



*Ready-to-Use*

# STD Curriculum for Clinical Educators

## Gonorrhea Module

**Target Audience** - Faculty in clinical education programs, including those programs that train advanced practice nurses, physician assistants, and physicians

**Contents** - The following resources are provided in this module:

- **Faculty Notes** (Microsoft Word and Adobe Acrobat formats) - Includes notes that correspond to the slide presentation, a case study with discussion points, and test questions with answers
- **Slide Presentation** (Microsoft PowerPoint and Adobe Acrobat formats)
- **Student Handouts**
  - **Case Study** (Microsoft Word format)
  - **Test Questions** (Microsoft Word format)
  - **Slides Handout** (Adobe Acrobat format)
  - **Resources** (Microsoft Word format)

**Suggested Time Allowance** - The approximate time needed to present this module is 60-90 minutes.

These materials were developed by the Program and Training Branch, Division of STD Prevention, CDC. They are Based on the curriculum developed by the National Network of STD/HIV Prevention Training Centers (NNPTC) which includes recommendations from the 2010 CDC STD Treatment Guidelines

Information on the NNPTC can be Accessed at:  
[www.nnptc.org/](http://www.nnptc.org/)

The 2010 CDC STD Treatment Guidelines Can be accessed or ordered online at:  
[www.cdc.gov/std/treatment/](http://www.cdc.gov/std/treatment/)



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## **Gonorrhea** ***Neisseria gonorrhoeae***

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### Learning Objectives

Upon completion of this content, the learner will be able to

1. Describe the epidemiology of gonorrhea in the U.S.
2. Describe the pathogenesis of *N. gonorrhoeae*.
3. Discuss the clinical manifestations of gonorrhea.
4. Identify common methods used in the diagnosis of gonorrhea.
5. List CDC-recommended treatment regimens for gonorrhea.
6. Summarize appropriate prevention counseling messages for patients with gonorrhea.
7. Describe public health measures for the prevention of gonorrhea.

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### Lessons

- I. Epidemiology: Disease in the U.S.
- II. Pathogenesis
- III. Clinical manifestations
- IV. Diagnosis
- V. Patient management
- VI. Prevention

[Slide 4]

Lesson I: Epidemiology: Disease in the U.S.

[Slide 5]

### Incidence and Prevalence

- Gonorrhea is a significant public health problem in U.S. It is second only to chlamydia in number of cases reported to CDC. Medical cost for treatment of gonorrhea and its complications is estimated at \$56 million.
- The number of reported cases is suspected to underestimate incidence by approximately 50%.
- Incidence remains high in some groups defined by geography, age, race/ethnicity, and sexual risk behavior. This is illustrated in the surveillance slides that follow.
- The proportion of gonococcal infections caused by resistant organisms is increasing.

***DISCUSSION QUESTION:*** *What is the definition of incidence of disease? What is definition of prevalence of disease?*

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Graph: Gonorrhea--Rates, United States, 1941-2010

The rate of gonorrhea declined by 74% from 1975 to 1997 after implementation of a national gonorrhea control program in the mid-1970s. After the decline halted for several years, in 2009 the gonorrhea rate decreased further to 98.1 cases per 100,000 population. This was the lowest rate since recording of gonorrhea rates began. The rate increased slightly in 2010 to 100.8 per 100,000 population.

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Graph: Gonorrhea--Rates by State, United States and Outlying Areas, 2010

Geographic and demographic variability; highest rates reported from the South.

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Graph: Gonorrhea--Rates by Sex, United States, 1990-2010

Unlike syphilis and chlamydia, rates for men and women are very similar. In the last 10 years, gonorrhea rates among women have been slightly lower than those among men.

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Graph: Gonorrhea--Rates by Race and Ethnicity, United States, 2000-2010

Race/ethnicity: Disproportionately high rates in African Americans (18.7 times higher than whites in 2010).

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Graph: Gonorrhea--Rates by Age and Sex, United States, 2010

Age: In 2010, the highest rates were observed among women aged 15-19 and 20-24 years. Among men, the rate was highest among those aged 20-24 years.

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Risk Factors

- Multiple or new sex partners or inconsistent condom use
- Urban residence (in areas with disease prevalence)
- Adolescents (females particularly)
- Lower socio-economic status
- Use of drugs
- Exchange of sex for drugs or money
- African American

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Transmission

- Likelihood of transmission by various routes
  - Male to female via semen: Approximately 50%-70% per episode of vaginal intercourse.
  - Female vagina to male urethra: Approximately 20% per episode of vaginal intercourse and increases to approximately 60%-80% after 4 or more exposures.
  - Rectal intercourse transmission rates have not been quantified, but rectal intercourse appears to be an efficient mode of transmission.
  - Pharyngeal gonorrhea is readily acquired by fellatio but less efficiently acquired by cunnilingus.
  - Perinatal transmission (mother to infant) can occur during vaginal delivery.
- Gonorrhea and HIV Interaction
  - Gonorrhea is associated with increased susceptibility to and transmission of HIV infection. This is thought to be due to increased HIV shedding in individuals with gonococcal infections.

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Lesson II: Pathogenesis

[Slide 14]

Microbiology and Pathology

- Etiologic agent is *Neisseria gonorrhoeae*.
- Gram-negative intracellular diplococcus, oxidase-positive, utilizes glucose, but not sucrose, maltose, or lactose. Infects mucus-secreting epithelial cells.
- Divides by binary fission every 20-30 minutes.
- *N. gonorrhoeae* attaches to different types of mucus-secreting epithelial cells via a number of structures located on the surface of gonococci.
- *N. gonorrhoeae* has ability to alter these surface structures, which helps the organism evade an effective host response.
- *N. gonorrhoeae* employs several mechanisms to disarm the complement system, which may result in a survival advantage in the human host.

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Image: Gonorrhea: Gram Stain of Urethral Discharge. *Note the intracellular diplococci are diagnostic, extracellular diplococci are not.*

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Lesson III: Clinical Manifestations

*N. gonorrhoeae* causes several clinical syndromes including urogenital, pharyngeal, and rectal infections in males and females, and conjunctivitis in adults and neonates. If untreated, gonorrhea can cause pelvic inflammatory disease (PID), tubal infertility, ectopic pregnancy, and chronic pelvic pain.

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Genital Infection in Men

- Urethritis (inflammation of the urethra)
- Epididymitis (inflammation of the epididymis)

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#### Male Urethritis

- Most male patients develop overt, symptomatic urethritis.
- Symptoms: typically purulent or mucopurulent urethral discharge often accompanied by dysuria.
- Clinical presentation: purulent or mucopurulent urethral discharge is common, but discharge may be clear or cloudy.
- Asymptomatic (unrecognized) infection may occur in a minority of male cases. Asymptomatic gonorrhea may act as a reservoir in the community that perpetuates transmission from men to women.
- Incubation period: usually 1-14 days for symptomatic disease. Most become symptomatic in 2-5 days after exposure.

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Image: Gonococcal Urethritis: Purulent Discharge

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#### Epididymitis

- Symptoms: unilateral testicular pain and swelling
- Infrequent, but most common local complication of gonorrhea infection in males
- Usually associated with overt or subclinical urethritis
- Uncommon complications include inguinal lymphadenitis, penile edema, periurethral abscess or fistula, accessory gland infection (Tyson's glands), balanitis, urethral stricture, and perhaps prostatitis.

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Image: Epididymitis

[Slide 22]

#### Genital Infection in Women

- At least 50% of women infected with gonorrhea are asymptomatic.
- Cervicitis—inflammation of the cervix
- Urethritis—inflammation of the urethra

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#### Cervicitis

- Symptoms: may be nonspecific such as abnormal vaginal discharge, intermenstrual bleeding, dysuria, lower abdominal pain, or dyspareunia.
- Clinical findings: may exhibit mucopurulent or purulent cervical discharge, and easily induced cervical bleeding.
- At least 50% of women with cervicitis have no symptoms.

- Incubation period unclear, but symptoms may occur within 10 days of infection.

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Image: Gonococcal Cervicitis. Note the mucopurulent discharge from the cervical os.

[Slide 25]

Urethritis

- Symptoms: dysuria, however, most women are asymptomatic
- 70%-90% of women with cervical gonococcal infection may have urethral infection

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Complications in Women

- Accessory gland infection. Often unilateral. Occlusion of the ducts results in abscess formation. Usual involved sites are
  - Bartholin's glands
  - Skene's glands
- Pelvic Inflammatory Disease (PID)
  - Refers to ascending infection to the endometrium or fallopian tubes or both
  - May be "silent" or asymptomatic
  - Symptoms: lower abdominal pain, discharge, dyspareunia, intermenstrual bleeding, and fever
  - Clinical exam findings: uterine or adnexal tenderness or cervical motion tenderness; evidence of cervicitis with mucopurulent discharge
  - Clinical diagnosis of PID is imprecise.
  - Long-term sequelae of untreated PID include chronic pelvic pain, tubal infertility, and ectopic pregnancy.
- Perihepatitis (Fitz-Hugh-Curtis Syndrome)
  - Inflammation of the liver capsule and adjacent peritoneum associated with PID
  - Initially attributed to gonococcal infection, but now often associated with chlamydial infection
  - Characterized by right upper quadrant pain, and may be accompanied by abnormal liver function tests

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Image: Bartholin's Abscess

[Slide 28-29]

Syndromes in Men and Women

- Anorectal infection
  - Usually acquired by anal intercourse, but has also been reported in women with gonococcal cervicitis who do not acknowledge rectal sexual contact. These infections may result from perineal contamination with

infected cervical secretions. However, in several pre-AIDS studies, the rectum was the only site of infection in approximately 5% of women with gonorrhea. Anorectal infection occurs rarely, if ever, in strictly heterosexual men.

- Most cases of anorectal infection are asymptomatic, but occasional severe proctitis occurs.
- Symptoms: anal irritation, painful defecation, constipation, scant rectal bleeding, painless mucopurulent discharge, tenesmus, and anal pruritus
- Evaluation utilizing an anoscopic examination is recommended if proctitis is suspected.
- Signs: mucosa may appear normal, or purulent discharge, erythema, or easily induced bleeding may be observed with anoscopic exam
- Pharyngeal infection
  - May be sole site of infection if oral-genital contact is the only exposure
  - Most often asymptomatic, but symptoms, if present, may include pharyngitis, tonsillitis, fever, and cervical adenitis. Exudative pharyngitis is rare.
- Conjunctivitis
  - In adults, usually a result of autoinoculation
  - Symptoms/signs: eye irritation with purulent conjunctival exudate
- Disseminated gonococcal infection (DGI): a systemic gonococcal infection
  - Occurs infrequently; risk is 0.5% to 3%. More common in women than in men.
  - DGI is associated with a gonococcal strain that has a propensity to produce bacteremia without associated urogenital symptoms.
  - Clinical manifestations include skin lesions, arthralgias, tenosynovitis, arthritis, hepatitis, myocarditis, endocarditis, and meningitis.

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Image: Gonococcal Ophthalmia. Note the purulent conjunctival exudates.

[Slide 31]

Image: Disseminated Gonorrhea--Skin Lesion on Foot

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Gonococcal Infections in Children

- Perinatal: During childbirth, the neonatal conjunctiva, pharynx, respiratory tract, or anal canal may become infected. Conjunctivitis (ophthalmia neonatorum) is preventable by ocular prophylaxis in the newborn.
- Older children
  - All cases of gonorrhea in children beyond the newborn period should be considered possible evidence of sexual abuse.
  - Vulvovaginitis (not cervicitis) is the most common manifestation in prepubescent girls. Symptoms/signs: vaginal discharge (often purulent or just minor crusting at the introitus), dysuria, odor, pruritis.

- The anorectum and the pharynx are the most frequently infected sites in abused boys. Urethritis is less frequently seen.
- If specimens are to be collected, proper guidelines for collecting forensic evidence must be followed. Individual state laws concerning reporting should be consulted. Because of the legal implications of a diagnosis of *N. gonorrhoeae* infection in a child, if culture for the isolation of *N. gonorrhoeae* is done, only standard culture procedures should be performed. Gram stains are inadequate to evaluate prepubertal children for gonorrhea and should not be used to diagnose or exclude gonorrhea. Specimens from the vagina, urethra, pharynx, or rectum should be streaked onto selective media for isolation of *N. gonorrhoeae*, and all presumptive isolates of *N. gonorrhoeae* should be identified definitively by at least two tests that involve different principles (e.g., biochemical, enzyme substrate, or serologic). Isolates should be preserved to enable additional or repeated testing.

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#### Lesson IV: Diagnosis

Diagnostic technology changed significantly in past 10 years with vast improvements in test sensitivity and specificity. Tests include culture and nonculture diagnostics. Newer nonculture tests are nucleic acid detection tests, which include amplified and non-amplified tests.

[Slides 34-35]

#### Diagnostic Methods

- Culture tests
  - Advantages: low cost, suitable for a variety of specimen sites, antimicrobial susceptibility can be performed. Thayer-Martin medium is one example of medium used for culture. Direct inoculation with swab specimen is best; inoculated culture plate should be promptly placed into CO<sub>2</sub>-enriched (3%-10%) environment and incubated at 35°-37° C.
  - Anatomic sites to test: test in response to exposure history in persons at significant risk of gonococcal infection, complaints, or clinical findings.
    - In men: test urethra in all men; and pharynx and rectum, depending on symptoms and exposure history (including history of receptive anal sex or performing fellatio or cunnilingus).
    - In women: cervix should be tested; also test pharynx and rectum, if there is a history of receptive anal sex or performing fellatio or cunnilingus; vagina may be tested if cervix is absent. Bartholin's or Skene's glands may be cultured if overt exudate is expressed.
- Non-culture tests: rely on bacterial nucleic acid detection. Two types of nucleic acid detection tests: amplified and non-amplified.
  - Amplified tests: Nucleic Acid Amplification Tests (NAATs): commercially available tests include: polymerase chain reaction (PCR), e.g., Roche Amplicor; transcription-mediated amplification (TMA), e.g., Gen-Probe

Aptima; strand displacement amplification (SDA), e.g., Becton Dickinson BDProbeTec.

- Advantages
  - FDA-cleared for endocervical swabs from women, urethral swabs from men, and urine specimens from both males and females. Some NAATS are cleared for vaginal swabs.
  - For some tests, the same sample can be evaluated for *C. trachomatis*.
  - Not FDA-cleared for oropharyngeal or rectal specimens, though individual laboratories can obtain waivers.
  - There is a concern about cross-reactivity with other *Neisseria* species with BD ProbeTec when used at the oropharyngeal site.
  - Sensitivity is better than culture
- Non-amplified tests: DNA probe, i.e., Gen-Probe PACE 2 and Digene Hybrid Capture II
  - Less likely to be affected by handling than culture, stable in transport
  - For some tests, same sample can also be evaluated for *C. trachomatis*
  - FDA-cleared for endocervical specimens from women and urethral specimens from men
  - Less sensitive than amplified tests
- Gram-stained smear: polymorphonuclear leukocytes (PMNs) with intracellular Gram-negative diplococci.
  - Advantages
    - Reliable either to diagnose or exclude gonorrhea urethritis in symptomatic men
    - Male urethra in symptomatic urethritis: >95% sensitivity and >99% specificity; sensitivity less for asymptomatic urethritis
  - Not recommended for endocervical specimens from women, or pharyngeal or rectal specimens from men or women due to low sensitivity.

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#### Clinical Considerations

- In cases of suspected sexual abuse
  - In adults, NAATs are preferred for diagnostic evaluation of sexual assault, regardless of penetration.
  - In children, data on use of NAATs for detection of *N. gonorrhoeae* are limited, and performance is test dependent. Consultation with an expert is necessary before using NAATs in this context to minimize the possibility of cross-reaction with nongonococcal *Neisseria* species and other commensals. NAATs can be used as an alternative to culture with vaginal specimens or urine from girls, whereas culture remains the preferred method for urethral specimens or urine from boys and for extragenital specimens (pharynx and rectum) from all children. All positive specimens should be retained for additional testing.

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## Lesson V: Patient Management

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### Antimicrobial Susceptibility of *N. gonorrhoeae*

- Antimicrobial resistance is an increasing problem. Resistance to one or more different antimicrobials can be found in 20%-30% of gonococci in the U.S.
  - Fluoroquinolone resistance
    - Quinolone-resistant *N. gonorrhoeae* (QRNG) is widely disseminated throughout the U.S. and the world.
    - Quinolones are no longer recommended therapy for gonorrhea treatment.
  - Approximately 25% of gonorrhea isolates are resistant to penicillin, tetracycline, or both, and the emergence of multidrug-resistant isolates (resistant to penicillin, tetracycline, and fluoroquinolones) with decreased susceptibility to cefixime has been noted.
  - Approximately 0.5% of gonorrhea isolates show decreased susceptibility to azithromycin.
  - Decreased susceptibility to ceftriaxone and cefixime has been reported recently.

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Graph: Gonococcal Isolate Surveillance Project (GISP)--Percent of *N. gonorrhoeae* isolates with resistance or intermediate resistance to ciprofloxacin, 1990-2010

- Antimicrobial resistance is an increasing problem. Quinolone-resistant *N. gonorrhoeae* (QRNG) has become so prevalent that quinolones are no longer recommended for the treatment of gonorrhea.

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Graph: Gonococcal Isolate Surveillance Project (GISP)—Proportion of *Neisseria gonorrhoeae* Isolates with Elevated Cefixime MICs, 2000-2010

- This graph displays the overall proportion of GISP isolates with elevated minimum inhibitory concentrations (MICs) of cefixime of 0.25 micrograms per ml or greater. The proportion of isolates with the elevated MICs remained relatively low through 2006. In 2009 and 2010, the proportion increased, to 1.4% in 2010, a statistically significant increase.
- Antibiotic susceptibility testing or laboratory testing for resistance use MICs to determine the amount of antibiotics needed to kill *N. gonorrhoeae* in the laboratory. Higher MICs indicate that higher amounts or concentrations are needed to kill the bacteria; increases in MICs over time suggest that resistance might emerge.

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Graph: Gonococcal Isolate Surveillance Project (GISP)—Proportion of *Neisseria gonorrhoeae* Isolates with Elevated Ceftriaxone MICs, 2000-2010

- This graph displays the data on ceftriaxone susceptibility. There was a small but significant increase over time in the proportion of isolates with elevated MICs of ceftriaxone. Note that these percentages are still quite small.

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Treatment for Uncomplicated Gonococcal Infections of the Cervix, Urethra, and Rectum

- Recommended regimen
  - Ceftriaxone 250 mg IM in a single dose
  - PLUS**
  - Azithromycin 1 g orally in a single dose, OR
  - Doxycycline 100 mg orally twice a day for 7 days

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Treatment for Uncomplicated Gonococcal Infections of the Cervix, Urethra, and Rectum

- Alternative regimen 1: **If ceftriaxone is not available:**
  - Cefixime 400 mg orally in a single dose
  - PLUS**
  - Azithromycin 1 g orally in a single dose, OR
  - Doxycycline 100 mg orally twice a day for 7 days
  - PLUS**
  - Test of cure in 1 week

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Treatment for Uncomplicated Gonococcal Infections of the Cervix, Urethra, and Rectum

- Alternative regimen 2: **If the patient is cephalosporin-allergic:**
  - Azithromycin 2 g orally in a single dose
  - PLUS**
  - Test of cure in 1 week

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Treatment of Uncomplicated Gonococcal Infections of the Pharynx

- Recommended regimen
  - Ceftriaxone 250 mg IM in a single dose
  - PLUS**
  - Azithromycin 1 g orally in a single dose, OR
  - Doxycycline 100 mg orally twice a day for 7 days

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## Special Considerations: Pregnancy

- Those infected with *N. gonorrhoeae* should be treated with recommended cephalosporin-based combination therapy.
- Women who cannot tolerate a cephalosporin should receive azithromycin 2g orally. A test of cure should be performed 1 week after treatment.
- Pregnant women should not be treated with quinolones or tetracyclines. Spectinomycin is not commercially available.

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#### Penicillin-Allergic

- Azithromycin 2 g orally if documented severe penicillin allergy with a test of cure 1 week after treatment
- Desensitization is impractical in most settings

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#### Follow-Up

- A test of cure is not recommended if the patient is treated with the CDC-recommended regimen of ceftriaxone plus either azithromycin or doxycycline
- A test of cure is recommended 1 week after treatment if the patient is treated with an alternative regimen
- If symptoms persist, perform culture for *N. gonorrhoeae*; any gonococci isolated should be tested for antimicrobial susceptibility at the site of exposure.
- Patient should be encouraged to follow up for repeat testing in 3 months, regardless of whether they have symptoms or not.

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#### Lesson VI: Prevention

### [Slide 50]

#### Screening (testing patients without symptoms)

- Pregnancy:
  - A test for *N. gonorrhoeae* should be performed at the first prenatal visit for women at risk, or for women living in an area in which the prevalence of *N. gonorrhoeae* is high.
  - A repeat test should be performed during the third trimester for those at continued risk.
- The U.S. Preventive Service Task Force recommends that clinicians screen all sexually active women, for gonorrhea infection if they are at increased risk of infection (e.g., women with previous gonorrhea infection, other STDs, new or multiple sex partners, and inconsistent condom use; those who engage in commercial sex work and drug use; women in certain demographic groups; and those living in communities with a high prevalence of disease). Women aged <25 years are at highest risk for gonorrhea infection.

- The CDC recommends screening of sexually active men who have sex with men at least annually at anatomic sites of exposure: urethra and rectum for gonorrhea and chlamydia, and pharynx for gonorrhea.

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Partner Management

- All sex partners of patients who have gonorrhea should be evaluated and treated for gonococcal and chlamydial infection if their last sexual contact with the patient was within 60 days before the onset of symptoms or diagnosis of infection in the patient.
- If a patient's last act of sexual intercourse was >60 days before onset of symptoms or diagnosis, the patient's most recent sex partner should be treated.
- Patients and partners should avoid sexual intercourse until therapy is completed and they no longer have symptoms.
- For heterosexual patients whose partners' treatment cannot be ensured, delivery of antibiotic therapy by the patient to their partners is an option.

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Reporting

- Laws and regulations in all states require that persons diagnosed with gonorrhea are reported to public health authorities by clinicians, labs, or both. For information on reporting requirements in your area, check with your state or local health department.

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Patient Counseling and Education: the nature of disease, transmission issues, and risk reduction

- Nature of the disease
  - Gonorrhea is usually symptomatic in males and usually asymptomatic in females.
  - Untreated gonorrhea in women can result in upper genital tract infection which may result in PID, infertility, and ectopic pregnancy.
  - Untreated gonorrhea in men can result in epididymitis or other less common complications such as penile edema, abscess, and stricture.
- Transmission issues
  - *N. gonorrhoeae* is efficiently transmitted from males to females via vaginal intercourse, rectal intercourse, and fellatio.
  - *N. gonorrhoeae* can be transmitted from females to males via vaginal intercourse and less efficiently by cunnilingus.
  - Patients with gonorrhea are more likely to transmit and acquire HIV.
  - Patients should abstain from intercourse until therapy is completed and until they and their sex partners no longer have symptoms.
- Risk reduction--The clinician should
  - Assess the patient's potential to change behavior,
  - Develop individualized risk-reduction plans with the patient,

- Discuss prevention strategies, ( i.e., abstinence, mutual monogamy with an uninfected partner, condom use, and limiting the number of sex partners). Latex condoms, when used consistently and correctly, can reduce the risk of transmission of gonorrhea.

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#### Case Study

Robert Forbes is a 33-year-old male who presents to his doctor reporting a purulent urethral discharge and dysuria for 3 days.

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#### History: Robert Forbes

- 33-year-old male investment broker living in Dallas with history of travel to Las Vegas 3 weeks ago.
- Complains of a purulent urethral discharge and dysuria for 3 days.
- Became sexually involved with a new female partner (Laura) 2 months ago. They have unprotected vaginal intercourse approximately 4 times per week, the last time being 2 days ago. They don't have oral or rectal sex.
- Robert states Laura is asymptomatic.
- Robert states he also had a one-time sexual encounter with a woman he met in Las Vegas 3 weeks ago (Monica). They had oral (Monica performed fellatio on Robert) and vaginal sex. No condoms used.
- Non-smoker and occasional runner, with good diet. No prior history of urethral discharge or STDs, no sore throat or rectal discomfort, no illicit drug use. His last HIV test 1 year ago was negative.

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#### Physical Exam

- Vital signs: blood pressure 98/72, pulse 68, respiration 14, temperature 37.2° C
- Cooperative, good historian
- Chest, heart, musculoskeletal, and abdominal exams within normal limits
- No flank pain on percussion, normal rectal exam, no sores or rashes
- The genital exam reveals a reddened urethral meatus with a purulent discharge, without lesions or lymphadenopathy.

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#### Questions

1) What should be included in the differential diagnosis?

Correct responses include the following:

- Chlamydia--Chlamydial discharge is usually mucoid, if present at all. Most chlamydial infections in men are asymptomatic.
- Gonorrhea--This clinical presentation is consistent with gonorrhea, although chlamydia cannot be ruled out.

2) Which laboratory tests would be appropriate to order or perform?

Correct responses include the following:

- Urethral swab for *N. gonorrhoeae* culture or NAAT
- Pharyngeal swab for *N. gonorrhoeae* culture or NAAT
- Gram stain of urethral swab--when capability exists, a Gram stain of a urethral swab can provide early indication for a gonorrhea diagnosis.
- Urine or urethral NAAT for gonorrhea and chlamydia. This would be appropriate given the symptom history and history of risky sexual behavior. Patients infected with *N. gonorrhoeae* are often co-infected with *C. trachomatis*.
- Syphilis screen with RPR or VDRL--The history of risky sexual behavior is an indication for syphilis screening.
- Counseling and testing for HIV--The history of risky sexual behavior is an indication for HIV counseling.

3) What is the appropriate treatment regimen?

- Ceftriaxone 250 mg intramuscularly plus azithromycin 1 gm orally once or doxycycline 100 mg orally twice a day for 7 days.
- This is an appropriate regimen for gonorrhea, and gonorrhea is a reasonable diagnosis for this presentation. Regardless of chlamydial test results, dual therapy for gonorrhea is recommended.

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## Laboratory Results

### Results of laboratory tests

- Urethral and pharyngeal culture showed growth of a Gram-negative diplococcus that was oxidase-positive. Biochemical and FA conjugate testing confirmed this isolate to be *N. gonorrhoeae* at both anatomic sites.
- The NAAT for chlamydia was negative.
- The RPR was nonreactive.
- The HIV antibody test was negative.

4) What is the diagnosis, based on all available information?

- Gonorrhea – urogenital and pharyngeal

5) Who is responsible for reporting this case to the local health department?

- Depending on local requirements, the health care provider, the laboratory, or both are responsible for reporting the case. Gonorrhea is a reportable STD in all U.S. states and territories. In most areas, both the provider and the laboratory are required to report gonorrhea cases to the local health department. Check

with your local health department for details on reporting requirements in your area.

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#### Partner Management

Upon further questioning, Robert admits to having another sex partner, in addition to Laura and Monica, within the past 3 months. Information on Robert's sex partners is as follows:

Laura

Last exposure--unprotected vaginal sex 2 days ago

Monica

Last exposure--unprotected oral (Monica performed fellatio on Robert) and vaginal sex 3 weeks ago while he was in Las Vegas

Jerilyn

Last exposure--unprotected vaginal sex 3 months ago

6) Laura was examined and her lab results came back negative for gonorrhea and chlamydia. How should Laura be managed?

Even if her lab tests are negative, Laura should receive Ceftriaxone 250mg intramuscularly in a single dose and azithromycin 1 gm orally once, since she was exposed to gonorrhea.

7) What tests should Jerilyn and Monica have?

Monica should have pharyngeal and cervical testing since she had both oral and vaginal sex with Robert within the last 60 days.

Jerilyn does not need to be examined since her last contact with Robert was >60 days ago. It is unlikely that she is related to this infection.

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#### Follow-Up

Robert returns 4 months later for an employer-sponsored flu shot. He took his medications as directed, is asymptomatic, and has had no sex partners since his office visit to you.

8) Does Robert need repeat testing for gonorrhea?

Yes, repeat testing is recommended after 3 months, even in individuals who are asymptomatic after treatment.

9) What are appropriate prevention counseling messages for Robert?

Correct responses include the following:

- Gonorrhea is most often symptomatic in males and asymptomatic in females.
- Untreated gonorrhea in women can result in upper genital tract infection which may result in PID, infertility, or ectopic pregnancy.
- Untreated gonorrhea in men can result in epididymitis or other less common complications such as penile edema, abscess, and strictures.
- *N. gonorrhoeae* is efficiently transmitted from males to females via vaginal intercourse, rectal intercourse, and fellatio.
- *N. gonorrhoeae* can be transmitted from females to males via vaginal intercourse and less efficiently by cunnilingus.
- Patients with gonorrhea are more likely to transmit and acquire HIV.
- Patients should abstain from intercourse until therapy is completed and until they and their sex partners no longer have symptoms.
- Latex condoms, when used consistently and correctly, can reduce the risk of transmission of gonorrhea.

## TEST QUESTIONS

1. The region of the U.S. with the highest rate of gonorrhea is
  - a) Western U.S.
  - b) Midwest U.S.
  - c) Southeast U.S.**
  - d) Northeast U.S.
2. The male-to-female ratio of gonorrhea infection in the U.S. is
  - a) 2:1
  - b) 1:1**
  - c) 1:2
  - d) 3:1
3. Quinolone-resistant *N. gonorrhoeae* (QRNG) is endemic in which state?
  - a) Hawaii
  - b) Pennsylvania
  - c) California
  - d) All of the Above**
4. The proportion of gonococcal infections caused by resistant organisms is increasing. What effect does this have on treatment?
  - a) Change in treatment recommendations**
  - b) Change in diagnostic procedures
  - c) No effect
  - d) Change in partner notification procedures
5. Peak incidence in women occurs in what age group?
  - a) 15-19**
  - b) 20-24
  - c) 25-29
  - d) 30-34
6. Gonorrhea is efficiently transmitted in which of the following ways:
  - a) Male to female during vaginal intercourse
  - b) Female to male during vaginal intercourse
  - c) Rectal intercourse
  - d) All of the above**
7. Which of the follow best describes *N. gonorrhoeae*?
  - a) Gram-negative rod
  - b) Gram-negative diplococcus**
  - c) Gram-positive diplococcus
  - d) Gram-positive rod
8. Which of the following assists *N. gonorrhoeae* in evading the host response?

- a) Multiple sites of entry
  - b) Short incubation period
  - c) Alters surface structures**
  - d) Does not depend on complement system
9. *N. gonorrhoeae* attaches to what type of cells?
- a) T-cells
  - b) Epithelial cells**
  - c) Interstitial cells
  - d) Epithelial cells and T-cells
  - e) All cell types
10. Which of the following statements best describes the clinical signs and symptoms of gonorrhea in women?
- a) Most women complain of a purulent discharge.
  - b) Most women complain of urinary symptoms.
  - c) It depends on the strain of gonorrhea.
  - d) Most women are asymptomatic.**
11. Which clinical sign is indicative of gonorrhea in women?
- a) Cervicitis**
  - b) Dyspareunia
  - c) Dysuria
  - d) None of the above
12. A complication of untreated gonorrhea in women is
- a) Bartholin's abscess
  - b) Pelvic inflammatory disease
  - c) Skene's abscess
  - d) All of the above**
13. Which of the following statements best describes the clinical signs and symptoms of gonorrhea in men?
- a) Most men complain of testicular pain.
  - b) Most men complain of dysuria or urethral discharge.**
  - c) It depends on the strain of gonorrhea.
  - d) Most men are asymptomatic.
14. Which of the following is true regarding gonorrhea symptoms in men?
- a) Painful urination is always present.
  - b) Purulent discharge from the urethra is always present.
  - c) Some men have no symptoms.**
  - d) Testicular pain and epididymal tenderness are often present.
15. When gonorrhea is diagnosed, what is the next course of action?
- a) Treat and screen for chlamydia and other STDs.

- b) Repeat test for gonorrhea in 3 months.
  - c) Contact, test, and treat sexual contacts from the past 60 days.
  - d) Discuss risk reduction behaviors.
  - e) **All of the above**
16. A common complication of untreated gonorrhea in men is
- a) Urethral stricture
  - b) Periurethral abscess
  - c) Fistula
  - d) **None of the above**
17. Which of the following statements is true regarding pharyngeal gonorrhea?
- a) It is usually symptomatic.
  - b) It produces a cough.
  - c) It can result from autoinoculation.
  - d) **It may be the sole site of infection.**
18. Common sites of perinatal gonorrheal infection include all of the following except
- a) **Genitals**
  - b) Conjunctiva
  - c) Pharynx
  - d) Respiratory system
19. Which of the following is a method to diagnose gonorrheal infection?
- a) Nucleic acid amplification technique (NAAT)
  - b) Culture
  - c) Gram stain
  - d) **All of the above**
20. Which of the following regimens is the **best** option in the case of an 18-year-old male with an uncomplicated gonococcal infection, and who has not been tested for chlamydia?
- a) Ceftriaxone 250 mg intramuscularly in a single dose
  - b) Azithromycin 1 g orally in a single dose
  - c) **Ceftriaxone 250 mg intramuscularly in a single dose plus azithromycin 1 g orally in a single dose**
  - d) Spectinomycin 2 g in a single IM dose plus levofloxacin 500 mg orally for 7 days
21. Which of the following describes the best way to handle a gonorrhea culture?
- a) Freeze immediately and transport.
  - b) Put inoculated culture plate into warmer.
  - c) Put inoculated culture plate into an O<sub>2</sub>-enriched environment.
  - d) **Put inoculated culture plate into a CO<sub>2</sub>-enriched environment.**
22. All of the following statements about Gram stain in gonorrhea diagnosis are true except

- a) A Gram stain is reliable to diagnose gonorrhea in males.
  - b) A Gram stain is reliable to diagnose gonorrhea in females.**
  - c) A Gram stain does not have a high sensitivity in asymptomatic males.
  - d) A Gram stain is not recommended to diagnose pharyngeal gonorrhea.
23. Gonorrhea in pregnancy should be treated with quinolones or tetracyclines.
- a) True
  - b) False**
24. Which of the following would be appropriate treatment for gonorrhea acquired in Las Vegas?
- a) Ceftriaxone 250 mg intramuscularly once and azithromycin 1 gm orally once**
  - b) Ciprofloxacin 500 mg once orally
  - c) Ofloxacin 400 mg once orally
  - d) Levofloxacin 250 mg once orally
25. All partners who have had sex with an infected person within the past \_\_\_\_ days should be treated.
- a) 30 +
  - b) 45
  - c) 60**
  - d) 90
26. Patient education for gonorrhea should include which of the following?
- a) Nature of the disease and complications
  - b) Transmission issues
  - c) Risk reduction
  - d) All of the above**

## RESOURCES

### Publications

1. CDC. [Update to CDC's sexually transmitted diseases treatment guidelines, 2006: fluoroquinolones no longer recommended for treatment of gonococcal infections.](#) MMWR 2007; 56:332–6.
2. CDC. Guidelines for the laboratory diagnosis of gonorrhea, chlamydia and syphilis. Available at [www.afpl.org/afplprograms/infectious/std/Pages/stdtestingguidelines.aspx](http://www.afpl.org/afplprograms/infectious/std/Pages/stdtestingguidelines.aspx)
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12. Newman LM, Moran JM, Workowski KA. Update on the Management of Gonorrhea in Adults in the United States. *Clin Inf Dis* 2007:44 (Suppl 3). [Peterman TA, Tian LH, Metcalf CA, et al.](#) High incidence of new sexually transmitted infections in the year following a sexually transmitted infection: a case for rescreening. *Ann Intern Med*. 2006 Oct 17; 145(8):564-72. [Summary for patients](#) in: *Ann Intern Med*. 2006 Oct 17; 145(8):144.
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15. Weinstock H, Berman S, Cates W Jr. Sexually transmitted diseases among American youth: incidence and prevalence estimates, 2000. *Perspect Sex Repro Hlth*, 2004; 36(1): 6-10.
16. Workowski KA. Emerging antimicrobial resistance in *Neisseria gonorrhoeae*: Urgent need to strengthen prevention strategies. *Ann Int Med* 2008; 148:606-613.
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### Websites and Other Resources

1. CDC, Division of STD Prevention: [www.cdc.gov/std](http://www.cdc.gov/std)
2. CDC. Gonococcal isolate surveillance project (GISP). Available from URL: [www.cdc.gov/std/gisp](http://www.cdc.gov/std/gisp).
3. National Network of STD/HIV Prevention Training Centers: [www.nnptc.org](http://www.nnptc.org)
4. 2010 CDC STD Treatment Guidelines (including e-Book for iPad, iPhone, iPod Touch): [www.cdc.gov/STD/treatment/](http://www.cdc.gov/STD/treatment/)
5. STD information and referrals to STD clinics  
 CDC-INFO  
 1-800-CDC-INFO (800-232-4636)  
 TTY: 1-888-232-6348  
 In English, en Español
6. CDC National Prevention Information Network (NPIN): [www.cdcpin.org](http://www.cdcpin.org)
7. American Social Health Association (ASHA): [www.ashastd.org](http://www.ashastd.org)