A Modern Approach to Sexually Transmitted Infections
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Medical College of Wisconsin
Objectives

- Present trends in sexually transmitted infection prevalence
- Review the CDC 2010 Sexually Transmitted Disease Guidelines pertaining to common sexually transmitted infections
- Discuss reduction strategies
Genital Herpes—Initial Visits to Physicians’ Offices, United States, 1966–2011

NOTE: The relative standard errors for genital herpes estimates of more than 100,000 range from 18% to 30%.
Genital Herpes

- Chronic life-long virus
  - HSV-1
  - HSV-2
- Majority of transmission occurs by asymptomatic or unaware persons
- Transmission occurs by direct contact with the virus between mucosal surfaces or small cracks in the skin
Genital Herpes-Diagnosis

- Clinical diagnosis is insensitive; laboratory testing should be done.
- Cell culture and PCR are preferred method to test.
  - Cell culture can have low sensitivity (recurrent lesions)
  - PCR assay higher sensitivity
Genital Herpes-Diagnosis

- Type specific antibody testing is available
  - Antibodies to HSV 1 and 2 develop during the first several weeks of infection
  - Persist indefinitely
- 50 million people are infected with HSV-2 in the US
  - 50%-80% have antibodies to HSV (I or II)
Genital Herpes

- Helpful If:
  - HSV culture/PCR testing of the lesion is neg
  - HSV diagnosis was by clinical criteria
  - Partner has HSV.
## HSV Treatment

<table>
<thead>
<tr>
<th>Primary lesions</th>
<th>Recurrent Lesions</th>
<th>Severe Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-10 days</td>
<td>Start within 1 day of onset or during the prodrome that precedes outbreaks</td>
<td>Disseminated disease: pneumonitis, hepatitis, meningoencephalitis</td>
</tr>
<tr>
<td>Acyclovir 400 mg po tid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acyclovir 200 mg 5x/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Famiciclovir 250 mg po tid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valacyclovir 1 gm po bid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acyclovir 400mg tid, 800 mg bid x 5d</td>
<td></td>
<td>IV acyclovir (5-10 mg/kg q 8 hours) until clinically improved</td>
</tr>
<tr>
<td>Acyclovir 800 mg bid x 5 days</td>
<td></td>
<td>PO antiviral therapy for total of ten days</td>
</tr>
<tr>
<td>Famiciclovir 125 mg bid x 5d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Famiciclovir 1000 mg bid x 1d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Famiciclovir 500 mg x 1, then 250 mg bid x 2 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valacyclovir 500 mg bid x 3d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valacyclovir 500 mg qd x 5d</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Suppressive therapy reduces outbreak frequency by 70-80% in those with frequent outbreaks

- Acyclovir 400 mg bid
- Famiciclovir 250mg bid
- Valcyclovir 1 gm qd or 500 mg qd
Syphilis—Reported Cases by Stage of Infection, United States, 1941–2011

Cases (in thousands)

Year


Total Syphilis

Early Latent

Primary and Secondary
Primary and Secondary Syphilis—Rates by County, United States, 2011

NOTE: In 2011, 2,154 (68.5%) of 3,142 counties in the United States reported no cases of primary and secondary syphilis.
## Primary and Secondary Syphilis—Rates by Age and Sex, United States, 2011

### Men

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate (per 100,000 population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>8.2</td>
</tr>
<tr>
<td>20</td>
<td>13.5</td>
</tr>
<tr>
<td>15</td>
<td>16.6</td>
</tr>
<tr>
<td>10</td>
<td>12.6</td>
</tr>
<tr>
<td>5</td>
<td>5.4</td>
</tr>
<tr>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

### Women

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate (per 100,000 population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-14</td>
<td>0.1</td>
</tr>
<tr>
<td>15-19</td>
<td>2.4</td>
</tr>
<tr>
<td>20-24</td>
<td>3.8</td>
</tr>
<tr>
<td>25-29</td>
<td>2.6</td>
</tr>
<tr>
<td>30-34</td>
<td>1.9</td>
</tr>
<tr>
<td>35-39</td>
<td>1.1</td>
</tr>
<tr>
<td>40-44</td>
<td>0.9</td>
</tr>
<tr>
<td>45-54</td>
<td>0.5</td>
</tr>
<tr>
<td>55-64</td>
<td>0.2</td>
</tr>
<tr>
<td>65+</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>1.0</td>
</tr>
</tbody>
</table>
Syphilis

- Transmitted mainly by genital contact but can primarily involve oropharynx, rectum, conjunctiva, blood
- Also can have transplacental infections
- Can penetrate intact mucosa
### Syphilis

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Neurosyphilis</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHANCEREPainless ulcerating lesion, hard CHANCEREPAINLESS</td>
<td>CONDYLOMA LATAgray or white erosive lesions, 6-8 weeks after chancre</td>
<td>No genital lesions</td>
<td>No genital lesion</td>
</tr>
<tr>
<td>Pelvic lymphadenopathy 10-90 days after initial transmission</td>
<td>Systemic symptoms, rash on palms and soles,</td>
<td>Cardiac lesions</td>
<td>Cranial nerve dysfunction, meningitis, stroke, acute or chronic alerted mental state, auditory or ophthalmic abnormalities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bone lesions (gumma)</td>
<td></td>
</tr>
</tbody>
</table>
Syphilis - Natural History

- Not necessarily progressive
  - Neurosyphilis can occur at any stage
  - Secondary syphilis can reappear over the first four years repeatedly
  - Disease can become latent at any stage
Syphilis- Natural History

- Latent Syphilis
  - Early Latent disease within one year of acquisition
  - Late latent disease more than one year of acquisition
  - Latent syphilis of unknown duration
Syphilis-Diagnosis

- Darkfield examination detects T. Pallidum
  - Exudate
  - Tissue
- PCR testing for T. Pallidum is limited
Syphilis - Diagnosis

- **Serology Tests**
  - Nontreponemal VDRL and RPR (antibody titers)
    - Normalize after treatment
  - Treponemal FTA-ABS, and TP-PA (positive/negative)
    - Remains positive in majority of people
  - Treponemal screening tests
    - Can differentiate between new and old infections
    - Still relies on confirmatory nontreponemal test and possibly another treponemal test
Syphilis - Treatment

- Treatment relies on parental Penicillin (PCN) G
  - Combining different PCN preparations is not effective (benzathine-procaine penicillin)
- Treatment is determined by stage
## Syphilis Treatment

<table>
<thead>
<tr>
<th></th>
<th>Primary, Secondary and Early Latent Stage</th>
<th>Late Latent Syphilis, unknown duration, and Tertiary stage</th>
<th>Neurosyphilis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benzathine PCN G</strong></td>
<td>2.4 million units IM x 1 dose</td>
<td>Benzathine PCN G 2.4 million units IM x 3 doses, 1 week intervals</td>
<td>Aqueous crystalline PCN G18-24 units q day (3-4 million units IV q 4 hours x 10 days-14 days) <strong>OR</strong> Procaine PCN 2.4 million units q day plus probenecid 500 mg qid x 10-14 days</td>
</tr>
</tbody>
</table>
Syphilis-Follow Up

- Nontreponemal testing should be done at 6, 12, 24 months
  - CSF evaluation if titers increase by fourfold, don’t decreased by fourfold after 12-14 months of therapy, or signs/symptoms of syphilis develop
Syphilis-Special Considerations

- PCN allergy: doxycycline 100 mg bid or tetracycline 500 mg qid x 28 days
  - Pregnant patient with PCN allergy should be desensitized and treated with PCN G

- HIV positive patients have the same recommendations of therapy
  - Follow up serology at 3,6,9,12,24 months
NOTE: As of January 2000, all 50 states and the District of Columbia have regulations that require the reporting of chlamydia cases.
Chlamydia—Rates by Age and Sex, United States, 2011

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate (per 100,000 population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>1343.3</td>
</tr>
<tr>
<td>Women</td>
<td></td>
</tr>
<tr>
<td>10-14</td>
<td>134.6</td>
</tr>
<tr>
<td>15-19</td>
<td></td>
</tr>
<tr>
<td>20-24</td>
<td>1343.6</td>
</tr>
<tr>
<td>25-29</td>
<td></td>
</tr>
<tr>
<td>30-34</td>
<td>567.6</td>
</tr>
<tr>
<td>35-39</td>
<td>233.9</td>
</tr>
<tr>
<td>40-44</td>
<td>105.9</td>
</tr>
<tr>
<td>45-54</td>
<td>35.8</td>
</tr>
<tr>
<td>55-64</td>
<td>10.1</td>
</tr>
<tr>
<td>65+</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>648.9</td>
</tr>
</tbody>
</table>
Chlamydial Infections

- Most frequently reported infectious disease in the US
- Significant reproductive sequelae
- Symptoms can include
  - purulent or mucoid discharge,
  - post coital bleeding
  - vaginitis
Chlamydial Infections

- Asymptomatic infection is common
  - Screen sexually active women 25 years of age and younger*
  - Screen older women with new partner or multiple partners
Chlamydial Infections

- Multiple laboratory techniques that can detect C. Trachomatis (CT)
  - Culture
  - Direct immunofluorescence
  - EIA
  - Nucleic acid hybridization tests
  - NAAT
## Chlamydial Infections Diagnosis

<table>
<thead>
<tr>
<th>Urine specimen</th>
<th>Endocervical swab</th>
<th>Vaginal Swab</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT clean catch</td>
<td>Requires a speculum examination</td>
<td>Self collection is acceptable</td>
</tr>
<tr>
<td>Only NAAT is FDA approved</td>
<td>All testing techniques are acceptable</td>
<td>Only NAAT is approved</td>
</tr>
<tr>
<td></td>
<td>NAAT has the greatest sensitivity</td>
<td></td>
</tr>
</tbody>
</table>
Chlamyдial Infections-
Diagnostic Considerations

- Liquid-based cytology
  - Some NAATs have been FDA cleared
  - Sensitivity of this specimen may be lower than endocervical specimen

- Rectal and oropharyngeal infections
  - Most tests are not FDA cleared for this
  - NAAT testing appears to be the most sensitive

References: 2
# Chlamydial Infections Treatment

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azithromycin 1 gram po x 1 OR</td>
<td>Erythromycin base 500 po mg qid x 7 days OR</td>
</tr>
<tr>
<td>Doxycycline 100 mg po x 1</td>
<td>Erythromycin ethylsuccinate 800 mg po qid x 7 days OR</td>
</tr>
<tr>
<td></td>
<td>Levofloxacin 500 mg po qd x 7 days OR</td>
</tr>
<tr>
<td></td>
<td>Ofloxacin 300 mg po bid x 7 days</td>
</tr>
</tbody>
</table>
Chlamydial Infections - Treatment Consideration

- Abstain from sex for seven days
- Test of cure is not recommended
  - Retesting should occur 3 months after treatment
  - More than 3 weeks should pass before retesting
- Sex partners should be treated
- Treatment is same for HIV+ patients
Gonorrhea—Rates by Sex, United States, 1991–2011

Rate (per 100,000 population)

Year

Women

Men

Total

1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011
Gonorrhea—Rates by County, United States, 2011

Rate per 100,000 population

- ≤ 19.0 (n=1,299)
- 19.1–100.0 (n=1,198)
- >100.0 (n=645)
Gonorrhea—Rates by Age and Sex, United States, 2011

Men  
Rate (per 100,000 population)  
Age  
750  600  450  300  150  0  10-14  15-19  20-24  25-29  30-34  35-39  40-44  45-54  55-64  65+  Total  
248.6  160.5  89.3  66.9  37.1  12.9  2.8  98.7  5.2

Women  
Rate (per 100,000 population)  
Age  
0  150  300  450  600  750  10-14  15-19  20-24  25-29  30-34  35-39  40-44  45-54  55-64  65+  Total  
26.2  237.2  110.8  50.3  25.8  9.7  2.5  0.4  556.5  584.2

2011-Fig 21. SR
Gonococcal Infections - Sequelae

- Associated with upper genital tract infections
- Disseminated disease results from bacteremia (DGI)
  - Petechial or pustular lesions, arthritis, asymmetric arthralgia, tenosynovitis.
  - Perihepatitis (occasional)
  - Endocarditis, meningitis (rare)
- Requires hospitalization
Gonococcal Infections

- **Screening**
  - Widespread screening is not recommended
  - Screening women under age 25 is the primary focus
Gonococcal Infections

- Diagnostic tests
  - Culture
  - Nucleic acid hybridization tests
  - NAAT
  - Gram stain
- Suitable specimens
  - Urine
  - Endocervical swabs
  - Vaginal swabs
# Gonococcal Infection-Diagnosis

<table>
<thead>
<tr>
<th>Urine Specimen</th>
<th>Endocervical Swab</th>
<th>Vaginal Swab</th>
<th>Gram Stain</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT clean catch</td>
<td>Requires a speculum examination</td>
<td>Self collection is acceptable</td>
<td>High specificity Low sensitivity</td>
</tr>
<tr>
<td>Only NAAT is FDA approved</td>
<td>All testing techniques are acceptable</td>
<td>Only NAAT is approved</td>
<td>Only appropriate for SYMPTOMATIC men</td>
</tr>
<tr>
<td></td>
<td>NAAT has the greatest sensitivity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Gonococcal Infections - Diagnostic Considerations

- Not all NAATs are the same
- Non-genital site infection
  - No FDA cleared test
  - NAATS appear to be the most sensitive
# Gonococcal Infections - Treatment

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ceftriaxone 250 mg IM x 1</strong>&lt;br&gt;OR&lt;br&gt;Cefixime 400 mg po x 1&lt;br&gt;OR&lt;br&gt;Single dose injectable cephalosporin PLUS Azithromycin 1 gm po x 1 or Doxycycline 100mg po bid</td>
<td><strong>Cefpodoxime 400 mg po x 1</strong>&lt;br&gt;OR&lt;br&gt;Cefuroxime axetil 1 gm po x 1&lt;br&gt;OR&lt;br&gt;Azithromycin 2 gm po x 1&lt;br&gt;OR&lt;br&gt;Spectinomycin</td>
</tr>
</tbody>
</table>