

# Vaginitis

## Learning Objectives:

Upon completion of this module, the learner will be able to:

1. Discuss the etiology of trichomoniasis, bacterial vaginosis (BV) and candidiasis.
2. Compare and contrast the clinical manifestations of trichomoniasis, BV and candidiasis.
3. State the clinical and laboratory criteria for the diagnosis of trichomoniasis, BV, and candidiasis.
4. Discuss the clinical management of vaginitis to include treatment, follow-up, patient counseling and partner management.
5. Discuss non-infectious causes of vaginitis to be considered in the differential diagnosis.

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## Vaginitis Curriculum Module Contributors

### Primary Editor 2001 Edition

**Jeanne Marrazzo, MD, MPH**, Assistant Professor, Infectious Diseases, University of Washington, Medical Director, Seattle STD/HIV Prevention Training Center, Seattle, WA

### Contributing Editors 2001 Edition

**Heidi M. Bauer, MD, MS, MPH**, Director, Office of Medical and Scientific Affairs, STD Control Branch, State of California, Department of Health Services, Berkeley, CA, Medical Co-director, California STD/HIV Prevention Training Center, Berkeley, CA, Clinical Instructor, Department of Obstetrics, Gynecology and Reproductive Health Sciences, School of Medicine, University of California, San Francisco, CA; **Gail A. Bolan, MD**, Chief, STD Control Branch, State of California, Department of Health Services, Berkeley, CA, Director, California STD/HIV Prevention Training Center, Berkeley, CA, Assistant Clinical Professor, School of Medicine, University of California, San Francisco, CA; **Helene Calvet, MD**, Medical Co-director, California STD/HIV Prevention Training Center, Long Beach, CA, Public Health Physician, Long Beach Department of Health and Human Services, Long Beach, CA; **Thomas Cherneskie, MD, MPH**, New York City Department of Health, STD Control Program, New York, NY; **John Douglas, MD**, Director of STD Control, Denver Public Health, Professor of Medicine and Preventive Medicine, University of Colorado Health Sciences Center, Denver, CO; **Charles L. Heaton, M.D.**, Professor of Dermatology, University of Cincinnati and Medical Director Cincinnati STD/HIV Prevention Training Center; Cincinnati, OH; **Kathryn Koski, MEd**, Public Health Advisor, CDC/Division of STD Prevention; Atlanta, GA; **James P. Luby, MD**, Professor of Internal Medicine, Division of Infectious Diseases, University of Texas Southwestern Medical School at Dallas, Medical Director, Dallas STD/HIV Prevention Training Center, Dallas, TX; **Sylvie Ratelle, MD, MPH**, Director, STD/HIV Prevention Training Center of New England, Division of STD Prevention, Massachusetts Department of Public Health, Assistant Professor of Family Medicine and Community Health, University of Massachusetts Medical School, Boston, MA; **Anne Rompalo, MD, ScM**, Associate Professor, Division of Infectious Diseases, Joint Appointment, Department of OB/GYN, Johns Hopkins University School of Medicine, Associate Professor, Department of Epidemiology, Johns Hopkins University School of Hygiene and Public Health, Medical Director, Baltimore STD/HIV Prevention Training Center, Baltimore, MD; **Marianne Scharbo-DeHaan, PhD, CNM**, Training and Health Communications Branch, Division of STD Prevention, Centers for Disease Control and Prevention, Atlanta, GA; **Bradley Stoner, MD, PhD**, Associate Professor, Washington University School of Medicine, St. Louis, Medical Director, St. Louis STD/HIV Prevention Training Center, St. Louis, MO; **John F. Toney, M.D.**, Associate Professor of Medicine, Division of Infectious Diseases and Tropical Medicine, University of South Florida College of Medicine, Director, Florida STD/HIV Prevention Training Center, Tampa, Florida, CDC National Network of STD/HIV Prevention Training Centers

### Expert Reviewers 2001 Edition

**Susan Kendig, RNC, MSN, WHCNP**, Clinical Assistant Professor, Barnes College of Nursing at the University of Missouri, St. Louis, MO; **Sudha Mehta, MD**, Medical Director, Cincinnati Health Department STD Clinic, Cincinnati, OH; **Anita Nelson, MD**, Professor, Department of Obstetrics and Gynecology, Medical Director, Women's Health Care Programs, Harbor-UCLA Medical Center, Torrance, CA; **Jeanne**

**S. Sheffield, MD**, Assistant Professor, Obstetrics and Gynecology, University of Texas Southwestern Medical Center, Dallas, TX; **Judy Shlay, MD, MSPH**, Attending Physician, STD Clinic, Denver Public Health Director, Teen Clinic, Denver Public Health, Denver, CO; **Kimberly A Workowski, M.D., FACP**, Chief, Guidelines Unit, Epidemiology and Surveillance Branch, Division of STD Prevention, CDC, Associate Professor Medicine, Division of Infectious Diseases, Emory University, Atlanta, GA

### **Contributors to Previous Editions**

**Jandel Allen-Davis, MD**, Assistant Clinical Professor, Department of OB/GYN, University of Colorado Health Sciences Center, Staff Physician, Kaiser Permanente, Department of Obstetrics and Gynecology, Denver, CO; **Teri Anderson, MT**, Associate Clinical Training Coordinator, Denver STD/HIV Prevention Training Center, Denver Public Health Department, Denver, CO; **Susan Bershoff-Matcha, MD**, Senior Fellow, Division of Infectious Diseases, Washington University School of Medicine, St. Louis, MO; **Jeanne Marrazzo, MD, MPH**, Assistant Professor of Medicine, University of Washington School of Medicine, Program Director, Principal Investigator, Seattle STD/HIV Prevention Training Center, Seattle, WA; **James McGregor, MD**, Senior Technical Physician, Denver Health Medical Center, Professor of Obstetrics and Gynecology, University of Colorado Health Sciences Center, Denver, CO; **Daniel Paul, MD**, Senior Fellow, Division of Infectious Diseases, Washington University School of Medicine, St. Louis, MO; **Bradley Stoner, MD, PhD**, Assistant Professor of Medicine, Washington University School of Medicine, Medical Director, St. Louis STD/HIV Prevention Training Center, St. Louis, MO

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## Vaginitis

Vaginitis is usually characterized by a vaginal discharge or vulvar itching and irritation; a vaginal odor may be present. The three common diseases associated with vaginal infection include trichomoniasis (15-20%), bacterial vaginosis (40-45%), and vulvovaginal candidiasis (20-25%) or, not infrequently, a combination. Other causes of vaginal discharge or irritation include mucopurulent cervicitis caused by *Chlamydia trachomatis* or *Neisseria gonorrhoeae*, or herpes simplex virus, atrophic vaginitis, allergic reactions (spermicides, deodorants), vulvar vestibulitis, lichen simplex chronicus and lichen sclerosis (especially pruritis) and foreign bodies (retained tampons). Trichomoniasis and bacterial vaginosis increase susceptibility to HIV acquisition.

The vagina is a dynamic ecosystem that normally contains approximately  $10^9$  bacterial colony-forming units per gram of vaginal fluid. The normal bacterial flora is dominated by lactobacilli, but a variety of other organisms, including some potential pathogens, are also present at lower levels. Lactic acids and other organic acids are metabolized from glycogen by the lactobacilli, maintaining the vaginal pH between 3.8 and 4.2. The acidic environment inhibits the overgrowth of bacteria and other organisms with pathogenic potential. The normal vaginal discharge is clear to white, odorless, and of high viscosity.

### Diagnosis and Evaluation:

Note character of vaginal discharge.

Ensure normal appearance of cervix with speculum exam to rule out cervicitis as a source of abnormal vaginal discharge.

Collect discharge from the lateral wall of the vagina.

Determine vaginal pH with narrow-range pH paper.

Perform microscopic exam of discharge with 10% KOH and 0.9% normal saline.

Perform amine or "whiff" test after application of 10% KOH to discharge.

Perform DNA probe for all 3 organisms (*Trichomonas vaginalis*, *Candida albicans*, and high-level *Gardnerella*) is available. Sensitivity, specificity, and clinical utility under investigation.

Cultures are not used routinely, but are available for both *T. vaginalis* and *Candida. spp.* Culture may be useful in the management of persistent or recurrent vulvovaginal candidiasis. Culture (including quantitative culture) is not useful for diagnosis of BV.

# Trichomoniasis

## Learning Objectives

Upon completion of this module, the learner will be able to:

1. Discuss the etiology and clinical manifestations of trichomoniasis.
2. List the laboratory tests available for the diagnosis of trichomoniasis.
3. Discuss the clinical management of trichomoniasis to include treatment, follow-up patient counseling, and partner management.

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## I. Epidemiology

- A. Estimated 5 million cases annually in the U.S. at a medical cost of \$375 million.
- B. Almost always sexually transmitted; fomite transmission is rare. Because *T. vaginalis* may persist for months to years in epithelial crypts and periglandular areas, distinguishing between persistent, subclinical infection and remote sexual acquisition is not always possible.
- C. Transmission between female sex partners has been documented.

## II. Pathogenesis

- A. Causative agent: *Trichomonas vaginalis*, flagellated anaerobic protozoa.
- B. Possible association with:
  - 1. Pre-term rupture of membranes and pre-term delivery.
  - 2. Increased risk of HIV acquisition.

## III. Clinical Manifestations

- A. Vaginitis:
  - 1. "Frothy" gray or yellow-green vaginal discharge.
  - 2. Pruritus.
  - 3. Cervical petechiae ("strawberry cervix"): classic presentation, but occurs in minority of cases.
- B. Can also infect Skene's ducts and urethra.
- C. Up to 50% of infected women are asymptomatic, although 30% of those who are asymptomatic will become symptomatic within six months.
- D. May cause up to ~11-13% of nongonococcal urethritis in males, but urethral infection is frequently asymptomatic.

#### **IV. Diagnosis**

- A. Vaginal pH >4.5 often present.
- B. Positive amine (KOH) test ("whiff" test) in many cases.
- C. Motile trichomonads seen in saline wet mount (usual mode of diagnosis). Sensitivity varies from 42%-70% depending upon the experience of the microscopist and specimen collection technique. White blood cells are frequently seen. Saline microscopy should be performed as soon as possible after obtaining the specimen. Trichomonads, especially if the specimen is old and they have become sluggish, may closely resemble white blood cells. Similarly, white blood cells can be confused with trichomonads, so motility should be assessed.
- D. Culture (Diamond's media or InPouch TV) is more sensitive than wet mount.
- E. Pap smear has limited sensitivity and low specificity; therefore, cannot be used to reliably diagnose trichomonal vaginitis.
- F. DNA probes (now available) are significantly more sensitive than wet prep, but are also more expensive and not widely available.
- G. For suspected trichomoniasis in males, first-void urine concentrated 10x and examine for motile trichomonads; urethral swab or 10 cc of first-void urine may also be obtained for culture

#### **V. Treatment**

- A. Metronidazole (95% cure rate):
  - 1. Recommended: metronidazole 2.0 gm po as one-time single dose.
  - 2. Alternate regimen: metronidazole 500 mg b.i.d. for 7 days.
  - 3. All patients with trichomoniasis should be treated (whether symptomatic or asymptomatic).

4. Sex partners should be treated; consider testing for other bacterial STDs.
5. Metronidazole gel (intravaginal) is ineffective for trichomoniasis and should not be used.
6. Options in the setting of metronidazole allergy include use of an alternative drug (e.g., paromomycin) or desensitization (see CDC Treatment Guidelines for protocol).

B. Pregnancy:

1. Metronidazole 2.0 gm one time in single dose.
2. No evidence of teratogenicity; treatment may be administered throughout pregnancy.

C. Treatment failures:

1. Repeat standard single-dose treatment regimen (metronidazole 2.0 g one time).
2. Assure treatment of sex partners.
3. Metronidazole 500 mg b.i.d. for 7 days if used 2 g one-time single dose initially.
4. With repeated failures, metronidazole 2 gm daily x 3-5 days.
5. Increasing the dose and duration of metronidazole or administering it intravenously may be of use; published regimens are available. Other agents, including topical paromomycin and oral tinidazole, are available.
6. If repeated treatment failures occur on higher dose regimens, contact Division of STD Prevention, CDC for metronidazole-susceptibility testing.

D. No follow-up necessary.

E. Consider testing for other bacterial STDs.

## VI. Prevention

- A. Partner management: sex partners should be treated. Patients should be instructed to avoid sex until they and their sex partners are cured. In the absence of a microbiologic test of cure, this means when therapy has been completed and patient and partner(s) are asymptomatic.
- B. Patient counseling and education:
  - 1. Nature of the infection:
    - a) Timely healthcare-seeking for abnormal vaginal discharge.
    - b) Education of women about normal vs. abnormal discharge.
  - 2. Transmission issues: trichomoniasis is almost always sexually transmitted; fomite transmission is rare.
  - 3. Risk reduction:
    - a) Assess client's behavior-change potential.
    - b) Discuss prevention strategies (abstinence, monogamy, condoms, limit number of sex partners, etc.). Latex condoms, when used consistently and correctly, can reduce the risk of transmission of trichomonas.
    - c) Develop individualized risk-reduction plans.

## VII. References: (See end of module)

# Candidiasis

## Learning Objectives

Upon completion of this module the learner will be able to:

1. Discuss the etiology and clinical manifestations of candidiasis.
2. State the clinical and laboratory criteria for the diagnosis of candidiasis.
3. Discuss the clinical management of candidiasis to include treatment, follow-up patient counseling and partner management.
4. Discuss the relationship and management of candidiasis when there is co-infection with HIV.

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## I. Epidemiology

- A. Not generally considered a sexually transmitted condition.
- B. Frequent infections may be linked to diabetes, corticosteroids, repeated courses of antibiotics, pregnancy, or HIV disease, although most patients have no risk factors.
- C. Most cases of candidiasis are caused by *C. albicans* (85%-90%); *C. glabrata* and *C. parapsilosis* responsible for 5%-10% of cases.

## II. Pathogenesis:

VVC is caused by overgrowth of *Candida albicans* and other non-*albicans* species that grow as oval, budding yeast cells and as chains of cells (pseudohyphae). *Candida* species are normal flora of skin and vagina and are not considered to be sexually transmitted pathogens. Clinical infection occurs in the setting of excessive growth of yeast, which is usually kept in check by normal vaginal bacteria (especially lactobacilli). As noted above, conditions which disrupt normal vaginal ecology or host immunity can predispose to vaginal yeast infections (e.g., antibiotic use, diabetes, HIV infection).

## III. Clinical Manifestations

- A. Thick, white, curdy vaginal discharge ("cottage-cheese-like").
- B. Vulvar pruritus, erythema, irritation, occasional erythematous "satellite" lesions.
- C. External dysuria.

## IV. Diagnosis

- A. Clinical presentation and symptoms.
- B. Visualization of pseudohyphae (mycelic) and/or budding yeast (conidia) on 10% KOH examination (preferred), saline wet mount, or Gram stains.

- C. pH usually <4.5. If pH is abnormally high ( $\geq 4.5$ ), consider concurrent BV or trichomoniasis.
- D. Cultures not useful for routine diagnosis, since positive cultures may be detecting colonization rather than clinically significant infections and therefore should not be treated. Cultures may be useful to detect non-albicans species or resistant organisms in women with recurrent disease. (See Section VI, below)
- E. DNA probe is available but expensive.

## V. Treatment

- A. Uncomplicated VVC (mild to moderate, sporadic, nonrecurrent disease in a normal host with normally susceptible *C. albicans*), responds to short (three-day) and single-dose oral therapy. In contrast, complicated VVC (severe local or recurrent VVC in an abnormal host; e.g., an uncontrolled diabetic, HIV infection with low CD4 count), requires longer duration (10-15 days) with topical imidazoles. Some clinicians treat with more than one dose of fluconazole depending on severity of illness (e.g., repeat on day 4 and possibly day 7), but this approach has not been well studied.
- B. Recommended regimens:
  - 1. Intravaginal agents:
    - Butoconazole 2% cream 5 g (Butoconazole<sup>1</sup> – sustained release), single intravaginal application, 5 g intravaginally for 3 days\*†
    - Clotrimazole 1% cream 5 g intravaginally for 7-14 days\*†
    - Clotrimazole 100 mg vaginal tablet for 7 days\*
    - Clotrimazole 100 mg vaginal tablet, 2 tablets for 3 days\*
    - Clotrimazole 500 mg vaginal tablet, 1 tablet in a single application\*
    - Miconazole 2% cream 5 g intravaginally for 7 days\*†
    - Miconazole 200 mg vaginal suppository, 1 suppository for 3 days\*†
    - Miconazole 100 mg vaginal suppository, 1 suppository for 7 days\*†
    - Nystatin 100,000-U vaginal tablet, 1 tablet for 14 days
    - Tioconazole 6.5% ointment 5 g intravaginally in a single application\*†
    - Terconazole 0.4% cream 5 g intravaginally for 7 days\*
    - Terconazole 0.8% cream 5 g intravaginally for 3 days\*
    - Terconazole 80 mg vaginal suppository, 1 suppository for 3 days\*

2. Oral agent: Fluconazole 150 mg oral tablet, 1 tablet in a single dose.

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\*These creams and suppositories are oil-based and may weaken latex condoms and diaphragms. Refer to condom product labeling for further information.

†Over-the-counter (OTC) preparations.

- C. In pregnant patients, only topical imidazoles are recommended. **Fluconazole should not be used.**
- D. Routine treatment of sex partners is usually not warranted. Male partners with balanitis or penile dermatitis may benefit from treatment.
- E. Only clotrimazole and miconazole are Category B in pregnancy; all other anti-yeast medications are Category C, because of the observation in fetal rat models that they are associated with decrease in skull ossification. For this reason, the Category C drugs are not first-line treatment in the first trimester, but women treated inadvertently at usual doses should be unaffected. Again, **avoid fluconazole.**
- F. In cases associated with severe vulvitis and intense pruritis, topical applications of low potency corticosteroid cream or nystatin cream may be beneficial.

## VI. Recurrent Vulvovaginal Candidiasis (RVVC)

- A. Women who experience four or more episodes of VVC annually may be considered to have RVVC. While some women with RVVC have risk factors (see above), most women do not. Recurrent disease may be more likely to be due to non-*albicans* species.
- B. The optimal treatment has not been established. An initial intensive regimen of 7-14 days of topical treatment or sequential oral doses of fluconazole (150 mg on days 1 and 4), followed by a maintenance regimen for at least six months is recommended. Maintenance ketoconazole 100 mg orally, once daily for up to six months or weekly fluconazole (150 mg weekly) reduces the frequency of episodes. Periodic monitoring of liver function tests should be performed if ketoconazole is given for maintenance therapy. Ketoconazole may also affect the efficacy of oral contraceptives; this should be discussed with the patient.

- C. RVVC should be confirmed by culture before initiating maintenance therapy. VVC diagnosis should also be periodically re-confirmed, and the presence of other contributory causes (new trichomoniasis or BV) assessed.
- D. Patients with RVVC who are receiving treatment should receive regular follow-up to monitor the effectiveness of therapy and the occurrence of drug-related side effects.
- E. Boric acid tablets intravaginally (500 mg in type O gel capsule nightly for 14 days) may be effective for RVVC; **do not use in pregnancy.**

## VI. Prevention

- A. Partner management: VVC is not usually acquired through sexual intercourse; treatment of sex partners is not recommended but may be considered in women who have recurrent infection. A minority of male sex partners may have balanitis, characterized by erythematous areas on the glans penis in conjunction with pruritis or irritation, and may benefit from treatment with topical antifungal agents to relieve symptoms.
- B. Patient counseling and education:
  - 1. Education re: normal vs. abnormal discharge and signs warranting evaluation.
  - 2. Avoidance of unnecessary antibiotic treatment.
  - 3. Control of predisposing conditions (e.g., diabetes)

## VII. References: (See end of module)

# Bacterial Vaginosis

## Learning Objectives

Upon completion of this module, the learner will be able to:

1. Discuss the etiology and clinical manifestations of BV.
2. State the clinical and laboratory criteria for the presumptive diagnosis of BV.
3. Discuss the clinical management of BV to include treatment, follow-up, patient counseling, and partner management.

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## I. Epidemiology

- A. Prevalence varies by population; 5-25% among college students, 12-35% among STD patients.
- B. Currently not considered sexually transmitted, but appears to be related to sexual activity.
- C. Widely distributed. More common in African-American women, women who douche, women using IUDs, women having new or more than 2 sex partners, and possibly in lesbians.
- D. BV linked to premature rupture of membranes, premature delivery, and low birth-weight delivery, acquisition of HIV, and development of PID and post-operative infections of gynecological procedures.

## II. Pathogenesis

- A. Overgrowth of bacteria species normally present in vagina, but at low levels, such as *Gardnerella*, *Bacteroides*, *Mycoplasma hominis*, *Mobiluncus*, *Peptostreptococcus*.
- B. BV correlates with loss of protective (peroxide-producing) lactobacilli, which are normally present in vagina:
  - 1. Vaginal acid pH normally maintained by *Lactobacillus* through breakdown of glycogen.
  - 2. Lactic acid is produced, helps maintain a low pH which may directly inhibit some organisms. Lactobacillus production of hydrogen peroxide is also important.
  - 3. Loss of protective lactobacilli may lead to BV.

### III. Clinical Manifestations

- A. 50% report malodorous vaginal discharge, sometimes reported more commonly after unprotected vaginal intercourse and after completion of menses.
- B. 50% asymptomatic:
  - 1. May have increased discharge.
  - 2. Vaginal pruritus may or may not be present.

### IV. Diagnosis

- A. Amsel criteria: must have at least three of the following findings:
  - 1. Vaginal pH >4.5 (most sensitive but least specific).
  - 2. Presence of "clue cells" on wet mount examination (bacterial clumping upon the borders of epithelial cells). Clue cells should constitute at least 20% of all epithelial cells (an occasional clue cell does not fulfill this criteria).
  - 3. Positive amine or "whiff test" (liberation of amines with or without the addition of 10% KOH, with resultant "fishy" odor).
  - 4. Homogeneous, non-viscous, milky-white discharge adherent to the vaginal walls.
- B. Some experts use vaginal Gram stain to diagnose BV (Nugent criteria). A normal Gram stain would show predominantly *Lactobacillus* bacteria. When a more mixed flora is present (Gram-positive cocci, small Gram-negative rods, curved Gram-variable rods) and *Lactobacillus* absent or present in low numbers, the smear is interpreted as consistent with BV.
- C. Bacterial cultures are not recommended.
- D. Newer diagnostic modalities include tests that detect abnormal pH and high levels of amine or *G. vaginalis* (e.g., FemExam card and others).

## V. Treatment

### A. Recommended regimens (non-pregnant patients):

1. Metronidazole 500 mg po b.i.d. x 7 days.
2. Clindamycin cream 2% one applicator-full intravaginally q.h.s. x 7 days.
3. Metronidazole gel 0.75% one applicator-full q.d. or b.i.d. x 5 days. If q.d., administer at bedtime.

### B. Alternative regimens (non-pregnant patients):

1. Metronidazole 2 gm po single dose.
2. Clindamycin 300 mg po b.i.d. x 7 days.
3. Clindamycin ovules 100 mg intravaginally at bedtime x 3 days.

### C. Treatment in pregnancy:

1. Pregnant women with symptomatic disease should be treated with metronidazole 250 t.i.d. x 7 days. There is no evidence of teratogenicity from metronidazole, even when used in first trimester. Some experts suggest that treating early in pregnancy may actually be important in preventing adverse outcome.
2. Alternative regimens include metronidazole 2 gm orally in a single dose or clindamycin 300 mg orally b.i.d. x 7 days. Metronidazole gel is also an alternative for low-risk women, but may not treat subclinical upper genital tract infection.
3. The use of clindamycin intravaginal cream in pregnant women is not recommended due to increased risk of premature delivery.

### D. Screening and treatment in asymptomatic patients:

1. Therapy is not recommended for male partners of women with BV. Female partners of women with BV should be examined and treated if BV is present.
2. Therapy may not be necessary for asymptomatic women with BV. Exceptions include:

- a) Asymptomatic patients with BV who are to undergo surgical abortion should be treated. BV has been associated with endometritis, PID or vaginal cuff cellulitis in women undergoing ambulatory invasive procedures (endometrial biopsy, hysteroscopy, IUD insertions) and women scheduled for vaginal or abdominal surgery. Although data are insufficient to recommend treatment of asymptomatic patients prior to procedures other than surgical abortion and hysterectomy (see new CDC tx guidelines), many providers elect to treat asymptomatic BV before any procedure involving the upper genital tract.
  - b) An association between BV and premature delivery has been demonstrated in a number of studies. Recent treatment trials have demonstrated a significant reduction in pre-term delivery in women at high risk. Therefore, some experts recommend screening and treatment of asymptomatic pregnant women at high risk for pre-term delivery (i.e., those who have previously delivered a premature infant) at the first prenatal visit.
- E. Drugs **not** recommended for the treatment of BV include: ampicillin, erythromycin, iodine, dienestrol cream, tetracycline/doxycycline, triple sulfa, and ciprofloxacin.
- F. Recurrence:
1. 80% recurrence rate within 7 months in one study.
  2. Recurrence may be a result of persistence of BV-associated organisms and/or failure of *Lactobacillus* flora to recolonize.
  3. Little data to support yogurt therapy or exogenous oral *Lactobacillus* treatment.
  4. Under study: vaginal suppositories containing human *Lactobacillus* strains.

## VI. Prevention

- A. Partner management: after multiple occurrences, some consider empiric treatment of male sex partners to see if recurrence rate diminishes, but this approach has not been validated in several studies.

B. Patient counseling and education:

1. Avoid douching, which can eliminate protective lactobacilli.
2. Education re: normal vs. abnormal discharge and signs warranting evaluation.

**VAGINITIS: DIFFERENTIATING Bacterial Vaginosis, Candidiasis, and Trichomoniasis**

	Normal	Bacterial Vaginosis	Candidiasis	Trichomoniasis
<b>Symptoms/Presentation</b>		Odor, discharge, itch	Itch, discomfort, dysuria, thick discharge	Itch, discharge, 50% asymptomatic
<b>Vaginal Discharge</b>	Clear to white	Homogenous, adherent, thin, milky-white; malodorous "foul fishy"	Thick, clumpy, white "cottage cheese"	Frothy, gray or yellow-green; malodorous
<b>Clinical Findings</b>			Inflammation and erythema	Cervical petechiae "strawberry cervix"
<b>Vaginal pH</b>	3.8-4.2	>4.5	Usually ≤4.5	>4.5
<b>KOH "whiff test"</b>	Negative	Positive	Negative	Often positive
<b>NaCl Wet Mount</b>	Lactobacilli	Clue cells (≥20%), no/few WBCs	Few WBCs	Motile flagellated protozoa, many WBCs
<b>KOH Wet Mount</b>			Pseudohyphae or spores if non- <i>albicans</i> species	

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