Sexually Transmitted Diseases and Travel: From Boudoir to Bordello

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ABSTRACT Travel has historically been an important risk factor for acquisition of sexually transmitted infections (STIs). Travel is often associated with a sense of adventure, periods of loneliness, and exploration away from one’s home environment—which often form a milieu in which sexual activity can occur with new partners. Survey data clearly demonstrate that out-of-country travel is associated with recruitment of new sex partners and increased STI risk. Pretravel counseling to prevent STI risk is variable, and there is little evidence that it modifies risk behavior. Some travel occurs specifically for sexual purposes, such as the sexual tourism junkets to Southeast Asian destinations which became popular during the 1980s or the more recent rise in the popularity of circuit parties for men who have sex with men. Some travel situations pose particularly high risks. For example, military deployments and assignments to work camps such as those for oil extraction occur in the context of large groups of individuals of reproductive age, often predominantly males, exposed to high levels of stress in unfamiliar environments. Additionally, over the past decade, the Internet has dramatically changed the ability to identify sexual partners while traveling.

INTRODUCTION

The types of diseases acquired during travel are dependent on the types of sexual activity, the types of sexual partners, and the reasons/type of travel that occurred. For example, the diseases and social situation of a military base are different from those of a refugee camp, which in turn are much different from the situations encountered by casual travelers. Travel is an important factor in the spread of new types of infections, such as antimicrobial-resistant Neisseria gonorrhoeae and human immunodeficiency virus (HIV) infection. In areas where STI incidence is low, travelers are often implicated in the reestablishment of new epidemic foci (reintroductions), as occurred in the reintroduction of syphilis and lymphogranuloma venereum (LGV) to disease-free areas in Europe and North America. In this chapter, we review the clinical syndromes and epidemiology of the most commonly encountered STIs, as well as the clinical and behavioral aspects of travel and STI epidemiology.

Sexually transmitted infections (STIs) have a major public health impact. In the United States, over 18 million cases of STIs occur annually, with the highest incidence in adolescents and young adults. The different syndromes caused by common STIs are described in Table 1.

TRANSMISSION

STIs are by definition transmitted through sexual contact. Sexual intercourse is clinically and epidemiologically defined as sexual contact, including vaginal intercourse, oral intercourse (either type of receptive...
oral intercourse, i.e., fellatio or cunnilingus), and rectal intercourse. That being said, not all STIs require intercourse for transmission but may occur through intimate skin to skin contact, such as herpes simplex virus (HSV) and syphilis. STIs can be transmitted between heterosexual or homosexual partners. Different types of sexual activity may result in increased risks. Receptive rectal intercourse and vaginal intercourse carry the highest risks of STI transmission. Oral intercourse is often perceived as the safest, but it should be noted that barrier protection such as condoms and dental dams are infrequently used with oral sex.

STIs are dependent on three key factors: personal behaviors, background prevalence of a disease, and the transmission dynamics of a given organism. Personal behaviors may include consistency of condom use, type of sexual practice (i.e., oral, anal), concurrent versus serial partners, and activities that occur around the time of sex such as cleansing practices.

Acquisition of STIs is also dependent on the probability that one will come into contact with an STI-infected partner. It is important to accurately assess the background prevalence of a disease. Geographic prevalence may be misleading if one’s partners are typically from a specific risk group rather than the general population. As is true for all infections, the susceptibility of the host, the inoculum, and the efficiency of transmission of the organism are important factors.

### STI COVARIATES
Socioeconomic factors have been associated with an increased incidence of bacterial STIs. A decreased availability of health services, especially preventive health services, has been associated with an increased incidence of STIs but also with underdetection and underreporting. For example, in Eastern Europe since the dissolution of the Soviet Union, there has been social and economic disruption, disintegration of the health care system, increased levels of intravenous drug use, and loosening of travel restrictions. Economic upheaval in parts of Asia and Africa and in Eastern European countries such as the Ukraine and Moldova, coupled with a demand for commercial sex workers (CSWs) in other areas of the world, resulted in these becoming “source countries” for trafficked CSWs. The combination of economic disparity, commercial sex work, and travel has the potential for developing large STI and HIV epidemics.

Urbanization in developing countries is strongly associated with an increased incidence of STIs. In the United States, illicit drug use and its associated sexual behaviors are associated with the incidence of STIs, especially syphilis and HIV infection. This is related in part to direct pharmacologic activities of the drugs themselves (cocaine and methamphetamine may stimulate increased frequency, intensity, and duration of sexual activity) but is more often due to the behaviors associated with drug use and the marketing of drugs, including prostitution.

Alcohol and other drug use is particularly associated with high-risk sexual activity. Similarly, studies of travelers find consistent relationships between alcohol use and, in some studies (where it was assessed), marijuana use and having sex with a new partner. Alcohol use is a frequent accompaniment of travel, and CSW establishments often are bars. Strategies for disease prevention in these settings should focus on identifying triggers or high-risk situations before they occur. If sexual activity is a possibility, then the individual should prepare beforehand (i.e., by having condoms available). Furthermore, individuals should take care not to over-indulge, because the technical capacity to use a condom correctly may become impaired with high levels of alcohol or drug use.

### EPIDEMIOLOGY OF TRAVEL AND STIs
Numerous studies have reported a high frequency of sex while traveling and low rates of condom use. In an early survey, 27% of women queried in a Swedish family planning setting reported a history of casual sex while traveling, mostly to destinations in Western Europe. Casual sex was associated with more frequent alcohol
and marijuana use, a past history of STIs, and paradoxically, a higher education level (although this may be correlated with income and ability to travel). In Britain, a survey conducted in the early 1990s at the largest STI clinic in London found that 18% of participants had traveled abroad within the previous 6 months, mostly to Western Europe. Of this subgroup, 25% reported a new sex partner while abroad, of whom 19% were from developing countries. Twenty-two percent of heterosexual men with new sex partners while abroad paid for these services, and two-thirds did not practice consistent condom use. Cabada et al. studied vacationers who went to Cuzco, Peru, and found that 5.6% of these travelers were sexually active with a new partner. Besides the demographic data, the study reported that 39% of travelers had received pretravel advice—but paradoxically, this group had higher rates of sexual activity. A novel part of the reported Cuzco experience was the description of a specific indigenous group, the bricheros, who interact with foreigners, especially in bars and discos. Cabada et al. also studied tour guides in Peru and found that 11% had had sex with a foreigner, but 46% of male and 4% of female guides would have sex with a traveler if the opportunity arose. More recently, Alcedo et al. surveyed an online community of frequent travelers. Of the 468 participants, 52% reported having sex on their last trip and 59.7% did not consistently use condoms. Twenty-five percent reported never using condoms.

The themes which emerged are as follows:

1. Sexual activity occurs within a large variety of settings.
2. Only a minority of travelers receive pretravel sexual counseling.
3. With the exception of sexual tourists, the vast majority of exposures are “assortative,” i.e., new partners are usually other travelers from the same host country.
4. Condom use is far less than 100% and is often affected by alcohol and other drug use.

**SPECIFIC STUDIES OF MSM AND HIV-POSITIVE INDIVIDUALS**

Few studies have specifically addressed the issue of STIs and travel among HIV-positive individuals, especially in the era of effective antiretroviral therapy. However, with the growing popularity of circuit parties, new research is emerging and necessary. Circuit parties, which initially served to raise funds and awareness for HIV, have now morphed into weekend-long dance events where sexual activity and poly-drug use are generally prevalent. It is not uncommon for thousands of gay and bisexual men to attend a single event. Typical attendees are 20- to 30-year-old middle class Caucasians, and they occur all around the globe. Party drug use is prevalent, and condom use and sero-disclosure are inconsistent. Circuit parties have been implicated in HIV transmission and syphilis outbreaks. Before the increase of circuit parties, specific locations known to be gay friendly were associated with higher rates of casual sex. For example, Pinkerton and colleagues studied men who have sex with men (MSM) by use of venue-based surveys in Key West and found that almost one-third of participants had a new partner while traveling to the island and that 60% had at least one unprotected exposure. HIV status disclosure was rare. Besides these studies, there is a substantial literature which has documented the spread of bacterial STIs, such as syphilis, LGV, and antimicrobial-resistant gonococcal infections, in MSM travelers. Fortunately, a Cochrane review of behavioral interventions to reduce risk for sexual transmission of HIV among MSM found that behavioral interventions decreased rates of reported unprotected anal sex and that work should continue in this area.

Most of the reported literature on travel describes people from developed countries visiting developing countries and ignores the risks associated with indigenous travel. STI risk in developing countries is often associated with personal mobility as well as with geographic proximity to trading centers in rural areas. Travel has affected HIV epidemiology in developed countries, especially those in Europe, where ties to Africa and Asia are often close. Increasingly, travel-associated infections are being diagnosed in émigrés living in a developed country who return home to visit friends and relatives.

**MILITARY POPULATIONS**

Military personnel and the merchant marine are at high risk of STIs. Studies from the 1960s and 1970s suggest that the annual incidence rate of STIs in merchant seamen was 17 to 23% per year. Military campaigns where there has been interaction with the local population have been associated with very high rates of STI acquisition. STI rates range from 10 to over 50% depending on the era, study, and locale. Similar problems were observed in military personnel deployed for noncombat roles. For example, of 1,885 Dutch marines deployed to Cambodia in 1992 to 1993, all received
intensive STI education before deployment, and condoms were available. Of these, 842 (45%) reported sexual contact during deployment; 301 (36%) had one to three contacts, and 541 (64%) had four or more contacts. More recent studies continue to support the frequency of sexual contact during deployment as well as ongoing risk behavior, especially among those who report stress. A 2008 Department of Defense Survey of health-related behaviors among active duty military personnel surveyed sexually active unmarried service members. The STI prevalence rate was 4.2% for men and 6.9% for women. One-fourth of men and 9.3% of women reported five or more sexual partners in the past 12 months. Binge drinking, illicit substance use, and unwanted sexual contact were associated with increased reports of sexual partners among both sexes, and multiple sex partners were highly associated with having an STI.

EXPATRIATES

Long-term travelers such as expatriates are at increased risk for HIV and STIs. A study of U.S. Peace Corps volunteers \((n = 1,602)\) found that 60% of respondents had sex while overseas, and 29% of these had sex with a local country partner. Only 32% of volunteers reported consistent condom use; alcohol use and low perceived HIV risk were the most important predictors of condom nonuse. A study of 847 Dutch expatriates found that 22% of men and 19% of women had a local steady sexual partner and that 29% of men and 17% of women had local casual partners. Condom use rates were 17 to 21% for the steady partners and 64 to 69% for the casual partners. Of the men with casual partners, 19% had CSW exposure.

OCCUPATIONAL TRAVEL AND STI EXPOSURE

Sudden economic development can also impact STI risk behaviors, especially in isolated areas where workers or travelers have rapid access to large amounts of funds and little activity. Goldenberg et al. performed qualitative work in the oil and gas boom towns of northern Canada. The work environment typically involved interim stays of 20 to 28 days and was located several hours from the nearest urban center. Important factors in high STI risk were mobility, high rates of partner turnover, binge partying, and a lack of community, which in turn impede communication of disease status with sex partners. Another factor described was that the workers often had steady partners or spouses at home, which makes this situation very much like that in Africa. Also identified were local barriers to STI testing for workers, including the logistics related to work schedule and deployments, waits at the clinics, lack of public transportation, geographic inaccessibility of the clinics and the limited time that the workers have, stigma and labeling which would result from being tested, and prior poor interactions with health care workers. The authors suggest that active outreach efforts for both service delivery and patient education should take place in settings where there are large numbers of people at risk.

CSWs

Sexual intercourse with CSWs is very common among travelers, expatriates, and military personnel and is one of the major risk factors for HIV and other STIs. In most parts of the world, CSWs are economically stratified. The lowest strata include brothel-based workers and CSWs who recruit customers on the street (“streetwalkers”). The next level are workers who recruit customers in bars (often karaoke bars in Asia) and have intercourse in hourly hotels. At the highest stratum are workers who have preset appointments and have one partner per day. The prices for services vary accordingly. Since STI rates are intrinsically tied to partner turnover rates and socioeconomic class, the lowest strata have the highest STD rates.

Besides unprotected sexual intercourse, several practices of CSWs may increase STI risk even higher. This can include use of preexposure antibiotics, use of vaginal products and disinfectants, and the presence of other communicable diseases, such as tuberculosis. Condom use with CSWs may vary by locale, which may be attributed to socioeconomic disparity (between CSW and client), social or local norms, and enforcement. A study of Hong Kong residents highlighted the difference in condom usage depending on the locale of the CSW. The authors found that condom use was higher when those surveyed used CSWs in Hong Kong (91%) than when they used CSWs from mainland China (66%) and that self-reported STI rates were four times higher in those who had traveled to the mainland; 33% of travelers to the mainland had used services of CSWs, and 11% had used these services on the most recent trip.

In Singapore, a study of STI clinic attendees \((n = 372)\) found that half of the clients had visited sex workers in Singapore and outside the country. Interestingly, 87.5% of the Singapore CSW contacts were condom-protected, whereas outside the country, the rate was 41 to 77%,
with the lowest rates in China and Indonesia. The important finding here is that the most important variable which predicted condom use was initiation by the CSW, and it was not associated with demographic or other factors, including perceived risk of HIV/STI. This demonstrates that among risky clients, there are still tremendous education needs, even in areas where STI education is prioritized. It also highlights the need for local structural interventions which target CSWs.

From a human rights standpoint, CSWs present important issues. Many are engaged in commercial sex work because of poverty or oppression, especially in developing countries. The work environments are oppressive because the activity is illegal in most settings and therefore prone to corruption and organized criminal syndicates. Trafficking is increasingly recognized as an international problem. Health services, including sexual health services and contraception, are often nonexistent. In the developed world, commercial sex work is associated with drug use and a lack of effective income and drug treatment options. In addition to the objective disease risks, travelers should also consider the social context of commercial sex work and its associated issues.

**CLINICAL ASPECTS OF COMMON STIs**

**Gonorrhea and Chlamydia**

Gonorrhea is caused by *N. gonorrhoeae*, a fastidious Gram-negative coccus. In men, urethritis is the most common syndrome. Discharge or dysuria usually appears within 1 week of exposure, although as many as 5 to 10% of patients never have signs or symptoms. Asymptomatic disease can exist in men for up to several weeks after infection. In women, gonorrhea typically causes cervical disease (cervicitis). Women with untreated gonococcal cervicitis may develop upper tract infection pelvic inflammatory disease (PID). Men and women who practice receptive anal intercourse may develop anorectal gonococcal disease. Less than 50% of anorectal infections have symptoms, but when present these include rectal pain, discharge, constipation, and tenesmus. Because rectal gonorrhea in men implies a history of unprotected rectal intercourse, surveillance of rectal gonorrhea has been useful as a surrogate marker for HIV risk in gay men. Gonococcal infection of the throat is common among individuals exposed during fellatio, with pharyngitis symptoms occurring rarely. When symptomatic, it is clinically indistinguishable from any other bacterial pharyngitis. *N. gonorrhoeae* infections can also disseminate (0.1 to 0.5% of cases), causing bacteremia with resultant tenosynovitis or septic arthritis.

The syndromes for chlamydia are similar to those seen for gonorrhea, but they tend to be less aggressive in the acute context yet cause significant numbers of complications, especially PID and adverse perinatal outcomes. In men, chlamydia urethritis accounts for approximately 40% of all cases of nongonococcal urethritis. Urethritis in men typically presents as a mucoid discharge, often associated with dysuria. Asymptomatic infection occurs in over 30% of cases seen in clinical settings but in >90% of cases diagnosed in population-based prevalence studies. The time from infection to development of symptoms is longer than that for gonorrhea, usually about 7 to 14 days.

In women, cervical infection is the most commonly reported syndrome. Over half of women with cervical infection are asymptomatic. When symptoms occur, they may manifest as vaginal discharge or poorly differentiated abdominal or lower abdominal pain. At clinical examination, there are often no clinical signs present. When they are present, they include mucopurulent cervical discharge, cervical friability, and cervical edema. Left untreated, approximately 30% of women with chlamydia infection develop PID. Rectal chlamydia infection occurs predominantly in homosexual men who have had receptive rectal intercourse, although there are cases in heterosexual women where similar exposures are reported. Oropharyngeal chlamydial infection appears not to be a clinically important entity.

**Diagnosis**

Current approaches to diagnosis usually use nucleic acid amplification tests, which have largely replaced culture. In developing countries, a syndromic approach is most often employed and does not detect or treat asymptomatic infections. For extra-genital infections, nucleic acid testing is recommended though not uniformly available.

**Antimicrobial Resistance**

Antimicrobial-resistant gonorrhea has become a global crisis and threat. The lack of new antibiotics to treat gonorrhea is of great concern. Drug resistance has been an ongoing problem since the development of plasmid-mediated β-lactam resistance (by penicillinase-producing *N. gonorrhoeae* in 1976), first diagnosed in returning travelers from Southeast Asia. In the 1990s, quinolones and cephalosporins were the drugs of choice, since they were effective against the known β-lactam and tetracycline resistance determinants. However, since the mid-1990s, resistance has developed rapidly, initiating from foci in Southeast Asia and widely disseminated by travelers with sexual contact in that region. Quinolone
resistance has become widespread, and these drugs are no longer recommended as therapy. In 2012, the Centers for Disease Control and Prevention (CDC) revised the recommendations to a single-dose intramuscular injection of ceftriaxone (250 mg) as well as treatment with either azithromycin (1-g single dose) or doxycycline (100 mg twice daily for 1 week).

Antimicrobial resistance in chlamydial infections had been felt not to be clinically relevant; however, reports of treatment failures and associated medication resistance have been reported.

**Pelvic Inflammatory Disease**

PID encompasses soft tissue upper tract inflammation, including endometritis, oophoritis, and pelvic peritonitis. PID usually follows an untreated lower genital tract infection, such as gonorrhea or chlamydia. Organisms that are isolated from the upper tract, for example, at laparoscopy or surgery, include *N. gonorrhoeae; Chlamydia trachomatis;* organisms associated with the vaginal flora, such as *Streptococcus* (group B), *Gardnerella, Escherichia coli,* and *Veillonella;* and intra-abdominal colonic organisms such as *Bacteroides* and other anaerobes. The inflammation caused by PID often results in tubal scarring, which may cause later tubal infertility and increased risk of ectopic pregnancy. Accurate clinical diagnosis is difficult because up to one-fourth of PID patients may manifest no symptoms, especially for disease associated with chlamydia. Therefore, many practitioners currently treat women with mild cervical motion tenderness with treatment regimens effective against PID under the assumption that the benefit of preventing PID or curing early PID outweighs the costs in terms of increased cost of treatment and potential side effects. Treatment strategies for PID are based on the underlying microbiology, including antimicrobial coverage for *N. gonorrhoeae, C. trachomatis,* streptococci, Gram-negative rods, and anaerobes. Treatment regimens are therefore complex and beyond the scope of this chapter. Despite the efforts made toward developing effective antimicrobial regimens, treatment efficacy has been difficult to assess because of the need to evaluate long-term impact.

**Vaginal Infections**

When individuals with vaginal infections or vaginal discharge are evaluated, it is imperative to differentiate primary vaginal infections from cervical infections presenting as vaginitis. Vaginitis has a number of causes, including trichomoniasis, bacterial vaginosis (BV), and candidiasis. Since *Candida* infection is not an STI and has very few long-term health effects, it is considered here, for the sake of brevity. However, the clinician should recognize that patients often confuse any vaginal discharge disorder with a yeast infection and treat it with over-the-counter drugs before seeking medical attention.

**Trichomonas**

*Trichomonas* infection occurs in approximately 3 million women annually in the United States, which is an underestimate, and is caused by *Trichomonas vaginalis,* a flagellated protozoan (Fig. 1). Signs and symptoms include a watery vaginal discharge, punctate hemorrhagic lesions on the cervix, and occasionally a frank

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**FIGURE 1** A photomicrograph of a wet-mounted vaginal discharge specimen reveals numbers of *Trichomonas vaginalis* protozoan parasites. This image was taken from the CDC-Phil image ID# 14500. doi:10.1128/microbiolspec.IOL5-0011-2015.f1
cervicitis occurring in response to the vaginal infection. The prevalence of trichomoniasis in women is high; some studies report rate ranges of 5 to 40%. In men, *Trichomonas* can present as a nonchlamydial, nongonococcal urethritis, and the prevalence in men in developing country settings ranges from 6 to 12%. Wet mount is the most inexpensive and widely used method for diagnosis, though nucleic acid amplifications are becoming more widely available and offer increased sensitivity in diagnosis. Treatment for trichomoniasis is metronidazole or tinidazole (2 g as a single dose).

**BV**

BV is a disorder that occurs as a result of ecological disturbances in the vaginal flora. The normal vaginal flora overwhelmingly consists of lactobacilli. As a result, the vaginal host environment is acidic, with a pH of <4.5. In BV, alteration of the microflora occurs, with the population of lactobacilli being replaced by Gram-negative rods and anaerobes.

BV occurs most commonly as a secondary disorder due to cervical infection and inflammation (such as gonorrhea or chlamydia), alteration of the vaginal microflora as a result of antibiotic use, or use of vaginal douches. Clinical recommendations include specific recommendations not to douche. BV is a risk for premature rupture of membranes and premature delivery in pregnant women. Diagnosis of BV is made on either evaluation of a vaginal smear Gram stain demonstrating the characteristic alteration of the vaginal flora or clinical criteria. The clinical criteria are three of the following: homogenous vaginal discharge, pH of >4.5, presence of an amine odor, and presence of “clue cells” (vaginal epithelial cells which have large amounts of adherent bacteria, causing a ground-glass-type appearance) (Fig. 2). Treatment of BV uses antimicrobials effective against anaerobes, such as metronidazole or clindamycin, which results in reestablishment of the normal vaginal microflora.

**Genital Ulcer Diseases**

**Syphilis**

Syphilis is a multistage disease caused by *Treponema pallidum*, whose widely variable symptoms have earned it the distinctive title of “the great imitator.” Initial infection occurs through sexual contact at a mucosal membrane. The incubation period ranges from 10 to 30 days until a chancre develops. The chancre is a painless lesion with an indurated border and has associated painless lymphadenopathy (Fig. 3). Left untreated, the chancre will heal spontaneously within 2 to 3 weeks. Four to eight weeks later, the secondary syphilis syndrome will develop. Secondary syphilis is a systemic vasculitis caused by high levels of *T. pallidum* in the blood and associated immunologic responses. The most characteristic findings are dermatological, including the classic palmar plantar rash, but other manifestations include generalized macular rash, patchy alopecia (hair loss), mucosal lesions, and visceral involvement, which can include granulomatous hepatitis, nephrotic syndrome, optic neuritis, and rarely, meningovascular syphilis. Left untreated, the secondary

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**FIGURE 2** Bacterial vaginosis. Clue cells with a ground-glass appearance are shown. This image was taken from the CDC-Phil image ID# 3719. doi:10.1128/microbiolspec.IOL5-0011-2015.f2
Syphilis syndrome will spontaneously resolve, usually within 1 to 2 months of onset. The late complications of syphilis, such as neurosyphilis, cardiovascular syphilis, and gummatous syphilis, do not develop until 10 to 20 years after the resolution of early syphilis. For HIV patients, numerous reports have shown that late complications may occur earlier and ulcers may be more severe.

Early latent syphilis is a serologic diagnosis in which a 4-fold increase in titer (i.e., two dilutions [see below]) is seen within 1 year, with previous documentation of the earlier serology. Late latent syphilis is a serologic diagnosis of syphilis occurring more than 1 year after baseline diagnosis.

Diagnosis of syphilis
Dark field examination of the chancre exudate establishes the diagnosis of primary syphilis. Dark field microscopy is not available in most settings. False-negative results may occur if patients apply bactericidal creams to the lesions. Therefore, diagnosis is usually established clinically because serological testing may be negative when a chancre is present. Serological diagnosis is more reliable for subsequent stages of syphilis. This is a two-step procedure. Initially, a nontreponemal screening test is performed. The most widely used tests are the Venereal Disease Research Laboratory and rapid plasma reagin tests. Results for these tests are reported as titers, i.e., the dilutions required to achieve a negative reaction with standard reagents. Patients with a positive nontreponemal test should have a confirmatory test such as the fluorescent treponemal antibody-absorbed test or microhemagglutination test. Up to 20% of patients with positive nontreponemal tests have negative confirmatory tests. These are termed benign false-positive results. Usually, these are seen in patients with rheumatologic disorders such as lupus, other infectious processes including hepatitis C, or Lyme disease, as well as during pregnancy. For patients that do not respond to treatment as expected or with abnormal neurologic exam, analysis of the spinal fluid should be performed to evaluate for neurosyphilis. All stages of syphilis are seen more commonly in HIV-infected patients. HIV prevalence in patients with syphilis is up to three times higher than that in nonsyphilis patients in these settings.

Treatment of primary, secondary, and early latent syphilis with a single dose of 2.4 million units benzathine penicillin is recommended. For patients who are allergic to penicillin, doxycycline may be used. Patients with late latent syphilis, late syphilis, or syphilis of unknown duration (serological syphilis in which an initial benchmark cannot be defined) should be treated with benzathine penicillin at 2.4 million units intramuscularly for 3 weeks. Neurosyphilis requires high-dose intravenous penicillin treatment for 10 to 14 days. Treatment is not different for patients with HIV co-infection, although more careful serological follow-up is recommended.

Chancroid and LGV
Chancroid is a genital ulcer disease caused by the organism Haemophilus ducreyi. Chancroid is predominantly seen in developing countries and in subtropical areas of the developing world. Occasional outbreaks are seen in the United States, usually associated with prostitution and drug use. The incubation period of chancroid is 4 to 7 days. The ulcer develops initially as a tender papule with erythema. The ulcer typically is undermined, and in contrast to the case with syphilis, it is often painful, is not indurated, and has a purulent exudate. Painful
large adenopathy is seen in up to 50% of patients. These can develop into large purulent nodes that can develop spontaneously in sinus tracts and rupture (buboes). Chancroid does not disseminate and has not been associated with major perinatal or neonatal complications. Confirmation of the diagnosis of chancroid is difficult because culture requires special growing conditions and is not widely available. Nucleic acid amplification tests are available only in research settings.

LGV is a genital ulcer disease caused by the L1, L2, and L3 serovars of *C. trachomatis*. This infection is found usually in tropical and subtropical areas of the world. Since 2003, large outbreaks have been reported in Western Europe and North America, primarily in MSM. The majority of these cases have presented as proctitis. In these outbreaks, over two-thirds of patients are also HIV positive. Primary infection is characterized by a genital ulcer or a mucosal inflammatory reaction at the site of inoculation. The incubation period is 3 to 12 days. The lesions heal spontaneously within a few days. The secondary stage appears 2 to 6 weeks later and is related to local direct extension of the infection to regional lymph nodes. Usually, in people who have had receptive rectal intercourse, an anorectal syndrome can also occur, which results in an inflammatory mass present in the rectum and retroperitoneum. Patients may present with rectal discharge, anal pain, constipation, fever, and/or tenesmus. There may be hemorrhagic proctocolitis and hyperplasia of intestinal and perirectal lymphatic tissue. This can be mistaken for inflammatory bowel disease or surgical disease. Complications include chronic colorectal fistulas and strictures. Diagnosis is difficult because the genital ulcer phase, during which *Chlamydia* can be identified, is relatively short and is often missed by clinicians. Serology is usually used to establish the diagnosis. Treatment regimens include either macrolides, such as azithromycin, or quinolones.

**Genital herpes infection**

Herpes simplex virus (HSV) infections are characterized by lifelong infection, latency, and recurrences. Genital herpes is almost exclusively sexually transmitted and can be caused by either HSV type 1 (HSV-1) or HSV-2. Primary infection is often asymptomatic. Genital herpes can occur at any exposed mucosal site (genitalia, rectum, and mouth). In primary disease, vesicles followed by ulceration develop 5 to 10 days after exposure; there may also be associated systemic signs, such as fever, myalgias, headache, and occasionally meningeal irritation. Recurrent herpes can develop at any time after the primary infection. In many settings, patients report a prodrome, which may consist of low-grade fever, pruritus, and tingling at the site of recurrence. Patients often report that they are able to feel the recurrence developing with nonspecific signs and symptoms, which is most likely related to irritation of the peripheral nerve roots. Prior to ulceration, patients often note grape-like clusters of fluid filled vesicles.

Symptomatic recurrences are less severe and heal faster than the primary episode. Recurrences occur most frequently within the first year after primary infection, and frequency decreases thereafter. Asymptomatic shedding plays a major role in transmission of HSV. Asymptomatic shedding occurs between clinical outbreaks, especially in the first few years after diagnosis. Initial studies of women with a recent diagnosis of primary herpes found that asymptomatic shedding occurred approximately 1% of the days. Asymptomatic shedding is felt to be responsible for a large portion of new infections as well as neonatal infections. Diagnosis of active genital herpes is made by either culture or other direct virus-specific tests, using specimens obtained from the lesions. In patients without active disease, serological testing with HSV-1/HSV-2-specific tests can define serological status, but results need to be interpreted in the context of the clinical history. Treatment is effective in managing symptoms but is not curative. The nucleoside analogue drugs—acyclovir, famciclovir, and valacyclovir—all reduce symptom severity and shorten the time to healing of lesions. For individuals who have more than six recurrences per year or who are profoundly immunosuppressed and have recurrent disease (such as those with advanced HIV disease, transplant recipients, and patients undergoing chemotherapy), suppressive therapy is indicated. Suppressive regimens are over 90% protective in preventing recurrences.

**HPV infection**

Human papillomaviruses (HPVs) are small RNA viruses which have the unique capacity of causing chronic infection and malignant transformation, resulting in vulvar, anal, cervical, and penile squamous cell carcinomas, but they cannot be cultured in *vitro*. There are over 80 subtypes of HPV. The HPV types that most commonly infect the genital tract are HPV-6, -11, -16, and -18. HPV-6 and -11 cause genital warts. HPV-16 and -18 are implicated in cervical infection, resulting in cellular changes and Pap smear abnormalities and can cause eventual malignant transformation and cervical cancer.

HPV infections are very common. One carefully performed study found that one-third of college students...
began infected within a year of initiating sexual intercourse, and other studies have suggested that within 5 years of sexual debut, over 50% of adults have been exposed to HPV. Estimates indicate that approximately 1% of the sexually active population in the United States has clinically apparent genital warts, and in STI clinic populations the percentage is much higher. Estimates of infection range from 20 to above 90%, depending on the specific populations studied, with college students, adolescents, and CSWs demonstrating the highest rates.

The vast majority of HPV infections are asymptomatic and clear spontaneously, making accurate prevalence studies difficult. The incubation period is estimated to be 3 months (range of 3 weeks to 8 months). Lesions may be internal and external, including on the external genitalia, in and around the anal canal, on the cervix, and intra-urethral. Treatment for condylomata is based on surgical excision of the lesions, tissue-destructive therapy such as liquid nitrogen cryotherapy, chemical destruction with trichloroacetic acid or podophyllin, or local immunotherapy with imiquimod, sinecatchins, or interferons. Immunotherapy options have lower rates of recurrence than tissue-destructive methods, likely because of greater clearance of latent virus.

The availability of an HPV vaccine has revolutionized the approach to HPV prevention. Three currently approved HPV vaccines are available at the time of this writing. All are ideally given before sexual debut and exposure to HPv. The quadrivalent and nonavalent vaccines are approved for adolescent and young men and women, while the bivalent vaccine is only approved for adolescent and young females.

**RELATIONSHIPS BETWEEN STIs AND HIV**

Sexually transmitted HIV is prevalent in many parts of the world, especially South Asia and Africa. Cross-sectional and prospective studies in the developed and developing world have firmly established that bacterial and viral STIs are biological cofactors in facilitating HIV transmission. As noted above, since the late 1990s, there has been a resurgence of both STIs and HIV infection, especially syphilis and gonorrhea, in gay men, often associated with high-risk sexual behavior at popular travel venues.

Studies of HIV transmission consistently demonstrate that the presence of STIs increases HIV transmission risk 3- to 5-fold. Travelers to areas where there are high rates of HIV-STI co-infection should be especially careful to practice safer sex and consistent condom use.

**Preexposure Prophylaxis for HIV**

Recently, studies have shown preexposure prophylaxis (PrEP) for HIV to effectively decrease HIV infection among high-risk individuals. PrEP entails taking medication for HIV prevention and may be compared to malaria prophylaxis in that adequate drug levels are needed prior to exposure. Barrier protections such as condoms are still recommended, especially because PrEP does not prevent other STIs. Multiple candidate medications and topical agents are being evaluated, and at the time of this writing, the oral fixed-dose combination of emtricitabine and tenofovir disoproxil fumarate (Truvada) once daily is the only approved option. It is important to note that while one does not need to take PrEP indefinitely, its effectiveness was tightly correlated to serum medication levels and adherence to either a daily regimen or recommended intermittent dosing schedule.

**Postexposure Prophylaxis for HIV**

Postexposure prophylaxis is based on animal studies that showed a decrease in the rate of transmission by giving the exposed animal 28 days of HIV medication. Treatment should be started as soon as possible and not more than 72 hours following exposure. Similarly, postexposure prophylaxis following nonoccupational exposure is also recognized as an option to prevent transmission during high-risk encounters. There is no evidence that a three-drug combination is more likely to be effective than a two-drug regimen in a nonoccupational exposure, but it is believed that the earlier treatment is started, the more effective it will be. Given the availability of PrEP, nonoccupational exposure should be reserved for high-risk situations such as sexual assault when the status of the source is unknown and the exposure unplanned.

**INTERVENTIONS TO REDUCE THE RISK OF SEXUAL EXPOSURE**

Promoting condom use has been one of the central tenets of HIV and STI risk reduction strategies, both in the United States and abroad. Condoms are effective when used correctly and consistently and are highly effective against transmitting HIV, genital herpes, and bacterial STIs. The most dramatic studies were performed early in the HIV epidemic, using HIV-discordant heterosexual couples in California and Italy, and conclusively demonstrated that consistent use in controlled settings results in an approximately 7-fold decrease in HIV seroconversions.
Probably the most intensive and successful effort has been implemented in Thailand, where the “100% Condom” program has been implemented since 1991 and includes intensive advertising, an infrastructure to purchase and distribute condoms, and linkages in promoting condoms with stakeholders, including the army, provincial and municipal governments, and CSWs. The Thai program provides a useful model for the development of an effective condom promotion and sexual risk reduction campaign; it was adopted by the World Health Organization as a model program and has been implemented in other countries, especially in Asia. The program includes open discussion of HIV prevention and condom promotion, mass media campaigns, and the active participation of a large variety of stakeholders, including the military, government, medical community, and even brothels. In other words, this effective program’s major accomplishment was to change the social norms across a broad spectrum of society to encourage condom use.

In developing countries, condom promotion and safer-sex education campaigns have often been innovative in responding to local situations. For example, a highly successful Kenyan campaign to increase condom use focused on truck drivers and their assistants and was delivered at truck and rest stops, which resulted in decreasing STIs by >30%. In Nicaragua, the health ministry successfully implemented a condom promotion campaign in a CSW district by providing condoms on the beds of local motels. Both of these efforts utilize a harm reduction and nonjudgmental approach.

**PREVENTION ISSUES SPECIFIC TO WOMEN**

If a woman regularly takes hormonal contraceptives, she should continue her regimen if there is even the remote possibility of sexual activity while traveling abroad. Under most circumstances, the risk of unintended pregnancy from unprotected intercourse is as high as or higher than that of STI. Hormonal contraceptives should be used in addition to condom use, i.e., the “dual protection” approach.

There has been much interest in developing vaginal microbicides as a female-controlled method of STI prevention. The ideal vaginal microbicides should demonstrate physical and chemical stability in the vaginal environment, allowing insertion some time before intercourse, should not interfere with sexual intercourse, and should also be inexpensive. The ideal compound would be cidal to bacterial and viral pathogens while being nontoxic to the host epithelium. Unfortunately, despite tremendous efforts, effective microbicides have yet to be developed.

**HIV-INFECTED TRAVELERS**

The advent of effective antiretroviral therapy has made prolonged overseas travel possible for people infected with HIV. Several review papers have addressed special problems facing HIV-infected travelers. Risky sexual behavior was described for Toronto HIV clinic patients and for MSM visiting Key West. Relatively high rates of risky sexual behavior while traveling were described, and about 10% of patients discontinued their medications while traveling. These data clearly demonstrate the need for more intensive and frank pretravel counseling. A major concern for all HIV-infected travelers is the risk of opportunistic infections. HIV patients under treatment and immune reconstitution are still at increased risk for opportunists. Therefore, water and food precautions are particularly important because of the risk of cryptosporidiosis, salmonellosis, and campylobacter infection in HIV-infected people. Traveler’s diarrhea prophylaxis should strongly be considered. HIV-infected travelers should also ensure that all of their vaccinations are up to date, especially those for hepatitis A and B. Live typhoid vaccine is contraindicated. Yellow fever vaccine is contraindicated for patients with CD4 counts of <200 but is considered safe for those with CD4 counts of >200. Malaria prophylaxis in HIV-infected people is a major clinical problem because of the myriad interactions between antimalarials and antiretrovirals. Doxycycline has the fewest interactions, but generally, this issue should be addressed with the health care provider prior to travel.

**CLASSIFICATION OF SEXUAL RISK AND THE TRAVELER**

Travelers who are at risk for unprotected sexual activity while abroad have been categorized into the following five major categories:

1. People who travel with a regular partner and who anticipate being sexually active while abroad, but within a monogamous relationship. These travelers do not need any additional counseling, especially for short trips. Additional counseling may be indicated if there are signs or anticipation that either partner may be interested in additional partners while abroad. Furthermore, people on long-term travel assignments may benefit from additional counseling.
2. The “unprepared.” These are people who are traveling and not anticipating being sexually active but have an unexpected sexual relationship while abroad. Since this is unexpected, by definition, all travelers should have pretravel sexual counseling and be aware especially of local triggers or customs. For example, travelers to countries where there is a large commercial sex industry based in alcohol establishments may have unexpected sexual exposures in these settings.

3. The “fanatical” (who must have sex to have a successful vacation). These individuals fall into two categories. The data clearly show that especially for young singles, recruiting an associative (from the same background and country) sex partner is quite common. The second group are the sex tourists, who are at extraordinarily high risk for STI-HIV infection unless condoms are used consistently.

4. The “unaffected” (who feel that sex abroad is the same as sex at home). These individuals should be counseled on the specific risks posed by local environments.

5. The “slightly accessible” (who feel that sex abroad is different and come prepared). These are the individuals who require informational counseling but have already understood the message.

AN STI PREVENTION STRATEGY
The epidemiological data consistently show that travelers are sexually active. From the standpoint of primary prevention, abstinence would be an impractical approach, although this would clearly reduce the risk to zero. Preventing sexual infection in travelers therefore emphasizes reducing risk (Table 2). In developing regions such as in Africa, Southeast Asia, and Eastern Europe STI rates are extraordinarily high, and heterosexual transmission of HIV is extremely common.

<table>
<thead>
<tr>
<th>TABLE 2 STI prevention strategy</th>
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<tbody>
<tr>
<td>Reduce number of sex partners</td>
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<tr>
<td>Recognize trigger situations for intercourse with new partners (alcohol use, drug use)</td>
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<tr>
<td>Eliminate or reduce contact with CSWs</td>
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<tr>
<td>100% condom use and use of hormonal contraceptives</td>
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<tr>
<td>Periodic screening for STIs and HIV at home and abroad</td>
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<tr>
<td>Postexposure</td>
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<tr>
<td>Emergency contraception</td>
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<tr>
<td>Syndromic treatment (postexposure prophylaxis)</td>
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Therefore, unprotected sexual contacts in these areas carry substantial risk. The context of sexual activity is clearly related to risk; for example, CSW contacts are more risky (in most situations) than expatriates. However, the reader should note with caution that these conclusions are based on population-based statistics and that an individual’s risk may vary substantially.

Travelers and those counseling travelers should emphasize that if there is even a remote possibility of sexual relations, the traveler should ensure that condoms are available and easily accessible. Counseling needs to be nonjudgmental and should also ascertain “triggers” or “risk situations” which put the traveler at risk. The best example of the above is the expatriate who does not anticipate being sexually active but becomes so because of an unforeseen opportunity, often associated with alcohol use. Counseling in prior recognition of these situations is critical.

People who are sexually active with multiple partners should have periodic screening for STIs, especially gonorrhea, chlamydia, syphilis, and HIV, at least on an annual basis.

MANAGEMENT STRATEGY AFTER EXPOSURE
Anyone who may have been exposed to an STI and develops a vaginal or urethral discharge, an unexplained rash or genital lesion, or genital or pelvic pain should cease sexual activity and promptly seek competent medical care. Because STIs are often asymptomatic, especially in women, anyone who believes that they may have been exposed to an STI should consult their health care provider for the advisability of screening for STIs.

When available, diagnostic services should include a physical examination, including a pelvic examination for women, and diagnostic tests for N. gonorrhoeae, C. trachomatis, and syphilis. Women should have a vaginal wet mount to evaluate for Trichomonas infection and BV. HSV testing should be performed in appropriate situations. All people evaluated for a travel-related unprotected sexual exposure should also receive HIV counseling and testing. If the initial test is negative, the person should be retested a second time, >3 months after the last unprotected sexual exposure, to ensure that the individual is not in the “seroconversion window.” Treatment for STIs should follow the current Centers for Disease Control and Prevention guidelines. People should not have unprotected sex until the diagnostic and therapeutic process is completed and HIV testing.
is confirmed to be negative. If possible, partners should also be notified of the potential exposure.

In many settings, however, diagnostic facilities and testing services are not available. In these situations, syndromic management strategies for STIs should be utilized, and HIV counseling and testing should still be offered.

The Centers for Disease Control and Prevention’s Travelers’ Health Service and the Canadian Department of Public Health have both published extensive recommendations on travel and STI prevention. In summary, health care providers should consider travel a potential risk factor for unprotected intercourse and STI exposure, in both pretravel counseling settings and posttravel evaluations.

**PRACTICAL TIPS**

- Sexual health counseling should be an integral part of travel advice.
- Travelers should be advised to recognize potentially risky situations, for example, alcohol establishments where there is an integral link with prostitution.
- Structural interventions, such as 100% condom regulations or increasing access to preventive methods, are usually the most effective.
- Health care providers should be cognizant that for many people the allure of traveling includes the possibility of new sexual partners. Barrier protection should be used for all sexual encounters unless they are with a monogamous partner.
- STI and HIV rates in different countries can vary substantially.
- Most new sexual partners are other travelers, usually from the same country and background. Travelers should not assume that their counterparts are free of STI risk.
- Expatriates and people on long-term overseas assignments should receive sexual health counseling.

**RECOMMENDED READINGS**


