

**The 21<sup>st</sup> Century Epidemic:  
Confronting Sexually Transmitted  
Diseases**

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**Objectives**

- Define common sexually transmitted diseases (STDs)
- Assess the epidemiology of STD and financial burden on the society
- Identify risk factors and available opportunities for prevention
- Explain the clinical manifestations associated with specific STDs
- Recommend treatment options
- Describe adverse effect(s) for each drug used in the management of STDs

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**Epidemiology Highlights**

- 19 million new infections occur yearly in the US
- 1 in 4 teens has a sexually transmitted disease (STD)
- 750,000 cases of PID occur each year
- Estimated 2.8 million cases of chlamydia occur each year
- Could result in permanent infertility in women

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**\$\$\$\$\$ burden**

- American Sexually Transmitted Disease Association (ASTDA) estimated the cost of gonorrheal infection at \$210 per case without including intangible and indirect cost
- Direct chlamydial costs: \$678 million per year
- Cost of infertility that could be a chlamydia sequelae exceeds \$5 billion/year

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**Current STD Facts**

- Broadened spectrum
- Number of infected people is on the rise
- Clinical manifestations are diverse
- Drug resistance
- Etiology is diverse- bacteria, protozoal and viral
- The infected population demographics
- Emergence of complications

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**Source of Infection**

| Bacterial                | Viral                       | Protozoal   | Fungal              |
|--------------------------|-----------------------------|-------------|---------------------|
| Syphilis                 | Human                       | Trichomonas | Vaginal candidiasis |
| Gonorrhoeae              | Immunodeficiency            | Vaginalis   |                     |
| Chlamydia                | Virus (HIV)                 |             |                     |
| Trachomatis              | Hepatitis B & C (HBV, HCV)  |             |                     |
| Mycoplasma genitalium    | Herpes Simplex              |             |                     |
| Lymphogranuloma venereum | Virus (HSV)                 |             |                     |
| Chancroid                | Human Papilloma Virus (HPV) |             |                     |

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**STD Focus**

- Gonorrhea
- Chlamydia
- Syphilis
- Genital Herpes
- Trichomoniasis
- Human Papilloma Virus

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Urethritis and Cervicitis  
Gonorrhea  
Chlamydia trachomatis

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**Gonorrhea's Presentation in Males:  
Urethritis & Epididymitis**

- 10 % of the cases are asymptomatic
- Most symptomatic patients who are left untreated becomes asymptomatic within 6 months
- Only few becoming asymptomatic carriers of the disease

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**Gonorrhea's Presentation in Males:  
Urethritis & Epididymitis**

- Urethritis symptoms:
  - Purulent or mucopurulent urethral discharge
  - Dysuria and urinary frequency
  - Incubation period: 1-14 days for symptomatic disease, may be longer
- Epididymitis symptoms:
  - Unilateral testicular pain and swelling

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**Gonorrhea's Presentation in  
Females: Cervicitis**

- 50% of women with clinical cervicitis are asymptomatic
- Symptoms are non specific
  - Abnormal vaginal/cervical mucopurulent or purulent discharge
  - Intermenstrual bleeding
  - Urethral infection: Dysuria, urinary frequency
  - 40-60 % of women with cervical infection also have urethral infection

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**Slide of a gram stain of gonococcal  
infection**



<http://www.textbookofbacteriology.net/neisseria.html>

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**Gonorrhea: Transmission & Diagnosis**

- Male to female via semen (40%)
- Female to male urethra (10%)
- Rectal intercourse
- Pharyngeal infection(oral intercourse)
- Perinatal transmission (mother to infant)
- Diagnosis: cultures and gram stains from the affected area or clinical specimen

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**Gonorrhea Complications**

- Disseminated gonococcal infection (DGI)
  - 3 x more in females than males
- Epididymitis
- Accessory gland infections
  - Bartholin's glands (labia)
  - Skene's glands (lower vaginal/upper urethral area)
- Pelvic inflammatory disease (PID)
- Fitz-Hugh-Curtis syndrome
  - perihepatitis

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**Treatment of Uncomplicated Gonorrheal Infections**

- **Ceftriaxone** (Rocephin®) 125 mg IM single dose
- **Cefixime** (Suprax®) 400 mg orally in a single dose or 400 mg by suspension (200 mg/5ml)
- *Alternative regimens: a single cephalosporin therapy*
  - Ceftrizoxime (cefizox®)500 mg IM; cefoxitin ( 2g IM administered with probenecid 1 g orally; cefotaxime (Claforan®)500 mg IM
  - Cefpodoxime (Vantin®) 400 mg or cefuroxime axetil (Ceftin®) 1g orally

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**Gonococcal infections in Pregnancy**

- Cephalosporins are safe in pregnancy
- Ceftriaxone 125 mg IM x 1
- Any other recommended PO cephalosporin can also be used

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**Treatment of DGI**

- Ceftriaxone 1g IM or IV every 24 hrs
- Alternative regimens:
  - Cefotaxime 1 g IV every 8 hours
  - Ceftizoxime 1 g IV every 8 hours
  - Spectinomycin\* 2g IM q 12 hours
- Continue for 24-48 hours after improvement begins the switch to oral treatment with cefixime or cefpodoxime x 7 days

\* Spectinomycin is not currently available in the US

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**Treat for chlamydial infections also unless ruled out!!!!**

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**Chlamydia trachomatis Presentation in Males: Urethritis**

- Most commonly transmitted STD in the US
- >50 % of urethral and rectal infections are asymptomatic
- Symptoms onset is 7-21 days
- Urethritis signs and symptoms: mild dysuria, mucopurulent discharge

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**Chlamydia trachomatis Presentation in females: Cervicitis and Urethritis**

- >70 % of cervical infections are asymptomatic
- Symptoms onset is 7-21 days
- cervicitis signs and symptoms:
  - mucopurulent vaginal discharge or uterine bleeding with scraping
- Urethritis:
  - usually asymptomatic pain
  - dysuria with pus when present

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**Chlamydia trachomatis transmission & diagnosis**

- Most commonly transmitted STD in the US
- Highly transmissible sexually or vertically
- 2/3 of infants acquire chlamydial infection during birth
  - 50 % of exposed infants develop conjunctivitis
  - 16% develop pneumonia
- Diagnosis:
  - Cell culture is the reference standard
  - NAAT: amplify and detect DNA genomes from a urethral , cervical swabs or urine sample

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### Treatment of Uncomplicated Genital Chlamydial Infections

- Azithromycin 1 g orally as a single dose
- Doxycycline 100 mg orally twice daily for 7 days
- Alternative regimens:
  - Erythromycin base 500 mg orally four times a day x 7 days
  - Erythromycin ethylsuccinate 800 mg orally four times a day x 7 days
  - Ofloxacin<sup>a</sup> 300 mg orally twice a day for 7 days
  - Levofloxacin<sup>a</sup> 500 mg orally once a day for 7 days

*a- contraindicated in pregnancy*

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### Chlamydia in Pregnancy

- All previous options except fluoroquinolones are acceptable regimens

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### Chlamydial Complications

- Epididymitis in males
- Perihepatitis
- Salpingitis in females
- Pelvic Inflammatory Disease
- Reiter's syndrome
  - Rare reactive arthritis (3% of the cases)

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**Case no. I**

- PJ is a 28 yr old male who comes to your pharmacy for the first time with 2 prescriptions. Per patient's interview, PJ is aware that he is being treated for chlamydia and gonorrhea that he acquired upon a trip to South Korea. The patient is married but he withheld these information from the outpatient clinic.
  - Doxycycline 100 mg po bid #14 no refills
  - Cipro 500 mgx1 no refills

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**Case no. I Question I**

- How effective are the treatment approaches in this case?

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**Case No. I question I answers**

- For chlamydia: patient might not be compliant with 7 days treatment of doxycycline
  - Suggest azithromycin 1g x1
- For Gonorrhea: Fluoroquinolones are not recommended due to the increase incidence of resistance
  - Suggest cefixime 400 mg x 1 or ceftriaxone 125 mg IM x1

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**Case No.1 Question 2**

- What if the patient is allergic to penicillin?

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**Case No.1 question 2 answer**

- Spectinomycin 2g IM x 1
- Azithromycin 2g po x 1 (treat both but high incidence of nausea)

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**Common Complications of Gonorrhea & Chlamydia**

- Pelvic Inflammatory Disease (PID)
- Epididymitis

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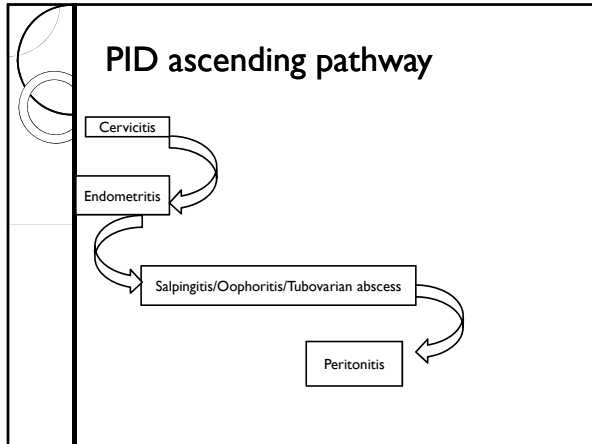
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### PID sequelae

- Increase in ectopic pregnancy rates by 12-15%
- Increase in the occurrence of tubal occlusion with infertility in 50% of women after three episodes of PID.
- Chronic pelvic pain

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### PID treatment

- Parenteral and oral regimens appear to have similar efficacy in mild to moderately severe cases.
- Switch from IV to PO within 24 hours of clinical improvement
- Women who do not respond to oral therapy after 72 hours should be reevaluated and IV therapy should be started (IM or IV)
- Cover for gonorrhea and chlamydia with or without coverage for facultative anaerobes i.e (bacteroides species)

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**PID-Oral Regimen**

Ceftriaxone 250 mg IM in a single dose  
OR  
Cefoxitin 2 g IM in a single dose with  
probenecid 1g orally  
PLUS  
Doxycycline 100 mg oral twice daily x 14  
days

With or without  
Metronidazole 500 mg orally twice daily  
x 14 days

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**PID-Parenteral Regimen**

- Regimen A

Cefotetan 2g IV every 12 hours  
OR  
Cefoxitin 2g IV every 6 hours  
PLUS  
Doxycycline 100 mg orally or IV q 12  
hours x 14 days

*Can substitute ampicillin/sulbactam 3g iv q 6 hrs for either cefotetan or  
cefoxitin in Regimen A as an alternative regimen.*

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**PID- Parenteral Regimen**

- Regimen B

Clindamycin 900 mg IV every 8 hours  
PLUS  
Gentamicin 2mg/kg IV or IM loading  
dose followed by 1.5 mg/kg every 8 hours.  
Single daily dosing may be substituted.  
THEN  
Switch to Doxycycline 100 mg orally twice  
daily x 14 days

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**PID- Parenteral Regimen**

- Regimen B  
Clindamycin 900 mg IV every 8 hours  
PLUS  
Gentamicin 2mg/kg IV or IM loading dose followed by 1.5 mg/kg every 8 hours.  
Single daily dosing may be substituted.  
THEN  
Switch to Doxycycline 100 mg orally twice daily x 14 days

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**Epididymitis Treatment**

- Empiric treatment to cover both chlamydia and gonorrhea with :
  - ceftriaxone 250 mg IM in a single dose  
PLUS Doxycycline 100 mg orally twice a day x 10 days
- Acute epididymitis causes possible by gram negative or with a negative gonococcal culture or ANA test:
  - Ofloxacin 300 mg orally twice a for 10 days or levofloxacin 500 mg orally once a day for 10 days

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**Possible adverse events**

- Penicillin allergies
- Metallic taste
- Nephrotoxicity
- photosensitivity

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### Syphilis

- Over 36,000 cases were reported in 2006
- Mostly among young people with age ranging between 20-39.
- In 2006, 64% of the reported primary and secondary cases are among men who have sex with men (MSM)

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### Syphilis

- Bacterium spirochete *Treponema pallidum*
- Incubation period: 9-90 days
- Spread through contact with infectious lesions or body fluids and vertically (transplacentally)
- Pathology:
  - Travels via lymphatic system to regional lymph nodes and throughout the body via blood stream
  - CNS invasion can occur during any stage of syphilis

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### Graph syphilis trends

P&S Syphilis Rates By Gender, 1981-2007

| Year | Males (Cases per 100,000) | Females (Cases per 100,000) |
|------|---------------------------|-----------------------------|
| 1981 | 18                        | 7                           |
| 1983 | 22                        | 7                           |
| 1985 | 16                        | 7                           |
| 1987 | 18                        | 7                           |
| 1989 | 22                        | 12                          |
| 1991 | 24                        | 16                          |
| 1993 | 18                        | 10                          |
| 1995 | 10                        | 6                           |
| 1997 | 5                         | 4                           |
| 1999 | 3                         | 3                           |
| 2001 | 4                         | 4                           |
| 2003 | 5                         | 5                           |
| 2005 | 6                         | 6                           |
| 2007 | 7                         | 7                           |

<http://www.cdc.gov/std/stats07/images/trends-syphilis-780.gif>

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### Picture of bacteria



Seattle STD/HIV Prevention Training Center Source: University of Washington

Description: Treponema pallidum spirochetes seen with darkfield microscope

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### Stages of syphilis

|   |   |
|---|---|
| Primary   | <ul style="list-style-type: none"> <li>• Single painless sore (Chancre) at the site of inoculation</li> <li>• Appears at 9-90 days after exposure (average of 21 days)</li> <li>• Lasts 3-6 weeks and heals without treatment.</li> <li>• If not treated adequately, a progression to secondary stage occurs</li> </ul> |
| Secondary   | <ul style="list-style-type: none"> <li>• Maculopapular rash</li> <li>• Lymphadenopathy</li> <li>• Rare hepatitis and renal complications</li> </ul>   |
| Tertiary or early latent  | <ul style="list-style-type: none"> <li>• Asymptomatic-appear after primary and secondary symptoms disappear</li> <li>• Can subsequently damage internal organs</li> </ul>   |
| Late latent (one year post exposure per CDC and >2 years per WHO) | <ul style="list-style-type: none"> <li>• Can last for years and can occur in 15% of patients who have not been treated</li> <li>• Can appear 10-20 years after acquisition</li> <li>• Can result in complications &amp; systemic involvement of CNS, cardiovascular and skeletal that can result in death</li> </ul>    |

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### Syphilis diagnoses requires 2 tests

- Screening
  - Rapid plasma regain (RPR)
  - Venereal disease research laboratory (VDRL)
- Confirmation
  - Fluorescent Treponema antibody (FTA-ABS)
  - Treponemal protein (TP-PA)
  - CSF analysis if neurological symptoms or HIV +

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**Treatment**

- Depends on the stage
- Antibiotics-Penicillin G as drug of choice
- Alternative antibiotics in penicillin allergic patients
- Curable
- Warn patients on penicillin treatment about Jarisch-Herxheimer Reaction

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**Therapy for primary, secondary, and early latent syphilis**

- Benzathine G penicillin 2.4 million units IM in a single dose
- If penicillin allergic:
  - Doxycycline 100 mg orally twice daily x 14 days
  - Tetracycline 500 mg 4 times a day x 14 days
  - ? Ceftriaxone 1 g IM or IV daily x 8-10 days

CDC

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**Therapy for late latent syphilis or latent syphilis of unknown duration or tertiary syphilis without neurological involvement**

- Benzathine penicillin G 2.4 million units IM every week x 3 doses
- If penicillin allergic:
  - Doxycycline 100 mg orally twice daily X 28 days
  - Tetracycline 500 mg orally 4 times daily x 28 days

CDC

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### Neurosyphilis

- Aqueous crystalline penicillin G 3-4 million units IV every 4 hours for 10-14 days
- Continuous infusion of 24 million units for 10-14 days
- Alternative
  - Penicillin G procaine 2.4 million units IM once daily with Probenecid 500 m g po daily for 10-14 days

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### Jarisch- Herxheimer Reaction

- Acute febrile reaction
- Headache, myalgia, tachycardia, increased respiratory rate
- Can occur within 24 hours of penicillin treatment
- Supportive care: NSAID and bed rest

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### Treatment Monitoring

- Treatment effectiveness: a 4-fold decline in RPR or VDRL titers in 6-12 months
- Early treatment: serology negative in 1-2 months
- Latent treatment: may result in life long reactivity at low titers

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### Treatment follow up

- Follow up titers should be compared to the maximum or baseline RPR or VDRL titer obtained on day 1 of treatment
- Primary or secondary syphilis
  - Re-examine at 6 and 12 months
  - 3,6,9, & 12 months in HIV patients
- Latent syphilis
  - Re-examine at 6, 12, 18 & 24 months in HIV and non-HIV patients
- Neurosyphilis
  - Serology as above
  - Repeat CSF examination at 6 month intervals until normal

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### Syphilis Prevention

- Avoid alcohol and drug use
- Communication between sex partners about their STDs status

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### Syphilis and HIV

- 2-5 fold increased risk of acquiring HIV if exposed while syphilis is present
- Ulcerative sores
- Presence of other STDs- behavioral marker

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**Syphilis and pregnancy**

- Vertical transmission
- Stillbirth
- Untreated infected babies suffer serious complications such as seizures, delayed development or death can occur

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**Case N.o2**

- You are a pharmacist who works in an outpatient clinic. A 20 yr old female walks in with a macular rash all over her trunk, arms, head and feet. Per patient's interview, she remembers having episodes of fever almost a week ago that she took some Tylenol for. Also, she reported having vaginal ulceration almost a month ago that healed spontaneously. Per serology testing the patient appears to have syphilis. NKDA

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**Case N.O 2 Questions?**

- What additional tests need to be done on this patient?

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**Case N.o 2 answers**

- HIV, pregnancy, chlamydia, gonorrhoea, HSV

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**Case N.O 2 Questions?**

- Patient comes positive with VDRL positive, all other tests are negative. What treatment options do we have?

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**Case N.o 2 answers**

- Secondary syphilis. Give penicillin Benzathine 2.4 MU IM x 1

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**Case N.O 2 Questions?**

- What side effect need to watch for?

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**Case N.o 2 answers**

- Jarisch-Herxheimer Reaction

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**Herpes Simplex Virus (HSV)**

- STD caused by HSV-1 or HSV-2
- Affect >50 million people in the US
- Most genital herpes are caused by HSV-2 (85-90 % of the cases)
- Each year 1.5 million new cases of genital herpes in the US
- Silent infection
- Transmitted via breaks in skin, viral access to mucosal surface

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### Genital Herpes

Clinical Presentation

- Multifactorial
- Viral type
- Gender
  - More severe symptoms with women than men
- Prior immunity
  - Exposure to HSV1 decreases severity of HSV-2
- Age

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### Genital herpes

Signs and symptoms

- Most patients are not aware, never have sores
- First outbreak within 2 weeks of exposure
- Sores heal within 2-4 weeks
- Flu-like symptoms and swollen glands

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### Genital Herpes

#### Four Infection Types

- Primary infection:
  - 1<sup>st</sup> infection ever with HSV-1 or HSV-2
  - Painful ulcers with flu-like symptoms
  - Local symptoms such as dysuria, itching, vaginal discharge and lymphadenopathy
  - Transit from peripheral nerves to local ganglia
  - Antibodies are not present

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**Genital Herpes**  
**Four Infection Types**

- Non-primary infection:
  - Newly acquired HSV-1 or HSV-2 infection in a previously exposed individual to either virus
  - Milder symptoms
  - Antibodies present when symptoms appear

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**Genital Herpes**  
**Four Infection Types**

- Recurrent symptomatic infection:
  - Most frequent during the first 3 months after the primary infection
  - Prodromal symptoms begin 12-24 hours before lesions including local irritation and tingling
  - Illness lasts 5-10 days
  - Milder disease and shorter duration

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**Genital Herpes**  
**Four Infection Types**

- Asymptomatic infection:
  - No known history of clinical outbreaks
  - Rates of asymptomatic shedding are greater with HSV-2 than HSV-1
  - Shedding rates are greatest in the first 3 months after infections

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### Diagnostic tests

- Viral culture-gold standard
  - Genital ulcers, mucocutaneous lesions
- Antigen detection
  - Useful in healing lesions
- PCR
  - useful for detecting HSV in spinal fluid

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### Management of Genital Herpes

- Systemic treatment
  - No eradication
  - Partially controls symptoms & signs of herpes episodes
  - Does not affect risk, frequency or severity of recurrences after drug is discontinued
  - Decrease risk of transmission by viral shedding

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### HSV treatment in non-HIV patients

| Oral regimens                  | Acyclovir                         | Famciclovir | Valacyclovir                          |
|--------------------------------|-----------------------------------|-------------|---------------------------------------|
| New Episode* (7-10 days)       | 400 mg TID<br>200 mg 5 x/day      | 250 mg TID  | 1 gram BID                            |
| Recurrent** (5 days)           | Same as above<br>Or<br>800 mg BID | 125 mg BID  | 500 mg BID for 5 days or 1 gram daily |
| Suppression (continuous daily) | 400 mg BID                        | 250 mg BID  | 500 mg or 1 gram daily***             |

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### Treatment of HSV complications

- Disseminated infections, pneumonitis, hepatitis, CNS complication
- IV acyclovir 5-10 mg/Kg IV every 8 hrs for 2-7 days or until clinical improvement then follow with oral treatment to completed 10 days of therapy

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### HSV and HIV

- Is there an association between HSV-2 and acquiring HIV?
- Hypothesis:  
“ the biological plausibility of this association is explained in part by the portal of entry created during the time of genital ulceration among HSV-2 infected persons and also in part by the influx of HIV target cells that occurs during episodes of HSV-2 reactivation.” (Koelle et al. J Infect. Dis. 169(5):956-961; Zhu et al. J. Exp Med 204(3):595-603(2007))

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### HSV and HIV

Will suppressive HSV-2 treatment prevent HIV transmission?

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| Author                                     | Title   | Journal   | Results   |
|--|---|---|---|
| Watson-Jones D, Weiss HA, rusizoka M et al | Effect of Herpes simplex suppression on incidence of HIV among women in Tanzania.   | N. Eng J Med 358(15), 1560-1571 (2008).   | Acyclovir 400 mg BID for 12 months: NO difference in HIV incidence after 2 yrs follow up  |
| Celum C, Wald A, Hughes J et al            | Effect of acyclovir on HIV-1 acquisition in herpes simplex virus 2 seropositive women and men who have sex with men: a randomized, double-blind, placebo-controlled trial.  | Lancet 371(9630), 2109-2119(2008)   | No impact on the risk of HIV acquisition despite high levels of adherence to acyclovir  |
| Celum C, Wald A, Lingappa J et al          | Twice daily acyclovir to reduce HIV-1 transmission from HIV-1/HSV2 co-infected persons within HIV-1 sero discordant couples: a randomized, double-blind, placebo-controlled trial. (the partners in prevention study) | Presented at: 5 <sup>th</sup> international AIDS Society Conference on HIV pathogenesis, treatment and prevention, Cape Town, South Africa, 19-22 July 2009 (Abstract WELBC101) | No reduction in HIV transmission but a delay in disease progression observed (CD4<250, death due to AIDS, or ART initiation, perinatal transmission) by 17% |

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## HSV and HIV

- Is there an association between HSV-2 and acquiring HIV?
- Hypothesis:
 

“ the biological plausibility of this association is explained in part by the portal of entry created during the time of genital ulceration among HSV-2 infected persons and also in part by the influx of HIV target cells that occurs during episodes of HSV-2 reactivation.” (Koelle et al; Infect. Dis. 169(5),956-961; Zhu et al; J. Exp Med 204(3),595-603(2007))

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## HSV and HIV

- Understand the biological level of HSV-2 reactivation
  - Zhu J, Hladik F, Woodward A et al: Persistence of HIV-1 receptor-positive cells after HSV-2 reactivation is a potential mechanism for increased HIV-1 acquisition. *Nat. Med.* 15(8), 886-892 (2009)
  - 8 volunteers that are HIV negative with HSV-2 recurrent episode were studied
  - punch biopsies were taken during the time of clinically symptomatic ulcerative lesions, at resolution and then at 2, 4 and 8 weeks after healing.
  - 4 patients were treated with acyclovir 400 bid at the start of the episode for 20 weeks.
  - Biopsy results showed an acute inflammatory response with CD4+ and CD8+ influx persisting for months in spite of acyclovir treatment
- HSV-2 Vaccine?

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### HSV and HIV

- Tenofovir gel has been proven to prevent HIV, HSV infection?
  - Phase 2b randomized, double-blind, placebo controlled centre for the AIDS Program of Research in South Africa (CAPRISA) 004 trial- Announced at the XVIII international AIDS 2010 conference .
  - Tenofovir 1% prefilled applicator of gel up to 12 hrs before intercourse and as soon as possible (up to 12 hrs after sex) for a maximum of 2 doses in a 24- hour period.
- Will the new guidelines include this recommendation?

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### Severe HSV and HIV co-infected

- Outbreaks are prolonged
- Severe atypical and painful lesions
- Increased shedding of both HIV and HSV
- Check for sensitivity if concerned about response
  - Foscarnet 40 mg/kg iv q 8 hrs until resolution
  - Topical cidofovir gel 1% applied once daily for 5 days

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### HIV/HSV co-infected

| Oral regimens         | Acyclovir                      | Famciclovir | Valacyclovir |
|-----------------------|--------------------------------|-------------|--------------|
| Episodic<br>5-10 days | 400 mg TID                     | 500 mg BID  | 1 gram BID   |
| Daily Suppressive     | 800 mg BID<br>or<br>400 mg TID | 500 mg BID  | 500 mg BID   |

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### HSV in pregnancy

- 2% of women acquire HSV during pregnancy
- 1500-2000 new cases occur are diagnosed each year
- Can be transmitted to the infant before, during, or after delivery
- Maternal age <21 yrs old is a risk factor for vertical transmission
- Intrapartum transmission account for 905 of the cases
- C-section is protective against neonatal infection

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### HSV treatment Side effects

- Class side effects for all synthetic guanine nucleoside analog i.e acyclovir family drugs:
  - Nausea, vomiting, abdominal pain
  - Neurotoxicity
  - Nephrotoxicity
  - Thrombotic thrombocytopenic purpura/hemolytic uremia syndrome with valacyclovir

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Vaginitis Curriculum

### Vaginitis Differentiation

|                      | Normal         | Bacterial Vaginosis  | Candidiasis                                   | Trichomoniasis                           |
|----------------------|----------------|--|---|--|
| Symptom presentation |                | Odor, discharge, itch  | Itch, discomfort, dysuria, thick discharge    | Itch, discharge, 50% asymptomatic        |
| Vaginal discharge    | Clear to white | Homogenous, adherent, thin, milky white, malodorous "foul fishy" | Thick, clumpy, white "cottage cheese"         | Frothy, gray or yellow-green, malodorous |
| Clinical findings    |                |  | Inflammation and erythema                     | Cervical petechiae "strawberry cervix"   |
| Vaginal pH           | 3.9 - 4.2      | > 4.5  | Usually < 4.5                                 | > 4.5                                    |
| KOH "whiff" test     | Negative       | Positive   | Negative                                      | Often positive                           |
| NaCl wet mount       | Lacto-bacilli  | Clue cells (>20%), no few WBCs                                   | Few WBCs                                      | Motile flagellated protozoa, many WBCs   |
| KOH wet mount        |                |  | Pseudhyphae or spores if non-albicans species | 10                                       |

CDC

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### Trichomonas Vaginalis

- Flagellated protozoan
- Infects Vagina, urethra, bartholin glands, skene's glands and prostate
- Human is the only host
- Incubation: 4-28 days

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### Trichomoniasis Symptoms

- Men are asymptomatic
- Women:
  - green foul smelling or frothy white discharge
  - Itching
  - Dyspareunia, urinary symptoms
  - Strawberry cervix or vulva

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### Trichomoniasis Diagnosis

- NaCl wet mount: motile trichomonads, WBC
- Vaginal PH >4.5
- Enzyme immunoassay, nucleic acid amplification & immunofluorescence

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### Trichomoniasis Treatment

- Metronidazole 2 gram orally x 1 dose
- Intravaginal gel- roughly 50% effective when compared to oral treatment
- Alternative regimen for failures:
  - Metronidazole 500 mg BID x 7 days
  - Tinidazole 2 gram x 1 dose

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### Treatment Side Effect

- Disulfiram –like reaction: abstain from alcohol consumption
- Nausea, abdominal cramping, constipation, metallic taste
- Stevens Johnson syndrome, urticaria

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### Genital Warts

- Human Papilloma Virus (HPV)
- Spread by direct skin contact
- High frequency of infection (>50%)
- > 100 types with 30 types infecting the genital tract
- Some types are associated with cervical cancer (mostly 16 & 18)

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### HPV genotyping system

- Low- risk types: 6 & 11
  - Most genital infections
  - Visible warts
  - Transient, asymptomatic, without clinical consequences
  - Recurrent respiratory papillomatosis (cancer of respiratory tract)
- High-risk types: 16&18
  - Could result in normal pap smear
  - Could never develop precancerous cell changes or cervical cancer

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### Genital Warts Treatment

- Patient applied
- Provider-administered therapy
- Choice of treatment depends on:
  - Patient's preference
  - Wart size
  - Location and number of warts

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### Genital Warts Treatment

- Podofilox 0.5% solution or gel (Condylox™)
  - Applied with a cotton swab(solution)
  - via finger (gel)
  - 1 application BID x 3 days on visible warts, stop Rx for 4 days then repeat the cycle up to 4 times as needed

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### Genital Warts Treatment

- Imiquimod 5% cream (Aldara™)
  - Apply cream once at bedtime, 3 times a week up to 16 weeks
  - Treatment area should be washed with soap and water 6-10 hrs after application
  - Never use on vaginal lesions due to chronic ulceration

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### HPV vaccine

- HPV types 6, 11, 16 and 18
- Prevent HPV associated with cervical cancer, cancer precursors and anogenital warts
- CDC advisory committee approved for females ages 11 to 12 (as young as 9) at 0, 2 & 6 months (catch up from 13-26)
- Male vaccination from ages 9-26 may be considered as well to prevent anogenital warts

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### Case N.o3

- 21 yr old female presents to the pharmacy with a prescription for acyclovir. She was told that she has genital herpes. By looking at the medications' profile, Bactrim DS was filled twice, metronidazole single dose. Upon interview, you gather that she was treated for UTI's even though her urine culture was negative, and yeast, BV infections for similar symptoms including recurrent dysuria and genital itching without relief.

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**Question N.o 1**

- Did the patient really had UTI , yeast, BV her symptoms were associated with herpes?

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**Case 3 Question N.o1 Answer**

- Though symptomatic with repeated dysuria and genital itching, this patient has never met the diagnostic criteria for yeast, urinary tract infection. She's been treated, however, yet continues to return with the same kinds of problems repeatedly....

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**Case 3 Question N.o2**

- The patient prescription is for acyclovir 400 mg po TID #14. is this appropriate? Would you treat this patient for acute or recurrent episode?

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**Case 3 Question N.o2 answer**

- Though we cannot know or certain that her recurrent symptoms are due to her herpes, a 6-12 month course of suppressive antiviral therapy may help to give us an answer.
- If her symptoms don't return while on suppression, we may assume that herpes was causing her symptoms.
- Acyclovir 400 mg po TID is correct

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**Case3 Question N.o3**

- What type of education do you want to provide the patient?

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**Case 3 Question N.o3 answer**

- The patient should be educated about transmission of her infection, and be made aware that suppressive therapy may not only help her symptoms, but also reduce the likelihood of infecting others.

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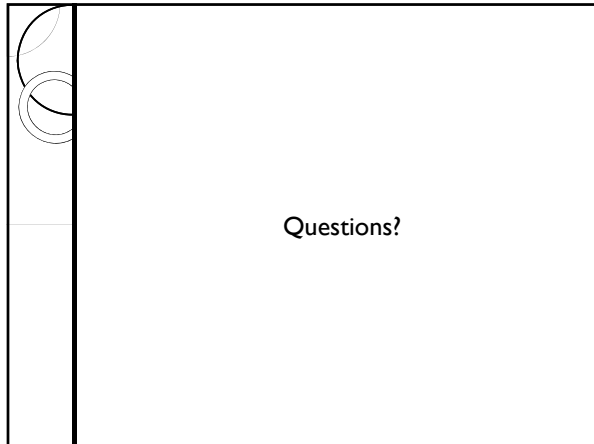
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