicrobials | Adverse effects |
|---|---|
| Ceftriaxone | Injection site pain, allergic reactions |
| Azithromycin | Gastrointestinal upset, QT prolongation |
| Doxycycline | Gastrointestinal upset, photosensitivity |
| Benzathine penicillin G | Injection site pain, allergic reactions |
| Acyclovir | Gastrointestinal upset, malaise, headache, rash, itching |
| Metronidazole | Gastrointestinal upset, neurotoxicity, disulfiram-like reaction with alcohol? |

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## Prevention – Provider

- Engage in risk assessment, education, and counseling of persons at risk
- Offer pre-exposure vaccination for vaccine-preventable STIs
- Identify persons with STIs
- Provide diagnosis, treatment, counseling, and follow-up for persons with STIs
- Provide evaluation, treatment, and counseling of sex partners

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## CDC Recommendations for Use of Doxycycline as PEP

- Counsel MSM and TGW with a history of >1 bacterial STI during the past 12 months about the benefits and harms of using doxy PEP
- Doxycycline 200 mg once within 72 hours of oral, vaginal, or anal sex
- Providers should offer doxy PEP through shared decision-making
- Ongoing need for doxy PEP should be assessed every 3 to 6 months

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## Prevention – Patient

- Practice abstinence
- Maintain a mutually monogamous sexual relationship with an uninfected partner
- Use barrier contraceptive methods: condoms, dental dams
- Use lubrication: water-based are preferred over oil-based

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## Question

- The consistent and correct use of latex condoms provides complete protection against herpes, syphilis, and genital warts.
  - **A) True**
  - **B) False**

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## Key References and Readings


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# Sexually Transmitted Infections: A Pharmacist's Guide to Prevention, Screening, and Treatment

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