Sexually Transmitted Infections

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Division of STD Prevention, CDC
Sexually Transmitted Diseases

• >19 million STD cases in US annually
  – CT and GC most reported infection (CDC)
• Health consequences of untreated STDs
  – Female reproductive health
    • Untreated CT or GC can lead to PID
    • Leading infectious cause of infertility
  – Infant mortality/morbidity
    • Neonatal HIV, HSV, congenital syphilis
  – HIV transmission
• Health care cost
  – $16.4 billion (2009)
Global estimates of selected incident STIs, WHO 2005

- Chlamydia: 102 million
- Gonorrhea: 87 million
- Syphilis: 11 million
- Trichomonas: 248 million
Populations at Greatest Risk for STDs

- **Youth**
  - Nearly 50% of STDs (15-24 yo)

- **Racial/ethnic minorities**
  - STDs among highest of racial/ethnic health disparities
  - African-Americans: 71% of GC, 48% CT, 52% syphilis
  - Over last 5 yr, syphilis >150% among young AA men

- **MSM**
  - 62% of syphilis cases in 2009
  - High rates of HIV co-infection
• Published 1982; evidence-based 1993
• Authoritative source for STD management
• Diagnostic evaluation, treatment regimens, prevention, and vaccination strategies
• Order hard copies www.cdc.gov/std
• Wall charts, pocket guides
Clinical Prevention Guidance

- High intensity behavioral counseling (USPSTF)
  - Partners, pregnancy, protection, practices, past STIs
- Pre-exposure vaccination- HAV, HBV, HPV
- Male latex condom
  - HIV, GC, CT, Trichomoniasis
  - May reduce HSV-2, HPV and genital warts
    - higher rates of CIN regression, HPV clearance, penile lesions
    - HPV acquisition (newly sexually active women)
- Male circumcision may reduce acquisition of some STI (HPV, genital HSV)
Condoms and STDs: Fact Sheet for Public Health Personnel

Consistent and correct use of male latex condoms can reduce (though not eliminate) the risk of STD transmission. To achieve the maximum protective effect, condoms must be used both consistently and correctly. Inconsistent use can lead to STD acquisition because transmission can occur with a single act of intercourse with an infected partner. Similarly, if condoms are not used correctly, the protective effect may be diminished even when they are used consistently. The most reliable ways to avoid transmission of sexually transmitted diseases (STDs), including human immunodeficiency virus (HIV), are to abstain from sexual activity or to be in a long-term mutually monogamous relationship with an uninfected partner. However, many infected persons may be unaware of their infections because STDs are often asymptomatic or unrecognized.

This fact sheet presents evidence concerning the male latex condom and the prevention of STDs, including HIV, based on information about how different STDs are transmitted, the physical properties of condoms, the anatomic coverage or protection that condoms provide, and epidemiologic studies assessing condom use and STD risk. This fact sheet updates previous CDC fact sheets on male condom effectiveness for STD prevention by incorporating additional evidence-based findings from published epidemiologic studies.
Prevention Methods
Spermicides

• Spermicides (N-9)
  – not effective in preventing cervical GC, CT, HIV
  – disruption of vaginal, anal epithelium
  – may increase risk of HIV transmission (vaginal IC)
    – diaphragm+ spermacide increased risk UTI

• Condoms lubricated with N-9
  – no more effective than other lubricated condoms in protection against HIV, STDs

Chlamydia Screening

• Primary focus of screening efforts to detect and prevent complications in women
  – Sexually active women < 25 (USPSTF)
• Selective male screening (adolescent clinics, corrections, national job training program, < 30 yrs, STD, military)
• Retest women/men 3 mo post treatment
  – CT testing in third trimester (reinfection)
GC Screening

- USPTF
  - sexually active women at risk: < 25, prior GC, other STI, new/many partners, +/- condom use, CSW, drugs
- Retest in 3 mo due to reinfection
- Nucleic acid amplification tests (NAATs)
  - superior sensitivity/specificity
  - vaginal swabs (women), urine (men)
  - commerical labs validated assay at rectal/pharyngeal sites (MSM)
  - asymptomatic infection
Gonorrhea Screening

- Screen sexually active women at increased risk (USPSTF)
  - <25 years
  - Previous GC or other STDs
  - Commercial sex work
  - New or multiple partners
  - Inconsistent condom use
  - Drug use

- No screening in men or women at low risk of infection (USPSTF)

- Retest women/men 3 mo after treatment
Special Populations

- Adolescents
- Children
- STD in pregnancy
- HIV
- MSM
- Women who have sex with women (WSW)
- Persons in correctional facilities
  - CT/GC adolescent females (juvenile detention/jail), females <35
  - Syphilis (local/institutional prevalence)
• STI risk higher in subgroups of MSM
  • Racial /ethnic minorities
  • Non-prescription drug use (methamphetamine)
  • Internet partnering
• Changing attitudes
  • Unprotected oral sex perceived as low risk
  • Serosorting
  • Advances in HIV therapy-improved quality of life
STI Screening

• Sexually active MSM +/- HIV (annual)
  – HIV serology
  – Syphilis serology
  – Urethral GC/CT (insertive); NAAT (urine)
  – Rectal GC/CT (receptive anal); NAAT
  – Pharyngeal GC (receptive oral); NAAT
  – HbsAg; HAV, HBV vaccine if nonimmune
  – HCV antibody (MSM HIV+)
STI Screening
Subsequent Visits

- Screen persons at high risk q3-6 mo
  - Multiple or anonymous sex partners
  - Past history of STIs
  - Behaviors associated with transmission of HIV/STIs
  - Sex or needle sharing partner with any risk
  - High prevalence of STIs in area or population
Nucleic Acid Amplification Tests Superior to Culture

<table>
<thead>
<tr>
<th>Method</th>
<th>Rectal GC</th>
<th>Rectal CT</th>
<th>Pharyngeal GC</th>
<th>Pharyngeal CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture</td>
<td>3.5%</td>
<td>1.6%</td>
<td>3.3%</td>
<td>0.4%</td>
</tr>
<tr>
<td>NAAT</td>
<td>8.2%</td>
<td>6.1%</td>
<td>8.3%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Schachter J. STD 2008
Chlamydial and Gonococcal infections not identified if only urine/urethral testing performed, gay/bisexual men: San Francisco – 2003

- Chlamydia: 53% Identified, 47% Not Identified (n = 574)
- Gonorrhea: 64% Identified, 36% Not Identified (n = 785)

Kent et al. CID 2005
San Francisco STD Clinic, 2003 – 2005

HIV Seroconversion by Number of Prior Rectal Infections

Log-Rank Test $p=0.0004$

Bernstein K, JAIDS 2010
### NAAT Laboratory Ordering and Billing Codes

<table>
<thead>
<tr>
<th>Company-Specific Ordering Codes for Combined GC/CT Nucleic Acid Amplified Tests (NAATs)</th>
<th>Company-Specific Ordering Codes for CT test only</th>
</tr>
</thead>
<tbody>
<tr>
<td>LabCorp*</td>
<td>Quest*</td>
</tr>
<tr>
<td>Rectal 188672</td>
<td>16506</td>
</tr>
<tr>
<td>Pharyngeal 188698</td>
<td>70051</td>
</tr>
</tbody>
</table>

* Represent the largest laboratories nationally. Other laboratories that have verified rectal and pharyngeal testing.

### CPT Billing Codes

<table>
<thead>
<tr>
<th>CT detection by NAAT</th>
<th>GC detection by NAAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>87491</td>
<td>87591</td>
</tr>
</tbody>
</table>
Clinical Presentation

- **Genital ulcer**: Syphilis, HSV, CT (LGV), *H. ducreyi*, Granuloma inguinale
- **Urethritis/Cervicitis**: GC, CT
- **Proctitis**: GC, CT(LGV), syphilis, HSV
- **Vaginal discharge**: Trichomonas, BV
- **Genital warts**: Papillomavirus
<table>
<thead>
<tr>
<th>Feature</th>
<th>Herpes simplex</th>
<th><em>Treponema pallidum</em> (Syphilis)</th>
<th><em>Haemophilus ducreyi</em> (Chancre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubation period estimates</td>
<td>2-7 days</td>
<td>2-4 weeks</td>
<td>1-14 days</td>
</tr>
<tr>
<td>Ulcer appearance</td>
<td>Small, superficial, smooth: erythematous edge, <strong>circular</strong></td>
<td>Superficial, medium size, well demarcated; elevated edge, circular/oval</td>
<td>Deep, small to large; undermined, ragged edge, <strong>irregular</strong> shape</td>
</tr>
<tr>
<td>Induration</td>
<td>None</td>
<td><strong>Firm</strong></td>
<td>Soft</td>
</tr>
<tr>
<td>Pain</td>
<td>Exquisitely</td>
<td>Typically painless</td>
<td>Variable</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>Firm, tender, often bilateral</td>
<td>Firm, <em>nontender</em>, bilateral</td>
<td><strong>Tender</strong>, can suppurate; <em>unilateral</em>: superinfection</td>
</tr>
</tbody>
</table>
### Sexually Transmitted Genital Ulcer Disease

<table>
<thead>
<tr>
<th>Feature</th>
<th>Chlamydia trachomatis (LGV)</th>
<th>Calyimdobacterium granulomatis (Granuloma Inguinale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubation period estimates</td>
<td>3-42 days</td>
<td>8-80 days</td>
</tr>
<tr>
<td>Ulcer appearance</td>
<td>Variable depth, small to medium size; <strong>elevated edge</strong>, round/oval</td>
<td>Small to large lesions; with elevated edge and beefy base, <strong>irregular</strong> shape</td>
</tr>
<tr>
<td>Induration</td>
<td>Occasionally firm</td>
<td>Firm</td>
</tr>
<tr>
<td>Pain</td>
<td>Variable</td>
<td>Not typical</td>
</tr>
<tr>
<td>Lymphadenopathy characteristic</td>
<td>Large, tender, unilateral; suppurate</td>
<td><strong>Pseudobuboes</strong>; regional lymphadenopathy with superinfection</td>
</tr>
</tbody>
</table>
Genital Ulcer Evaluation

- Clinical diagnosis often inaccurate
- Multiple agents or immunocompromised
- Noninfectious- yeast, aphthi, fixed drug eruption, psoriasis, lichen planus
- Evaluation
  - syphilis serology, darkfield microscopy, HSV culture or PCR, biopsy
- Treat for dx most likely- clinical presentation/epi
Primary and Secondary Syphilis—Rates by Sex and Male-to-Female Rate Ratios, United States, 1990–2009

Rate (per 100,000 population)

Year

Rate Ratio (log scale)

Male Rate
Female Rate
Total Rate
Male-to-Female Rate Ratio

Primary and Secondary Syphilis—Reported Cases* by Stage, Sex, and Sexual Behavior, United States, 2009

* Of the reported male cases of primary and secondary syphilis, 20% were missing sex of sex partner information.
† MSW = men who have sex with women only; MSM = men who have sex with men.
Syphilis

• Definitive diagnosis for early syphilis
  – darkfield microscopy; PCR
  – No commercially available *T. pallidum* detection tests
• Nontreponemal/treponemal serologic testing
  – Reverse serologic screening (treponemal/nontreponemal)
• Management principles for HIV+ similar
  – Frequent clinical/serologic monitoring
• CNS involvement can occur at any stage
CDC-recommended algorithm for reverse sequence syphilis screening *

- **EIA or CIA**
  - **EIA/CIA +**
  - **Quant. RPR**
    - **RPR+**
      - **Syphilis, past or present**
    - **RPR-**
      - **TP-PA**
        - **TP-PA+**
          - **Syphilis, past or present**
        - **TP-PA-**
          - **Syphilis unlikely**

If incubating or primary syphilis is suspected, treat with benzathine penicillin G 2.4 million units IM x 1

Evaluate and determine if past syphilis treatment, assess risk of infection, and administer therapy (CDC 2010 STD Treatment Guidelines)†

If at risk for syphilis, repeat RPR in several weeks

* CDC continues to recommend nontreponemal followed by treponemal testing

Treatment Recommendations
Primary, Secondary, Early Latent

- Penicillin treatment of choice +/- HIV
  - Benzathine penicillin 2.4 mu IM x 1
- No benefit of additional therapy
  - Enhanced treatment (IM + oral)
- Penicillin alternatives
  - Doxycycline, ceftriaxone
  - Azithromycin 2 gm (resistance/treatment failure)
    - Use only if penicillin or doxycycline not feasible
    - Do not use in MSM or pregnancy
**Evaluation of CNS Involvement**

- Neurologic, ocular, auditory signs/sxs
- CNS invasion in early syphilis +/- HIV or neuro sx
  - Clinical significance (protein, pleocytosis unknown (HIV+/-))
  - Neurosyphilis dx - combination of tests
- LP: neuro/ocular sx, serologic treatment failure, tertiary
  - Some studies - clinical and CSF consistent with NS
    - RPR $\geq 1:32$ and/or CD4 $\leq 350$
    - Unless neurologic sx, CSF exam has not been associated with improved clinical outcomes
Herpes Simplex Virus Type 2 (HSV-2)

Highly prevalent, most common cause of genital ulcer disease worldwide

<table>
<thead>
<tr>
<th>Population</th>
<th>HSV-2 Seroprevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-49 year-olds in US</td>
<td>17%</td>
</tr>
<tr>
<td>US STD clinic patients</td>
<td>40%</td>
</tr>
<tr>
<td>African-American women, 14-49 years</td>
<td>50%</td>
</tr>
<tr>
<td>HIV-negative women, southern Africa</td>
<td>70%</td>
</tr>
<tr>
<td>HIV-positive persons globally</td>
<td>~80%</td>
</tr>
</tbody>
</table>
HSV-2 Seroprevalence by Number of Lifetime Sex Partners and Race/Ethnicity

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>1 partner</th>
<th>2-4 partners</th>
<th>5-9 partners</th>
<th>10+ partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic White</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexican American</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Herpes Simplex Virus (HSV)

- Sexual transmission through subclinical shedding
- HSV-1 & HSV-2 cause genital infections
  - HSV-2 more likely to reactivate
  - HSV-2 associated with risk of HIV acquisition
    * suppressive acy does not reduce HIV acquisition*
- Primary infection: fever, HA, myalgias, itching, vaginal/urethral dc, tender LN
- Majority of infections unrecognized
HSV2 Genital Shedding

- Cohort of 498 immunocompetent HSV2+ (Tronstein, JAMA 2011;305(14):1441-9)
- Self collected genital swabs for 30 days

<table>
<thead>
<tr>
<th></th>
<th>Symptomatic</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSV2 (% of days)</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>HSV DNA</td>
<td>4.3 log</td>
<td>4.2 log</td>
</tr>
<tr>
<td>Subclinical shedding</td>
<td>13%</td>
<td>8.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
HSV Diagnosis

- Cell culture
- PCR most sensitive
- Tzanck smear insensitive
- IgM test unreliable
- Type–specific HSV serology (IgG)
  - Recurrent/atypical lesions cx neg ulcers
  - clinical dx without lab confirmation
  - partners
HSV

• Antiviral efficacy
  – Acyclovir, valacyclovir, famciclovir equally effective
    • Famciclovir 500 mg x 1, 250 mg bid x 2 d (episodic)
  – Acyclovir and valacyclovir effective for suppression
  – Famciclovir slightly less effective for suppression

• Acyclovir resistance
  – Topical cidofovir or imiquimod
  – Less likely to develop resistance using suppressive therapy
    (bone marrow transplant)

- Placebo: 3.8% (28/741)
  - RR: 0.50 (95% CI: 0.26, 0.94)
  - P=0.039

- Valaciclovir 500 mg once daily: 1.9% (14/743)
  - 50% Reduction
Risk of HIV Acquisition by Prevalent vs. Incident HSV-2 Infection in Women

Adapted from Brown et al, AIDS, 2007
Urethritis

• Bacterial STDs: GC (5-20%), CT (15-40%)

• Nongonococcal urethritis (NGU)
  – *Mycoplasma genitalium* 5-25%
  – *Ureaplasma* 0-20%; data inconsistent, biovars differ
  – *Trichomonas vaginalis* 5-20% (age, geography)
  – HSV 15-30%; urethritis in primary infection
  – Adenovirus, enterics, Candida, anaerobes
Urethritis: Treatment

• Therapy (NGU):
  - Azithromycin 1gm PO once
  - Doxycycline 100mg PO bid

• Recurrence or persistence
  – retreat if non-compliant
  – Trichomonas (urine NAAT)
  – tetracycline-R Ureaplasma (Rx macrolides)
Mycoplasma genitalium

- Association with acute or persistent NGU
  - No role in male infertility
- Azithromycin superior to doxycycline for MG urethritis
- Moxifloxacin 400 mg qd x 7 d (persistent NGU)
- Conflicting/insufficient evidence: cervicitis, PID, infertility, ectopic pregnancy, adverse birth outcomes
Cervicitis

• Frequently asymptomatic
  - purulent or mucopurulent endocervical exudate
  - easily induced endocervical bleeding
• Etiology: CT, GC, Trichomonas, HSV, BV
• Dx: CT/GC NAAT, Trichomonas, BV
• Presumptive therapy:
  - azithromycin 1gm PO once OR
  - doxycycline 100 mg PO bid for 7d
Burden of Infection Highest Among Sexually Active Adolescents and Young Adults

Sexually active people aged 14-24 have about 3x the chlamydia prevalence of sexually active adults aged 25-39

Prevalence, %

Sexual activity = “yes” response to “Have you ever had sex?”
Sex = vaginal, anal, or oral sex

NHANES, National Health and Nutrition Examination Survey, 1999-2008
Chlamydia Prevalence in Sexually Active Females Aged 14-24 in the United States

Prevalence, %

<table>
<thead>
<tr>
<th>Age</th>
<th>Overall</th>
<th>NH white</th>
<th>NH black</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-19 years</td>
<td>6.8</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>20-24 years</td>
<td>12.1</td>
<td>1.3</td>
<td></td>
</tr>
</tbody>
</table>

NHANES, National Health and Nutrition Examination Survey, 1999-2008
Sexual activity =“yes” response to “Have you ever had sex?”
Sex = vaginal, anal, or oral sex
Chlamydia: Clinical Manifestations

- Chlamydia: Sexually transmitted infection caused by the bacterium *Chlamydia trachomatis*
- Vast majority asymptomatic
- Lower genital tract infection
  - Cervicitis – discharge, cervical friability
  - Urethritis – dysuria, discharge
- Can ascend to the upper genital tract
  - Men – epididymitis
  - Women – pelvic inflammatory disease (PID)
Chlamydia Treatment

• Equivalent efficacy/tolerance of azithromycin and doxycycline
• Adolescents can use azithromycin
• Erythromycin, quinolones are alternatives
• Insufficient data on new therapies
• Azithromycin or amoxicillin in pregnancy
Long-term Reproductive Complications

- Tubal inflammation can result in scarring, loss of function
- Long-term sequelae
  - Tubal factor infertility
  - Ectopic pregnancy
  - Chronic pelvic pain
- Tubal factor infertility: Inability to conceive due to fallopian tube damage

Normal tubal tissue, 1200x  Post-PID, 1200x
## Risk of sequelae: Long-term outcomes following symptomatic PID

<table>
<thead>
<tr>
<th>Reference</th>
<th>N, case definition</th>
<th>Design, setting</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weström, 1992</td>
<td>Cases: 1,844 with salpingitis confirmed by laparoscopy</td>
<td>Prospective cohort over 1960s-80s, Sweden</td>
<td><strong>Infertility:</strong> 16% cases 2.7% controls <strong>Ectopic:</strong> 9.1% cases 1.4% controls</td>
</tr>
<tr>
<td></td>
<td>Controls: 657 clinical PID, but normal laparoscopy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ness, 2002</td>
<td>N= 831 mild to moderate clinical PID</td>
<td>RCT, 1996-99, US (PEACH)</td>
<td><strong>Infertility:</strong> 18% <strong>Ectopic:</strong> 0.6%</td>
</tr>
</tbody>
</table>

- Symptomatic PID may lead to **infertility in ~1 in 6 women**
- Chlamydial PID no more likely to cause sequelae than other causes of PID
## Risk of sequelae with repeated chlamydial infections

<table>
<thead>
<tr>
<th>Ref</th>
<th>N, setting</th>
<th>Design</th>
<th>Ectopic pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hillis 1997</td>
<td>N=11,000, FP and STD clinics, ≥1 CT infection, WI</td>
<td>Retrospective cohort</td>
<td># CT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital D/C codes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3+</td>
</tr>
<tr>
<td>Bakken 2007</td>
<td>N=20,762, w/ CT test 1990-2003, Norway</td>
<td>Retrospective cohort; Inpt + outpt</td>
<td>#CT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2+</td>
</tr>
</tbody>
</table>

- Risk is at **least doubled in women with 2+ CT episodes**
- Risk appears simply additive; not clear that risk *per infection* increases
Keratoderma Blenorrhagica
Gonorrhea Rates, United States, 2006–2010*

* As of March 11, 2011 (preliminary)
Neisseria gonorrhoeae Antimicrobial Resistance

1936
- Sulfanilimide Introduced

1930
- Penicillin

1945
- Penicillin

Late 1940s
- Tetracycline

Late 1940s
- Sulfonamide Resistance Widespread

1976
- Penicillinase Producing N. gonorrhoeae

1984
- Plasmid Mediated Tetracycline Resistance

1991
- Quinolone Resistant NG in Hawaii

2007
- Quinolone No Longer Recommended

1993
- Quinolones & Cefixime

1945-1970s
- Chromosomal PCN & Tetracycline resistance – gradual increase
  - MICs

Workowski K. Ann Int Med 2008
GISP sites and regional laboratories
United States, 2010 (29 Sites)

Regional Labs
- Birmingham
- Atlanta
- Seattle
- Cleveland
- Austin*

* Expect to initiate specimen testing in 2011
Gonococcal Isolate Surveillance Project (GISP)—Percentage of *Neisseria gonorrhoeae* Isolates with Resistance or Intermediate Resistance to Ciprofloxacin, 1990–2009

**NOTE:** Resistant isolates have ciprofloxacin minimum inhibitory concentrations (MICs) >1 µg/ml. Isolates with intermediate resistance have ciprofloxacin MICs of 0.125–0.5 µg/ml. Susceptibility to ciprofloxacin was first measured in GISP in 1990.
Cephalosporin GC Rx Failures

- Oropharyngeal ceftriaxone failure (Tapsall 2009)
- Treatment failure or *in vitro* resistance
  - infectious disease consultation
  - culture and susceptibility
  - Rx at least 250 mg of ceftriaxone IM
  - ensure partner tx
  - report to CDC via state or local public health
Anogenital GC Treatment

- **Dual therapy**
  - Ceftriaxone 250 mg IM (preferred)
    - PLUS azithromycin 1 gm or doxy 100 mg bid x 7
  - Cefixime 400 mg PO (if ceftriaxone is not an option)
    - PLUS azithromycin 1 gm or doxy 100 mg bid x 7
- **Alternatives**
  - Cefpodoxime 400 mg + azi or doxy
  - Azithromycin 2 g (pen allergy)
Disseminated GC

- 1-3% with mucosal infection (culture of cervix, urethra, and rectum)
- Monoarticular septic arthritis
- Tenosynovitis/dermatitis
- Complement deficiency (C5-C8)
Sexually Transmitted GI Syndromes

- Proctitis
  - GC, CT, HSV, syphilis

- Proctocolitis
  - Camplyobacter, shigella, salmonella, Entamoeba histolytica, LGV

- Enteritis
  - Giardia

- Hepatitis A, B, C
LGV Proctitis

- Rectal ulcers
- Mucoid anal discharge
- Tenesmus or constipation
- HIV + MSM
- Rectal NAAT
- Genotype L2b
- Tx doxy bid x 21d
LGV inguinal syndrome

- *C. trachomatis* L1, L2, L3
- Herpetiform genital ulcers and/or papules
- Tender, fluctuant, inguinal lymphadenopathy (buboes)
<table>
<thead>
<tr>
<th>Vaginitis Differentiation</th>
<th>Normal</th>
<th>Trichomoniasis</th>
<th>Candidiasis</th>
<th>Bacterial Vaginosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptoms</strong></td>
<td>Itch, discharge, 50% asymptomatic</td>
<td>Itch, discomfort, dysuria, thick discharge</td>
<td>Odor, discharge, itch</td>
<td></td>
</tr>
<tr>
<td><strong>Vaginal discharge</strong></td>
<td>Clear to white</td>
<td>Frothy, gray or yellow-green; malodorous</td>
<td>Thick, clumpy, white “cottage cheese”</td>
<td>Homogenous, adherent, thin, milky white; malodorous “foul fishy”</td>
</tr>
<tr>
<td><strong>Clinical findings</strong></td>
<td>Cervical petechiae “strawberry cervix”</td>
<td>Inflammation and erythema</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vaginal pH</strong></td>
<td>3.8 - 4.2</td>
<td>&gt; 4.5</td>
<td>Usually ≤ 4.5</td>
<td>&gt; 4.5</td>
</tr>
<tr>
<td><strong>KOH “whiff” test</strong></td>
<td>Negative</td>
<td>Often positive</td>
<td>Negative</td>
<td><strong>Positive</strong></td>
</tr>
<tr>
<td><strong>NaCl wet mount</strong></td>
<td>Lactobacilli</td>
<td>Motile flagellated protozoa, many WBCs</td>
<td>Few WBCs</td>
<td>Clue cells (≥ 20%), no/few WBCs</td>
</tr>
<tr>
<td><strong>KOH wet mount</strong></td>
<td>Pseudohyphae or spores if non-albicans species</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Other Causes of Vaginitis

• Cervicitis
• Herpes simplex virus
• Atrophic vaginitis
• Allergic reactions
• Vulvar vestibulitis
• Foreign bodies
• Desquamative inflammatory vaginitis
Trichomoniasis

• Diagnostic evaluation
  – Wet prep 60% sensitive; OSOM, Affirm VPIII
  – *T. vaginalis* nucleic acid test
  – Consider rescreen women at 3 mo
• Tx metronidazole or tinidazole 2 gm
  – Resistance 5-10%
• HIV and Trichomoniasis
  – Screening at entry into care
  – Rx metronidazole 500 mg bid x 7 days (Kissinger 2010)
Bacterial Vaginosis

• Recommended regimen
  – Metronidazole 500 mg bid x 7
  – Clindamycin cream 2% x 7
  – Metrogel 0.75% qday x 5

• New alternative regimen
  – Tinidazole 2 g qd x 2 or 1 g qd x 5

• Management of recurrences
  – Metronidazole gel 2x weekly x 4-6 mo
  – Oral nitroimidazole followed by intravaginal boric acid and suppressive metronidazole gel
## HPV-Associated Disease in Males and Females

<table>
<thead>
<tr>
<th>HPV-associated Disease</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital precancers and cancers</td>
<td>penile, anal</td>
<td>cervical, vaginal, vulvar, anal</td>
</tr>
<tr>
<td>Oropharyngeal cancers</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Recurrent respiratory papillomatosis</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Anogenital warts</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
HPV/Genital Warts

- Counseling messages
  - Oral transmission
- HPV testing (ASCUS, >30 + PAP)
  - Not indicated- +/-vaccinate, STI screen, <21
- GW treatment
  - Sinecatechins ointment (15%)
  - Imiquimod induced vitiligo
- HPV vaccine
# HPV Vaccines in Females

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Quadrivalent</th>
<th>Bivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPV 16/18 related CIN2+*</td>
<td>≥98%</td>
<td>≥93%</td>
</tr>
<tr>
<td>HPV 6/11 related genital lesions</td>
<td>~99%</td>
<td>-</td>
</tr>
<tr>
<td><strong>Cross-protection against CIN2+</strong>, high risk types other than HPV 16,18</td>
<td>Some types phylogenetically related to HPV 16?</td>
<td>Some types phylogenetically related to HPV 16 and 18?</td>
</tr>
<tr>
<td>Seroconversion to vaccine types</td>
<td>&gt;99%</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Geometric mean Ab titers</td>
<td>bivalent &gt; quadrivalent</td>
<td></td>
</tr>
<tr>
<td>Duration of protection</td>
<td>Unclear if any differences</td>
<td></td>
</tr>
<tr>
<td>Local reactogenicity</td>
<td>bivalent &gt; quadrivalent</td>
<td></td>
</tr>
<tr>
<td>Cost of vaccine dose</td>
<td>$130 private</td>
<td>$128 private</td>
</tr>
<tr>
<td></td>
<td>$106 CDC contract**</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

*Quadrivalent vaccine - protection against VIN2/3 and VaIN2/3

** [http://www.cdc.gov/vaccines/programs/vfc/cdc-vac-price-list.htm](http://www.cdc.gov/vaccines/programs/vfc/cdc-vac-price-list.htm)
HPV Vaccine

- MSM at risk for AIN, anal cancer, genital warts
- Quadrivalent HPV vaccine in MSM (ACIP 2/2010)
  - HPV 6/11/16,18 EGL 90.6%
  - HPV 6/11/16,18 AIN 77.5%
  - HPV 6/11/16,18 AIN 2/3 86.6%
- HIV + men/women 9-26 yrs (HIV OI Guidelines 2011)
  - Quadrivalent or bivalent
  - Cervical ca screening regardless of vaccine status
Scabies/Pediculosis

- Permethrin superior to crotamiton (2 RCTs)
- Combined tx for crusted scabies - topical scabicide (5% topical benzyl benzoate or 5% topical permethrin) and repeated tx with ivermectin 200ug/kg dys 1,2,8,9,15. +/- tx on 22,29 if severe
- Emerging resistance to all pediculicides except malathion
Clinician Resources

- Condoms and STDs: Fact Sheet for Public Health Personnel
  - [www.cdc.gov/condomeffectiveness/latex.htm](http://www.cdc.gov/condomeffectiveness/latex.htm)
- Expedited Partner Therapy
  - [www.cdc.gov/std/ept](http://www.cdc.gov/std/ept)
- Get Yourself Tested
  - [www.itsyoursexlife.com/gyt](http://www.itsyoursexlife.com/gyt)
Educational and Training Resources

• NNPTC
  – www.nnptc.org

• 2010 STD Treatment Guidelines
  – www.cdc.gov/std/treatment/2010
  – cdcinfo@cdc.gov or 800.CDC.INFO (800.232.4636)

• CDC Division of STD Prevention
  – www.cdc.gov/std/training
  – stdtraining@cdc.gov or 404.639.8360