



*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 Training and Health Communication 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 2002 CDC STD Treatment Guidelines.

Information on the NNPTC can be accessed at:

<http://www.stdhivpreventiontraining.org>

The 2002 CDC STD Treatment Guidelines can be accessed or ordered online at:

<http://www.cdc.gov/std/treatment/default.htm>



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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

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### **I. Epidemiology: Disease in the U.S.**

[Slide 5]

- A. Incidence and prevalence
  1. 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.
  2. Historically, the rate rose steadily between 1957 and 1975. The rate declined by 73.8% from 1975 to 1997 after implementation of national gonorrhea control program in the mid-1970s, but increased in 1998 and has remained essentially unchanged.
  3. The number of reported cases is suspected to underestimate incidence by approximately 50%.
  4. 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.
  5. 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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- B. Graph: Gonorrhea--reported rates: United States, 1970-2003 and the Healthy People 2010 objective

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- C. Graph: Gonorrhea--rates by state: United States and outlying areas, 2003
  - 1. Geographic and demographic variability; highest rates reported from the South

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- D. Graph: Gonorrhea--rates by sex: United States, 1981-2003 and the Healthy People 2010 objective

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- E. Graph: Gonorrhea--rates by race and ethnicity: United States, 1981-2003 and the Healthy People 2010 objective
  - 1. Race/ethnicity: disproportionately high rates in African Americans

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- F. Graph: Gonorrhea--age- and sex-specific rates: United States, 2003
  - 1. Age: peak incidence in men 20-24 years, women 15-19 years; >80% of cases occur between age 15-29 years when rates for men and women are combined

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- G. Graph: Gonococcal Isolate Surveillance Project (GISP)--Percent of *N. gonorrhoeae* isolates with resistance or intermediate resistance to ciprofloxacin, 1990-2003
  - 1. Antimicrobial resistance is an increasing problem. Quinolone-resistant *N. gonorrhoeae* (QRNG) is endemic in Hawaii and California with rates exceeding 5% and is appearing with increasing frequency, although sporadically, elsewhere in the U.S.

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- H. Risk factors and risk markers
  - 1. Multiple or new sex partners or inconsistent condom use
  - 2. Urban residence (in areas with disease prevalence), adolescents (females particularly), lower socio-economic status, use of drugs, exchange of sex for drugs or money

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- I. Transmission
  - 1. Likelihood of transmission by various routes

- a) Male to female via semen: approximately 50%-70% per episode of vaginal intercourse
  - b) Female to male urethra: approximately 20% per episode of vaginal intercourse and increases to approximately 60%-80% after 4 or more exposures
  - c) Rectal intercourse transmission rates have not been quantified, but rectal intercourse appears to be an efficient mode of transmission.
  - d) Pharyngeal gonorrhea is readily acquired by fellatio but less efficiently acquired by cunnilingus.
  - e) Perinatal transmission (mother to infant) can occur in a vaginal delivery.
- J. Gonorrhea and HIV interaction
- 1. 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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## II. Pathogenesis

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- A. Microbiology
  - 1. Etiologic agent is *Neisseria gonorrhoeae*
  - 2. Gram-negative intracellular diplococcus, oxidase-positive, utilizes glucose, but not sucrose, maltose, or lactose. Infects mucus-secreting epithelial cells.
  - 3. Divides by binary fission (every 20-30 minutes)
- B. Pathology
  - 1. *N. gonorrhoeae* attaches to different types of mucus-secreting epithelial cells via a number of structures located on the surface of gonococci.
  - 2. *N. gonorrhoeae* has ability to alter these surface structures, which helps the organism evade an effective host response.
  - 3. *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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- C. Image: Gonorrhea: Gram stain of urethral discharge

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## 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 is a major cause of pelvic inflammatory disease (PID), tubal infertility, ectopic pregnancy, and chronic pelvic pain.

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- A. Genital infection in men
  - Urethritis (inflammation of the urethra)
  - Epididymitis (inflammation of the epididymis)

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1. Urethritis

- a) Most male patients develop overt, symptomatic urethritis.
- b) Symptoms: typically purulent or mucopurulent urethral discharge often accompanied by dysuria
- c) Clinical presentation: purulent or mucopurulent urethral discharge is common, but discharge may be clear or cloudy
- d) Asymptomatic (unrecognized) infection may occur in approximately 10% of male cases. Asymptomatic gonorrhea may act as a reservoir in the community that perpetuates transmission from men to women.
- e) 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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2. Epididymitis

- a) Symptoms: unilateral testicular pain and swelling
- b) Infrequent, but most common local complication of gonorrhea infection in males
- c) Usually associated with overt or subclinical urethritis
- d) 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

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B. Genital infection in women

Approximately 50% of women infected with gonorrhea are asymptomatic.

Cervicitis—inflammation of the cervix

Urethritis—inflammation of the urethra

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1. Cervicitis

- a) Symptoms: may be nonspecific such as abnormal vaginal discharge, intermenstrual bleeding, dysuria, lower abdominal pain, or dyspareunia
- b) Clinical findings: may exhibit mucopurulent or purulent cervical discharge and easily induced cervical bleeding
- c) Incubation period unclear, but symptoms may occur within 10 days of infection
- d) 50% of women with clinical cervicitis have no symptoms

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

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2. Urethritis
  - a) Symptoms: dysuria; however, most women are asymptomatic
  - b) 40%-60% of women with cervical gonococcal infection may have urethral infection

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

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Image: Bartholin's abscess

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- C. Syndromes seen in men and women
  1. Anorectal infection
    - a) Usually acquired by anal intercourse but has also been reported in women with gonococcal cervicitis who do not acknowledge rectal sexual contact. These infections are assumed to 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.

- b) Most cases of anorectal infection are asymptomatic, but occasional severe proctitis occurs.
  - c) Symptoms: anal irritation, painful defecation, constipation, scant rectal bleeding, painless mucopurulent discharge, tenesmus, and anal pruritus
  - d) Evaluation utilizing an anoscopic examination is recommended if gonococcal proctitis is suspected.
  - e) Signs: mucosa may appear normal, or purulent discharge, erythema, or easily induced bleeding may be observed with anoscopic exam
2. Pharyngeal infection
    - a) May be sole site of infection if oral-genital contact is the only exposure
    - b) Most often asymptomatic but symptoms, if present, may include pharyngitis, tonsillitis, fever and cervical adenitis. Exudative pharyngitis is rare.
  3. Conjunctivitis
    - a) In adults, usually a result of autoinoculation
    - b) Symptoms/signs: eye irritation with purulent conjunctival exudate
  4. Disseminated gonococcal infection (DGI): a systemic gonococcal infection
    - a) Occurs infrequently; risk is 0.5% to 3%. More common in women than in men.
    - b) DGI is associated with a gonococcal strain that has a propensity to produce bacteremia.
    - c) Clinical manifestations include skin lesions, arthralgias, tenosynovitis, arthritis, hepatitis, myocarditis, endocarditis, meningitis.

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Image: Gonococcal ophthalmia. Note the purulent conjunctival exudates.

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Image: Disseminated gonorrhea--skin lesion on foot

[Slide 32]

#### D. Infections in children

1. 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.
2. Older children:
  - a) All cases of gonorrhea in children beyond the newborn period should be considered possible evidence of sexual abuse.
  - b) Vulvovaginitis (not cervicitis) is most common manifestation in prepubescent girls. Symptoms/signs: vaginal discharge (often purulent or just minor crusting at the introitus), dysuria, odor, pruritis.
  - c) The anorectum and the pharynx are the most frequently infected sites in abused boys. Urethritis is less frequently seen.

- d) If specimens are to be collected, proper guidelines for collecting forensic evidence must be followed. Individual state laws concerning reporting should be consulted.

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#### IV. Laboratory Diagnosis

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

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##### A. Culture

1. 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<sup>o</sup>-37<sup>o</sup> C.
2. Anatomic sites to test: test in response to complaints or clinical findings and exposure history in persons at significant risk of gonococcal infection.
  - a) In men: urethra in all; pharynx and rectum, depending on symptoms and exposure history (including history of receptive anal sex or performing fellatio or cunnilingus)
  - b) In women: cervix should be tested; 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.

##### B. Non-culture tests: the most common non-culture tests rely on detection of bacterial nucleic acid) in patient samples. Two types of nucleic acid detection tests: amplified and non-amplified.

1. 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.
  - a) Advantages
    - 1) Most are FDA-cleared for endocervical swabs from women, urethral swabs from men. Most tests are also cleared for testing urine from both males and females.
    - 2) For some tests, the same sample can be evaluated for *C. trachomatis*.
    - 3) Not approved for oropharyngeal or rectal specimens
    - 4) Sensitivity is as good as culture
2. Non-amplified tests: DNA probe, i.e., Gen-Probe PACE 2 and Digene Hybrid Capture II
  - a) Advantages
    - 1) Less likely to be affected by handling than culture, stable transport

- 2) For some tests, same sample can also be evaluated for *C. trachomatis*
- 3) FDA-cleared for endocervical specimens from women and urethral specimens from men
- C. Gram-stained smear: the presence of polymorphonuclear leukocytes (PMNs) with intracellular Gram-negative diplococci indicates positivity for gonorrhea.
  - 1. Advantages
    - a) Reliable either to diagnose or exclude gonorrhea in symptomatic men
    - b) Male urethra in symptomatic urethritis: >95% sensitivity and >99% specificity; sensitivity less for asymptomatic urethritis
  - 2. Not recommended for endocervical specimens from women, or pharyngeal or rectal specimens from men or women

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Clinical considerations

- D. In cases of suspected sexual abuse, the legal standard is culture to confirm the identity of *N. gonorrhoeae*.

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## V. Patient Management/Treatment

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- A. 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.
  - 1. Fluoroquinolone resistance
    - a) The incidence of quinolone-resistant *N. gonorrhoeae* (QRNG) is increasing.
    - b) The prevalence of QRNG exceeds 5% in Hawaii and California.
    - c) QRNG has become relatively common in parts of Asia and the Pacific (approximately 40% of GC in Japan and the Philippines).
    - d) Quinolones are no longer recommended therapy for gonorrhea acquired in Hawaii, California, Asia, or the Pacific Islands. They are also not recommended for treatment of gonorrhea in MSM.
    - e) Taking a travel history and inquiring about sexual orientation is important.
    - f) Approximately 18% of gonorrhea isolates are resistant to penicillin, tetracycline, or both.

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- B. CDC-recommended regimens for treatment of uncomplicated gonococcal infections of the cervix, urethra, and rectum in adults
  - 1. Recommended regimens
    - a) Cefixime 400 mg orally in a single dose, OR
    - b) Ceftriaxone 125 mg IM in a single dose, OR
    - c) Ciprofloxacin 500 mg orally in a single dose,\* OR
    - d) Ofloxacin 400 mg orally in a single dose,\* OR
    - e) Levofloxacin 250 mg orally in a single dose\*

\*Quinolones should not be used for infections acquired in California, Asia, the Pacific Islands including Hawaii, and other areas with increased prevalence of fluoroquinolone resistance. The CDC recommends that clinicians no longer use fluoroquinolones as a first-line treatment for gonorrhea in MSM.

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- C. Unless chlamydia infection is ruled out, CDC recommends the following for co-treatment for *C. trachomatis*:
- 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 and alternative regimens

D. Pregnancy

1. Pregnant women should not be treated with quinolones or tetracyclines. Those infected with *N. gonorrhoea* should be treated with a recommended or alternate cephalosporin. Women who cannot tolerate a cephalosporin should be administered a single, 2 g dose of spectinomycin IM.

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E. Alternative regimens

- a) Spectinomycin 2 g in a single IM dose
- b) Single-dose cephalosporin regimens
  - 1) Ceftizoxime 500 mg IM
  - 2) Cefoxitin 2 g IM with Probenecid 1 g orally
  - 3) Cefotaxime 500 mg IM
- c) Single-dose quinolone regimens
  - 1) Gatifloxacin 400 mg orally
  - 2) Norfloxacin 800 mg orally
  - 3) Lomefloxacin 400 mg orally

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F. Follow-up

1. A test of cure is not recommended if the patient is treated with a CDC-recommended regimen.
2. If symptoms persist, perform culture for *N. gonorrhoeae*; any gonococci isolated should be tested for antimicrobial susceptibility.

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**VI. Prevention**

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A. Screening (testing without symptoms)

1. 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.

2. A repeat test should be performed during the third trimester for those at continued risk.
3. Other populations should be selected for screening based on local prevalence of gonorrhea and the patient's risk behaviors.

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B. Partner management

1. All sex partners of patients who have gonorrhea should be evaluated and treated for gonorrheal and chlamydial infection if their last sexual contract with the patient was within 60 days before the onset of symptoms or diagnosis of infection in the patient.
2. 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.
3. Patients and partners should avoid sexual intercourse until therapy is completed and they no longer have symptoms.

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- C. 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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D. Patient counseling and education: should cover the nature of disease, transmission issues, and risk reduction

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

- c) 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

## 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

- 33-year-old male investment broker living in Dallas with history of travel to Hawaii 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 Hawaii 3 weeks ago (Monica). They had oral (Robert was receptive partner) 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:

- Culture of urethral swab for *N. gonorrhoeae*
- Gram stain of urethral swab--when capability exists, a Gram stain of a urethral swab can provide early indication for a gonorrhea diagnosis.

- Non-culture test 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 125 mg IM plus 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. Chlamydia is the other possible diagnosis, and patients infected with gonorrhea are often coinfecting with chlamydia. Chlamydia can be effectively treated with azithromycin or with doxycycline, and it is appropriate to administer this dual therapy unless chlamydia is ruled out.

Based on Robert's history of travel to Hawaii, quinolones (e.g., ciprofloxacin, ofloxacin, levofloxacin) are not appropriate therapy.

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### Laboratory Results

Results of laboratory tests:

- Urethral culture showed growth of a Gram-negative diplococcus that was oxidase-positive. Biochemical and FA conjugate testing confirmed this isolate to be *N. gonorrhoeae*.
- The DNA probe 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

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.

The CDC Division of STD Prevention website contains a link to state and some local health departments: [http://www.cdc.gov/nchstp/dstd/Public\\_Health\\_dept.htm](http://www.cdc.gov/nchstp/dstd/Public_Health_dept.htm)

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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 (Robert was receptive partner) and vaginal sex 3 weeks ago while he was in Hawaii

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 Cefixime 400 mg orally in a single dose since she was exposed to gonorrhea.

7) What tests should Jerilyn and Monica have?

Both cervical and pharyngeal swabs should be taken on Monica since she had 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 1 month 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 a test of cure?

No, tests of cure are not recommended 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 rates 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) Georgia
  - b) Pennsylvania
  - c) California**
  - d) Texas
4. The proportion of gonococcal infections caused by resistant organisms is increasing. What effect does this have on treatment?
  - a) Change in treatment recommendations in affected areas and affected populations**
  - 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?
- Multiple sites of entry
  - Short incubation period
  - Alters surface structures**
  - Does not depend on complement system
9. *N. gonorrhoeae* attaches to what type of cells?
- T-cells
  - Epithelial cells**
  - Interstitial cells
  - Epithelial cells and T-cells
  - All cell types
10. Which of the following statements best describes the clinical signs and symptoms of gonorrhea in women?
- Most women complain of a purulent discharge.
  - Most women complain of urinary symptoms.
  - It depends on the strain of gonorrhea.
  - Most women are asymptomatic.**
11. Which clinical sign is indicative of gonorrhea in women?
- Cervicitis**
  - Dyspareunia
  - Dysuria
  - None of the above
12. A complication of untreated gonorrhea in women is:
- Bartholin's abscess
  - Pelvic inflammatory disease
  - Skene's abscess
  - All of the above**
13. Which of the following statements best describes the clinical signs and symptoms of gonorrhea in men?
- Most men complain of testicular pain.
  - Most men complain of urinary symptoms.**
  - It depends on the strain of gonorrhea.
  - Most men are asymptomatic.
14. Which of the following is true regarding gonorrhea symptoms in men?
- Painful urination is always present.
  - Purulent discharge from the urethra is always present.
  - Some men have no symptoms.**
  - Testicular pain and epididymal tenderness are often present.
15. When gonorrhea is diagnosed, what is **not** the next course of action?

- a) Treat and screen for chlamydia and other STDs
  - b) Test for antimicrobial resistance**
  - c) Contact, test, and treat sexual contacts within 60 days
  - d) Discuss risk reduction behaviors
16. A common complication of untreated gonorrhea in men is:
- a) Proctitis
  - b) 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) Cell culture techniques, using live cells
  - 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 125 mg IM in a single dose
  - b) Azithromycin 1 g orally in a single dose
  - c) Cefixime 400 mg orally 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 Hawaii?
- a) Ceftriaxone 125 mg IM 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 days
  - b) 45 days
  - c) 60 days**
  - d) 90 days
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

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16. 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.

### **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: <http://depts.washington.edu/nnptc/>
4. 2002 CDC STD Treatment Guidelines (including downloadable version for Palm devices): <http://www.cdc.gov/STD/treatment/>
5. CDC National STD Hotline: 800-227-8922 or 800-342-2437
  - a. En Español: 800-344-7432
  - b. TTY for the Deaf and Hard of Hearing: 800-243-7889
6. CDC National Prevention Information Network (NPIN): [www.cdcnpin.org](http://www.cdcnpin.org)
7. American Social Health Association (ASHA): [www.ashastd.org](http://www.ashastd.org)