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This Practice Bulletin was developed by the ACOG Committee on Practice Bulletins— Gynecology with the assistance of Paul Nyirjesy, MD. The information is designed to aid practitioners in making decisions about appropriate obstetric and gynecologic care. These guidelines should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.
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Vaginitis

Vaginal symptoms are common in the general population and are one of the most frequent reasons for patient visits to obstetrician–gynecologists (1). Vaginitis may have important consequences in terms of discomfort and pain, days lost from school or work, and sexual functioning and self-image. Vaginitis is associated with sexually transmitted diseases and other infections of the female genital tract, including human immunodeficiency virus (HIV) (2, 3), as well as adverse reproductive outcomes in pregnant and nonpregnant women. Treatment usually is directed to the specific causes of vaginal symptoms, which most commonly include bacterial vaginosis, vulvovaginal candidiasis, and trichomoniasis. The purpose of this document is to provide information about the diagnosis and treatment of vaginitis.

Background

Vaginitis is defined as the spectrum of conditions that cause vulvovaginal symptoms such as itching, burning, irritation, and abnormal discharge. The most common causes of vaginitis are bacterial vaginosis (22–50% of symptomatic women), vulvovaginal candidiasis (17–39%), and trichomoniasis (4–35%); 7–72% of women with vaginitis may remain undiagnosed (4). In the undiagnosed group of women, symptoms may be caused by a broad array of conditions, including atrophic vaginitis, various vulvar dermatologic

conditions, and vulvodynia. Vaginitis has a broad differential diagnosis, and successful treatment frequently rests on an accurate diagnosis.

Estrogen status plays a crucial role in determining the normal state of the vagina. In the prepubertal and postmenopausal states, the vaginal epithelium is thinned, and the pH of the vagina usually is elevated (4.7 or greater). A routine bacterial culture will demonstrate a broad variety of organisms, including skin and fecal flora. During the reproductive years, the presence of estrogen increases glycogen content in vaginal epithelial cells, which in turn encourages colonization of the vagina by lactobacilli. This increased level of colonization leads to lactic acid production and a resulting decrease in the vaginal pH to less than 4.7. However, even in women of reproductive age, the normal vaginal flora remain heterogeneous, and other components of the vaginal flora, such as *Gardnerella vaginalis, Escherichia coli,* group B streptococci (GBS), genital mycoplasmatales, and *Candida albicans,* are commonly found.

Evaluation of women with vaginitis should include a focused history about the entire spectrum of vaginal symptoms, including change in discharge, vaginal malodor, itching, irritation, burning, swelling, dyspareunia, and dysuria. Questions about the location of symptoms (vulva, vagina, anus), duration, the relation to the menstrual cycle, the response to prior treatment including self-treatment and douching, and a sexual history can yield important insights into the likely etiology. Because many patients with vaginitis have vulvar manifestations of disease, the physical examination should begin with a thorough evaluation of the vulva. However, evaluation may be compromised by patient self-treatment with nonprescription medications. During speculum examination, samples should be obtained for vaginal pH, amine ("whiff") test, and saline (wet mount) and 10% potassium hydroxide (KOH) microscopy. The pH and amine testing can be performed either through direct measurement or by colorimetric testing. It is important that the swab for pH evaluations be obtained from the mid-portion of the vaginal side wall to avoid false elevations in pH results caused by cervical mucus, blood, semen, or other substances. In selected patients, vaginal cultures or polymerase chain reaction tests for trichomonas or yeast are helpful. A vaginal Gram stain for Nugent scoring of the bacterial flora may help to identify patients with bacterial vaginosis. Other currently available ancillary tests for diagnosing vaginal infections include rapid tests for enzyme activity from bacterial vaginosis-associated organisms, *Trichomonas vaginalis* antigen, and point-of-care testing for DNA of *G vaginalis, T vaginalis,* and *Candida* species; however, the role of these tests in the proper management of patients with vaginitis is unclear. Depending on risk factors, DNA amplification tests can be obtained for *Neisseria gonorrheae* and *Chlamydia trachomatis.*

Vulvovaginal Candidiasis

Physical manifestations of vulvovaginal candidiasis range from asymptomatic colonization to severely symptomatic. Symptomatic women may report itching, burning, irritation, dyspareunia, burning with urination, and a whitish thick discharge. Multiple studies conclude that a reliable diagnosis cannot be made on the basis of history and physical examination alone (4). Diagnosis requires either 1) visualization of blastospores or pseudohyphae on saline or 10% KOH microscopy, or 2) a positive culture in a symptomatic woman. The diagnosis can be further classified as uncomplicated or complicated vulvovaginal candidiasis (see the box). This classification system has treatment implications because complicated vulvovaginal candidiasis is more likely to fail standard antifungal therapy (5, 6).

Women with uncomplicated vulvovaginal candidiasis can be treated successfully with any of the options in Table 1. Topical treatments may cause local side effects, such as burning and irritation. Occasionally, oral

therapy may cause systemic side effects, such as gastrointestinal intolerance, headache, and liver function test elevations; these usually are mild and self-limited (5). Allergic reactions to oral therapy are rare. Because all listed antifungal treatments seem to have comparable safety and efficacy, the choice of therapy should be individualized to the specific patient; factors such as cost, convenience, compliance, ease of use, history of response or adverse reactions to prior treatments, and patient preference can all be taken into consideration.

Classification of Vulvovaginal Candidiasis

Uncomplicated
- Sporadic or infrequent episodes
- Mild to moderate symptoms or findings
- Suspected *Candida albicans* infection
- Nonpregnant woman without medical complications

Complicated
- Recurrent episodes (four or more per year)
- Severe symptoms or findings
- Suspected or proved non-*albicans Candida* infection
- Women with diabetes, severe medical illness, immunosuppression, other vulvovaginal conditions
- Pregnancy

Modified from Sexually transmitted diseases treatment guidelines 2002. Centers for Disease Control and Prevention. MMWR Recomm Rep 2002;51(RR-6):1-78.

Patients with complicated vulvovaginal candidiasis require more aggressive treatment to achieve relief of symptoms. In a placebo-controlled randomized trial of women with severe vulvovaginal candidiasis, a second dose of fluconazole, 150 mg given 3 days after the first dose, increased the cure rate from 67% to 80% (6). In women with recurrent vulvovaginal candidiasis secondary to C albicans, after initial intensive therapy for 7-14 days to achieve mycologic remission, prolonged antifungal treatment with fluconazole, 150 mg weekly (7) for 6 months, will successfully control more than 90% of symptomatic episodes and will lead to a prolonged protective effect in approximately 50% of women. Although daily oral ketoconazole was previously described as an effective suppressive therapy in women with recurrent vulvovaginal candidiasis (8), weekly fluconazole has a lower risk of liver toxicity and should be used instead of ketoconazole (9). For patients who are unable or unwilling to take fluconazole, prolonged maintenance therapy with intermittent topical agents, such as clotrimazole, 500 mg weekly or 200 mg twice a week, are acceptable options (9). Candida species colonization and symptomatic vulvovaginal candidiasis may occur more commonly in pregnant women (10). Although low-dose short-term fluconazole use is not associated with known birth defects (11), higher doses of 400-800 mg/d have been linked to birth defects (12). Thus, treatment of vulvovaginal candidiasis in pregnancy should consist of one of the topical imidazole therapies listed in Table 1, probably for 7 days (13).

Although much less common than *C albicans*, vulvovaginal candidiasis caused by non-*albicans Candida* species are less likely to respond to azole antifungal therapy (6). Current experience consists exclusively of descriptions of case series of patients seen at centers specializing in the treatment of vaginitis. A standard course of topical imidazole therapy may be effective in up to 50% of such cases (14). Therapy

with vaginal boric acid, 600-mg capsules daily for a minimum of 14 days, seems to be effective for azole failures (15). Patients with non-*albicans Candida* vulvovaginal candidiasis in whom boric acid therapy is ineffective should be referred to a specialist experienced in handling such cases.

Table 1. Therapy for Vulvovaginal Infections (Drugs Listed Alphabetically)

Indication	Drug	Formulation	Dosage	Duration
Uncomplicated vulvovaginal candidiasis	Butoconazole	2% sustained-release cream	5 g daily	1 day
	Clotrimazole	1% cream	5 g daily	7 days
		2% cream	5 g daily	3 days
		100-mg vaginal suppository	100 mg daily	7 days
		200-mg vaginal suppository	200 mg daily	3 days
		500-mg vaginal suppository	500 mg daily	1 day
	Fluconazole	150-mg oral tablet	150 mg daily	1 day
	Miconazole	2% cream	5 g daily	7 days
		100-mg vaginal suppository	100 mg daily	7 days
		200-mg vaginal suppository	200 mg daily	3 days
		1,200-mg vaginal suppository	1,200 mg daily	1 day
	Nystatin	100,000 units vaginal tablets	daily	14 days
	Terconazole	0.4% cream	5 g daily	7 days
		0.8% cream	5 g daily	3 days
	Tioconazole	2% cream	5 g daily	3 days
		6.5% cream	5 g daily	1 day
Bacterial vaginosis	Clindamycin	2% cream	5 g daily	7 days
		2% sustained-release cream	5 g daily	1 day
		100-mg ovules	100 mg daily	3 days
		300-mg oral	300 mg twice daily	7 days
	Metronidazole	0.75% gel	5 g daily	5 days
		500-mg oral	500 mg twice daily	7 days
Trichomoniasis	Metronidazole	500-mg oral	4 tabs as one dose	1 day
			500 mg twice daily	7 days
	Tinidazole	500-mg oral	4 tabs as one dose	1 day

Data from Sexually transmitted diseases treatment guidelines 2002. Centers for Disease Control and Prevention. MMWR Recomm Rep 2002;51(RR-6):1–78; Sobel JD, Faro S, Force RW, Foxman B, Ledger WJ, Nyirjesy P, et al. Vulvovaginal candidiasis: epidemiologic, diagnostic, and therapeutic considerations. Am J Obstet Gynecol 1998;178:203–11; Cohen L. Treatment of vaginal candidosis using clotrimazole vaginal cream: single dose versus 3-day therapy. Curr Med Res Opin 1985;9:520–3; Faro S, Skokos CK. The efficacy and safety of a single dose of Clindesse vaginal cream versus a seven-dose regimen of Cleocin vaginal cream in patients with bacterial vaginosis. Clindesse Investigators Group. Infect Dis Obstet Gynecol 2005;13:155–60; Gabriel G, Robertson E, Thin RN. Single dose treatment of trichomoniasis. J Int Med Res 1982;10:129–30.

Bacterial Vaginosis

Bacterial vaginosis is a polymicrobial infection marked by a lack of hydrogen peroxide-producing lactobacilli and an overgrowth of facultative anaerobic organisms. Organisms that are found with greater frequency and numbers in women with bacterial vaginosis include *G vaginalis, Mycoplasma hominis, Bacteroides* species, *Peptostreptococcus* species, *Fusobacterium* species, *Prevotella* species, *Atopobium vaginae,* and other anaerobes (16, 17). Because these organisms are part of the normal flora, the mere presence of these organisms, especially *G vaginalis*, on a culture does not mean that the patient has bacterial vaginosis. Patients with bacterial vaginosis, when symptomatic, may complain of an abnormal vaginal discharge and a fishy odor. A clinical diagnosis of bacterial vaginosis requires the presence of three out of four Amsel's criteria: abnormal gray discharge, vaginal pH greater than 4.5, a positive amine

test, and more than 20% of the epithelial cells being clue cells. In research settings, the Nugent score (18), which assigns a value to different bacterial morphotypes seen on Gram stain of vaginal secretions, is considered the current criterion standard for diagnosing bacterial vaginosis. Compared to Nugent scoring, Amsel's criteria have a sensitivity of 92% and specificity of 77% (19). However, a similar sensitivity and specificity have been demonstrated by using any combination of only two clinical criteria (20).

In nonpregnant women, bacterial vaginosis has been associated with a number of infections of the female reproductive tract, including pelvic inflammatory disease (PID), postprocedural gynecologic infections, and acquisition of HIV and herpes simplex virus (HSV)-2 infections (21). Treatment for bacterial vaginosis before abortion or hysterectomy significantly decreases the risk of postoperative infectious complications (22). Treatment helps women to resolve concurrent mucopurulent cervicitis (23). There are no current data on the treatment of bacterial vaginosis to decrease acquisition of PID, HIV, or HSV-2, and the role of treatment of asymptomatic bacterial vaginosis to prevent these associated morbidities is unclear.

Following treatment, bacterial vaginosis may recur in up to 30% of women within 3 months (24). Possible mechanisms include persistence of pathogenic bacteria, reinfection from exogenous sources, including a sexual partner, or failure of the normal lactobacillus-dominant flora to reestablish themselves. Studies of partner treatment have failed to show a protective effect (25, 26). Studies of recolonization with lactobacillus supplements have used nonvaginal strains of lactobacillus and have failed to show a clear benefit (24). Prolonged antibiotic therapy may be useful in women with recurrent bacterial vaginosis; however, further investigation is warranted.

Nonpregnant women with bacterial vaginosis can be treated with the alternatives listed in Table 1. Although clindamycin use may be associated with in vitro antimicrobial resistance (21), the listed alternatives seem to have comparable clinical efficacy and safety (27–29). Generally, topical therapy is more expensive than generic oral metronidazole, although the latter may be associated with significant gastrointestinal symptoms. Disulfiramlike reactions may occur with both oral and topical metronidazole. As with the treatment of vulvovaginal candidiasis, treatment for BV should be individualized to the patient after considering multiple clinical factors.

In several epidemiologic studies, bacterial vaginosis has been associated with low birth weight, premature rupture of membranes (PROM), and prematurity (30–32). Standard antibiotic therapy seems to effectively eradicate bacterial vaginosis in pregnant women (33, 34), and those with symptomatic bacterial vaginosis should be treated. Neither metronidazole nor clindamycin have known teratogenic effects (35). Studies have been conducted to determine whether treating asymptomatic bacterial vaginosis in an uncomplicated pregnancy will decrease the risk of adverse outcomes. They have yielded conflicting results and have shown no clear benefit to routine screening and treatment in U.S. populations (36). However, in women with high-risk pregnancies, particularly those with prior preterm deliveries, some studies have shown that screening for and treating bacterial vaginosis with oral metronidazole may decrease the risk of preterm PROM and preterm delivery (37, 38), but others have not (36).

Trichomoniasis

Vaginal trichomoniasis is a common sexually transmitted disease with an estimated annual incidence of 7.4 million cases in the United States (39). Symptomatic women with trichomoniasis may have an abnormal discharge, itching, burning, or postcoital bleeding. Although many women with trichomoniasis

will have an elevated vaginal pH, diagnosis in clinical settings relies on visualization of motile trichomonads on saline microscopy. A wet mount has a sensitivity of 55–60% in diagnosing trichomoniasis (40, 41). Trichomonas culture techniques are associated with greater than 90% sensitivity (42). A point-of-care test for trichomonas antigens, the OSOM Trichomonas Rapid Test, has a sensitivity of 88.3% and specificity of 98.8% (43) compared with culture. This test may be a valuable diagnostic tool, particularly in settings with a high prevalence of trichomoniasis and where microscopy or culture is not available.

Treatments for uncomplicated trichomoniasis are listed in Table 1. Although metronidazole has been the mainstay of treatment in the United States, tinidazole also has recently been approved as single-dose therapy. Both treatments seem to be equally efficacious (9). Side effects seem to be of similar nature, including a possible disulfiramlike effect; alcohol should be avoided for 24 hours after metronidazole use and 72 hours after tinidazole use (9). Partners of women with trichomoniasis also should be treated. In cases of metronidazole allergy, patients may be referred for desensitization to and treatment with metronidazole. There are no data on cross-reactivity between tinidazole and metronidazole.

Metronidazole is considered safe to use in pregnancy; data on tinidazole are too limited to be of use. Like bacterial vaginosis, trichomoniasis has been associated with adverse outcomes such as preterm delivery, PROM, and low birth weight (42). Although a study of treatment for asymptomatic trichomoniasis in pregnant women showed an increased preterm delivery rate in the treated group, it should be noted that 23% of the women in the placebo group received metronidazole outside the protocol, and treatment occurred at advanced gestational age. Therefore, these results may not apply to a broader population of pregnant women (44). However, the results of this study suggest that treatment of trichomoniasis during pregnancy does not help to prevent associated adverse sequelae.

Although high-level resistance to metronidazole is considered rare, low level in vitro resistance may be as high as 5% (45). In suspected cases of resistance, patients should be interviewed carefully to exclude the possibility of noncompliance with the medication regimen or reinfection from an untreated partner. In a series of 33 cases, treatment with high-dosage tinidazole, 500 mg four times daily or more for 14 days, was well tolerated and effective in more than 90% of resistant cases (46). A lower dosage of tinidazole, 500 mg three times daily for 7 days, was also effective in a series of three resistant cases (47). Sending the resistant isolate to a reference laboratory that can perform susceptibility testing should be considered to help guide choice and dosing of therapy (9).

Other Causes of Vaginal Symptoms

Although vulvovaginal candidiasis, bacterial vaginosis, and trichomoniasis cause the most vulvovaginal symptoms, other causes may include a broad range of conditions such as vulvar diseases, atrophic vaginitis, and rarer forms of vaginitis.

Patients with atrophic vaginitis may have an abnormal vaginal discharge, dryness, itching, burning, or dyspareunia. Although more common in postmenopausal women, sometimes it can be observed in younger premenopausal women. Diagnosis can be made on the basis of an elevated vaginal pH and the presence of parabasal or intermediate cells on microscopy. An amine test result will be negative. Treatment consists of local water-based moisturizing preparations or topical or systemic estrogen (48).

Of the rarer forms of vaginitis, the best defined seems to be desquamative inflammatory vaginitis (49). Generally occurring in perimenopausal or postmenopausal women, desquamative inflammatory vaginitis causes burning, dyspareunia, and an abnormal yellow or green discharge. Although streptococcal species, including GBS, are found in more than 90% of affected women, this does not mean that desquamative inflammatory vaginitis is caused by streptococcal species. Some have argued that desquamative inflammatory vaginitis may represent a vaginal expression of erosive lichen planus (50). Examination reveals a purulent discharge with varying amounts of vestibular and vaginal erythema. The vaginal pH is elevated and the amine test result is negative. Microscopy reveals large amounts of polymorphonuclear cells and parabasal cells. This condition is easily mistaken for trichomoniasis; however, in cases of desquamative inflammatory vaginitis, no motile trichomonads are present and cultures for T *vaginalis* are negative. Although no randomized controlled studies have been performed, a 14-day course with 2% clindamycin cream often will achieve a cure; however, relapse after therapy is fairly common (49).

Clinical Considerations and Recommendations

- ***When are vaginal cultures helpful in making the diagnosis of vaginitis?***

Although microscopy is considered the standard in clinical practice, its sensitivity to yeast is around 50% and it misses a substantial percentage of patients with symptomatic vulvovaginal candidiasis (51, 52). Self-treatment before evaluation also may make it more difficult for the health care provider to visualize yeast on microscopy. Furthermore, compared with culture and yeast polymerase chain reaction, false-positive rates of up to 50% have been reported (53). Because they can pick up smaller numbers of organisms, yeast cultures are considered the criterion standard in confirming the presence of yeast. They are not routinely performed because of their cost, the delay involved in obtaining results, and the fact that many women may be asymptomatically colonized with yeast. Nevertheless, yeast cultures should be obtained in cases of recurrent vulvovaginal candidiasis or possible non-*albicans Candida* infection; the latter should be suspected if microscopy reveals only blastospores or the patient with vulvovaginal candidiasis has persistent symptoms after antifungal therapy. Yeast cultures also should be considered in symptomatic women with negative microscopy, those with signs of vulvovaginal candidiasis, or multiple symptoms but negative microscopy results (54).

Because microscopy has a fairly limited sensitivity, culture or trichomonas antigen testing should be obtained in situations where trichomoniasis is suspected but not proved. However, health care providers may have difficulty finding a laboratory that can provide a culture medium and perform the test. There are currently no clear criteria or studies to assess which patients should undergo trichomonas cultures. Their use should be considered in patients with a negative wet mount test result and any of the following circumstances: a history of trichomoniasis with persistent symptoms after therapy, a high vaginal pH and microscopy that reveals leukocytes, a Pap test result with trichomonas, or patient desire for trichomonas screening because of a possible exposure.

Mucopurulent cervicitis, which is sometimes caused by *Neisseria gonorrheae* or *C trachomatis* (55), may present as an abnormal yellow discharge. Therefore, DNA tests or cultures for these two organisms should be obtained in patients with a purulent discharge, cervical friability, any symptoms suggestive of PID, or leukocytes on microscopy. Such tests also should be performed in women who fall into higher risk groups where annual screening is recommended (9).

Because the normal vaginal flora is very heterogeneous, routine bacterial cultures of the vagina have no use in diagnosing bacterial vaginosis. They may have a limited role in diagnosing suspected cases of group A streptococcal vaginitis, but this condition is considered rare. In patients with symptoms suggestive of bacterial vaginosis that do not fulfill Amsel's criteria, a Gram stain is considered the criterion standard for diagnosis. Other organisms routinely found on vaginal culture include GBS and lactobacilli. Group B streptococci is part of the normal flora in approximately 25% of women and, as a result, is frequently isolated in women with vaginal symptoms as well. However, a case-control study of 118 women with GBS found no association between women with GBS and vulvovaginal symptoms (56). Similarly, lactobacilli are part of the vaginal flora. Although it has been hypothesized that an overgrowth of lactobacilli can cause vaginal symptoms (57), such a syndrome is poorly characterized, and controlled studies confirming the existence of such a syndrome are lacking. Thus, the presence of large numbers of lactobacilli on either microscopy or vaginal culture should be considered a normal finding.

- *When is it appropriate to provide treatment for vaginitis without an examination?*

  Over the past decade, women have increasingly relied on self-diagnosis and self-treatment of vulvovaginal candidiasis. An estimated $275 million is spent annually on nonprescription antifungals, and the drugs number in the top 10 of all nonprescription medications sold in the United States (58). With topical antimycotic agents approved for nonprescription use, it is assumed that women with a prior episode of vulvovaginal candidiasis can self-diagnose accurately (59). The perceived benefits of nonprescription antifungals include convenience, the ability to rapidly initiate antimycotic therapy, and the potential to reduce health care costs significantly (1).

  However, the reliability of self-diagnosis may be poorer than previously suggested. In a study of 601 women recruited from a variety of medical and community sites in Georgia, investigators found that only 11% of women with no prior diagnosis and 34.5% of women with a prior diagnosis of vulvovaginal candidiasis accurately recognize the classic scenario for candidiasis (60). Both groups were particularly poor at recognizing bacterial vaginosis, with an accuracy of 3.2% and 4.4%, respectively. In a prospective study of 95 symptomatic women purchasing nonprescription antifungal products, only 34% had pure vulvovaginal candidiasis, and self-treatment with a topical antifungal agent would have been inappropriate or inadequate therapy in the remaining 66% (61). In a longitudinal study of women who submitted yeast cultures every 4 months for a year, researchers found no correlation between antecedent *Candida* species colonization and subsequent antifungal use (62). Finally, a telephone diagnosis of vaginal symptoms seemed to correlate poorly with the actual diagnosis (63). Given the nonspecific nature of vulvovaginal symptoms (19), patients who are already in the office should not be treated for vaginitis without an examination. Whenever possible, patients requesting treatment by telephone should be asked to come in for evaluation; this is particularly true of a woman who has treated herself with a nonprescription antifungal and still has persistent symptoms. However, in a known compliant patient with multiple confirmed prior episodes who reports the same symptoms as before, a short course of treatment can be initiated over the phone. If she fails to improve, she should be asked to come in for evaluation.

- *How should patients be evaluated in the absence of a microscope?*

  There may be times when patients can only be evaluated without microscopy. Because there are currently no rapid tests for yeast, testing for vulvovaginal candidiasis without a microscope will consist of history, examination, and culture. An elevated vaginal pH will determine which patients may need further testing for bacterial vaginosis or trichomoniasis. Testing for trichomoniasis can be performed with point-of-care tests for trichomonas antigen (the OSOM Trichomonas Rapid Test) or culture. Point-of-care tests for pH

and amines (QuickVue Advance pH and Amines test), *G vaginalis* proline iminopeptidase activity (QuickVue Advance G. vaginalis test) and vaginal sialidases (OSOM BVBlue test) are all FDA-approved to aid in the diagnosis of bacterial vaginosis. Although their exact role in current diagnostic algorithms is unclear, their use should be considered when a microscope is unavailable. When possible, a slide of vaginal secretions should be obtained for future Gram stain.

- *Are there adverse effects of nonprescription antifungal use?*

  In general, topical nonprescription antifungal use is associated with cure rates and side effects that are similar to prescription therapy. A patient with vulvovaginal candidiasis who uses a nonprescription product should respond to therapy; failure to respond to initial treatment should prompt clinical evaluation. Physical side effects consist primarily of localized burning and irritation in about 5% of women (5). If used for the wrong condition or if the patient has vulvovaginal candidiasis but fails to respond to treatment, antifungal use may lead to a delay in accurate diagnosis and appropriate treatment. Although such delay may have minimal effect on vulvovaginal symptoms, such as itching, odor, or discharge, it may be of greater concern if a patient who self-treats for vulvovaginal candidiasis actually has PID, a sexually transmitted infection, or a urinary tract infection (61). Isolation of resistant *Candida* species as a result of widespread nonprescription antifungal use seems to be uncommon (64). If a woman who self-treats with a nonprescription agent fails to improve with therapy, her treatment may compromise the ability of her health care provider to obtain an accurate diagnosis and will further delay the ability to initiate appropriate therapy. Furthermore, women who use numerous courses of nonprescription antifungal therapy and do not have vulvovaginal candidiasis may incur significant financial costs. Because many of the adverse effects of nonprescription products are secondary to an imprecise diagnosis, accurate home tests for vaginitis ultimately may help to minimize these effects.

- *For symptomatic patients with a high pH but normal microscopy, what is appropriate management?*

  Testing of the vaginal pH and amine testing are part of a battery of tests that are used to diagnose vulvovaginal symptoms. When pH is abnormally elevated in a symptomatic patient, it is usually associated with microscopic findings that help to establish a diagnosis. Depending on the cause of symptoms, findings such as trichomonads, clue cells, or immature epithelial cells may be seen. However, recent intercourse, menses, sampling of cervical mucus, or recent treatment with a medication also can alter the pH of the vagina. In the presence of completely normal microscopy (including vaginal cytology), there is no evidence that a high pH alone causes vaginal symptoms. Thus, the symptomatic patient should be treated in a manner similar to other women with vaginitis where the diagnosis is unclear, including obtaining cultures for yeast and trichomonas.

- *For findings of bacterial vaginosis or trichomonas on a cytology report, what is appropriate management?*

  The Pap test is an unreliable tool for diagnosing either bacterial vaginosis or trichomoniasis. When compared to Gram stain criteria for bacterial vaginosis, a Pap test has a sensitivity of 49% and specificity of 93% (65). In symptomatic women with bacterial vaginosis on a Pap test, a vaginal pH, amine test, and wet mount should be performed; asymptomatic women do not need evaluation or treatment given that the diagnosis on Pap test is uncertain and it is unclear that asymptomatic nonpregnant women with bacterial vaginosis benefit from treatment (9). For trichomoniasis, the Pap test has a sensitivity similar to the wet mount but yields a false-positive rate of at least 8% with standard tests (40) and 4% with liquid-based

cytology (66); thus, a diagnosis based on cytology can lead to an inaccurate diagnosis of a sexually transmitted infection. When feasible, in patients with trichomonas found on a Pap test, a wet mount and, if negative, a culture should be performed. If culture is unavailable, the least expensive approach is to treat the patient with metronidazole. In populations with a low prevalence of trichomoniasis (5% or less), this approach may lead to unnecessary treatment in more than 50% of patients (67).

- *What nonmedical approaches are effective?*

  Complementary and alternative therapies are commonly used to treat vulvovaginal symptoms (68). Such therapies include lactobacilli, yogurt, garlic, tea tree oil, a low carbohydrate diet, desensitization to *Candida* species antigen, hormonal manipulation with depot medroxyprogesterone, and douching. Current data are insufficient regarding either efficacy or safety to support recommendation of these nonmedical treatments for bacterial vaginosis or vulvovaginal candidiasis (69).

- *For vaginitis in pediatric or adolescent patients, what is appropriate management, and are there any special considerations?*

  Vulvovaginitis is one of the most common gynecologic problems in prepubertal girls. However, because of the lack of estrogenization of the vagina and resulting vaginal atrophy and alkalinic pH, the causes seem to be quite different from an adult population. Most cases are thought to be noninfectious in origin, secondary to a broad range of conditions, many of them dermatologic (eg, contact dermatitis). Those cases with specific bacterial causes typically have an acute onset of a visible discharge.

  Respiratory organisms such as group A streptococci and *Hemophilus influenzae* are the most common infectious causes (70), as well as enteric and sexually transmitted pathogens; *Candida* species is rarely found. Lichen sclerosis and atrophic vaginitis also may be present in prepubertal girls. Pinworms may cause perianal and vulvar itching. A pediatric patient with vulvovaginal symptoms should undergo a careful vulvar examination to look for evidence of a dermatologic cause and for vaginal discharge. Vaginal secretions should be evaluated by microscopy to look for leukocytes (70), and a bacterial culture should be obtained by introducing a swab through the hymen. Therapy depends on the results of the microscopy and culture. An examination for pinworms may demonstrate the presence of pinworm eggs. In cases of a possible foreign body, the discharge often will have an abnormal odor and be associated with some vaginal bleeding. Vaginal irrigation may lead to expulsion of the foreign body; if not, vaginoscopy should be performed. If sexual abuse is suspected, child protective services should be notified and the child referred to a professional trained in the management of such cases (71).

  In adolescent patients, the causes of vaginitis are similar to an adult population of reproductive age (72). In sexually active adolescents with vaginitis, screening for gonorrhea and chlamydia also should be performed. In adolescents who wish to avoid a speculum examination, examination of swabs obtained blindly from the vagina have a sensitivity similar to speculum examinations (72) for diagnosing causes of vaginitis, and urine testing can be performed for gonorrhea and chlamydia if indicated.

- *How should patients be counseled?*

  Several specific myths may need to be addressed in counseling patients about vaginitis. Following is a discussion of some common questions that may arise during counseling:

- *Which types of vaginitis are sexually transmitted diseases (STDs) and which are not? Did I get this from my current sexual partner?* Trichomoniasis is an STD. However, because asymptomatic carriage can occur for prolonged periods in both men and women, a recent diagnosis of trichomoniasis does not necessarily establish recent acquisition, unless the patient has had documented negative trichomonas cultures in the past. Because men can harbor *T vaginalis*, a woman with trichomoniasis should refrain from intercourse until both she and her partner(s) have been treated. Although bacterial vaginosis is associated with sexual activity (73), it also has been described in virginal women (74) and is not considered an STD. However, in female partners of lesbians with bacterial vaginosis, there is a higher incidence of bacterial vaginosis (75); no studies address whether simultaneous treatment of both women in a lesbian couple will decrease recurrence rates. Although vulvovaginal candidiasis also is associated with sexual factors, such as oral receptive sex, it does not seem to be an STD (76). With both bacterial vaginosis and vulvovaginal candidiasis in heterosexual couples, randomized studies of partner treatment have failed to show a decrease in the risk of recurrence (22, 77).
- *What is the role of douching in the prevention or treatment of vaginitis?* No studies show any benefit to douching as a treatment for vaginitis. The association of douching with bacterial vaginosis (73) and bacterial vaginosis-associated flora (16), although not a clear demonstration of cause and effect, suggests that douching should not be used as a treatment for vaginitis and actually may exacerbate symptoms. In addition, douching has been associated with increased risk of cervicitis, PID, and tubal infertility in retrospective studies (78). However, a recent prospective study failed to find an association between douching, cervicitis, and PID (79).
- *What is the role of tampons in causing vaginitis?* Tampon use does not seem to be associated with either bacterial vaginosis (73) or vulvovaginal candidiasis (76). Women who are using an intravaginal product to treat a vaginal infection may want to avoid use of tampons during treatment to ensure adequate dispersion of the medication.

Summary of Recommendations and Conclusions

The following recommendations are based on good and consistent scientific evidence (Level A):

- Women with complicated vulvovaginal candidiasis should receive more aggressive treatment than women with an uncomplicated episode.
- To prevent reinfection, women with trichomoniasis should avoid intercourse until they and their partner have received treatment.

The following recommendations and conclusions are based on limited or inconsistent scientific evidence (Level B):

- Microscopy is the first line for diagnosing vulvovaginal candidiasis and trichomoniasis. In selected patients, culture for yeast and *T vaginalis* should be obtained in addition to standard office-based testing.
- Douching is not recommended for the prevention or treatment of vaginitis.
- Self-diagnosis of vaginitis is unreliable.

The following recommendation is based primarily on consensus and expert opinion (Level C):

- Clinical evaluation of women with vaginal symptoms should be encouraged, particularly for women who fail to respond to self-treatment with a nonprescription antifungal.

Proposed Performance Measure

Percentage of women with vulvovaginal candidiasis in whom diagnosis was confirmed with microscopy or culture

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The MEDLINE database, the Cochrane Library, and the American College of Obstetricians and Gynecologists' own internal resources and documents were used to conduct a literature search to locate relevant articles published between January 1985 and February 2006. The search was restricted to articles published in the English language. Priority was given to articles reporting results of original research, although review articles and commentaries also were consulted. Abstracts of research presented at symposia and scientific conferences were not considered adequate for inclusion in this document. Guidelines published by organizations or institutions such as the National Institutes of Health and ACOG were reviewed, and additional studies were located by reviewing bibliographies of identified articles. When reliable research was not available, expert opinions from obstetrician-gynecologists were used.

Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive

Services Task Force:

I Evidence obtained from at least one properly designed randomized controlled trial.

II-1 Evidence obtained from well-designed controlled trials without randomization.

II-2 Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.

II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.

III Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

Level A—Recommendations are based on good and consistent scientific evidence.

Level B—Recommendations are based on limited or inconsistent scientific evidence.

Level C—Recommendations are based primarily on consensus and expert opinion.