

APPENDIX. Recommendations to Help Patients Avoid Exposure to Opportunistic Pathogens*

SEXUAL EXPOSURES

1. Patients should use a latex condom during every act of sexual intercourse to reduce the risk for acquiring cytomegalovirus, herpes simplex virus, and human papillomavirus, as well as other sexually transmitted pathogens (AII). Condom use also will, theoretically, reduce the risk for acquiring human herpesvirus 8, as well as superinfection with an HIV strain that has become resistant to antiretroviral drugs (BIII) and will prevent transmission of HIV and other sexually transmitted pathogens to others (AII). Data regarding the use and efficacy of female condoms are incomplete, but these devices should be considered as a risk-reduction strategy (BIII).
2. Patients should avoid sexual practices that might result in oral exposure to feces (e.g., oral-anal contact) to reduce the risk for intestinal infections (e.g., cryptosporidiosis, shigellosis, campylobacteriosis, amebiasis, giardiasis, and hepatitis A and B) (BIII).

INJECTION DRUG USE EXPOSURES

1. Injection drug use is a complex behavior that puts HIV-infected persons at risk for hepatitis C virus infection, additional, possibly drug-resistant strains of HIV, and other blood-borne pathogens. Providers should assess the individual's readiness to change this practice and encourage efforts to provide education and support directed at recovery. Patients should be counseled to stop using injection drugs (AIII) and to enter and complete substance-abuse treatment, including relapse prevention programs (AIII).
2. If they are continuing to inject drugs, patients should be advised (BIII)
 - to never reuse or share syringes, needles, water, or drug preparation equipment; if, nonetheless, injection equipment that has been used by other persons is shared, to first clean the equipment with bleach and water (U.S. Public Health Service. HIV prevention bulletin: medical advice for persons who inject illicit drugs. May 8, 1997. Rockville, Maryland: CDC, 1997);
 - to use only sterile syringes obtained from a reliable source (e.g., pharmacies or syringe exchange programs);
 - to use sterile (e.g., boiled) water to prepare drugs; if not possible, to use clean water from a reliable source (e.g., fresh tap water); to use a new or disinfected container ("cooker") and a new filter ("cotton") to prepare drugs;
 - to clean the injection site with a new alcohol swab before injection;

- to safely dispose of syringes after one use.

ENVIRONMENTAL AND OCCUPATIONAL EXPOSURES

- 1. Certain activities or types of employment might increase the risk for exposure to tuberculosis (BIII). These include volunteer work or employment in health-care facilities, correctional institutions, and shelters for the homeless, as well as other settings identified as high risk by local health authorities. Decisions about whether to continue with such activities should be made in conjunction with the health-care provider and should be based on such factors as the patient's specific duties in the workplace, the prevalence of tuberculosis in the community, and the degree to which precautions designed to prevent the transmission of tuberculosis are taken in the workplace (BIII). These decisions will affect the frequency with which the patient should be screened for tuberculosis.**
- 2. Child-care providers and parents of children in child care are at increased risk for acquiring CMV infection, cryptosporidiosis, and other infections (e.g., hepatitis A and giardiasis) from children. The risk for acquiring infection can be diminished by good hygienic practices, such as hand washing after fecal contact (e.g., during diaper changing) and after contact with urine or saliva (AII). All children in child-care facilities also are at increased risk for acquiring these same infections; parents and other caretakers of HIV-infected children should be advised of this risk (BIII).**
- 3. Occupations involving contact with animals (e.g., veterinary work and employment in pet stores, farms, or slaughterhouses) might pose a risk for cryptosporidiosis, toxoplasmosis, salmonellosis, campylobacteriosis, or *Bartonella* infection. However, the available data are insufficient to justify a recommendation against work in such settings.**
- 4. Contact with young farm animals, especially animals with diarrhea, should be avoided to reduce the risk for cryptosporidiosis (BII).**
- 5. Hand washing after gardening or other contact with soil might reduce the risk for cryptosporidiosis and toxoplasmosis (BIII).**
- 6. In areas endemic for histoplasmosis, patients should avoid activities known to be associated with increased risk (e.g., creating dust when working with surface soil; cleaning chicken coops that are heavily contaminated with compost droppings; disturbing soil beneath bird-roosting sites; cleaning, remodeling or demolishing old buildings; and cave exploring) (CIII).**
- 7. In areas endemic for coccidioidomycosis, when possible, patients should avoid activities associated with increased risk, including those involving extensive exposure to disturbed native soil (e.g., at building excavation sites or during dust storms) (CIII).**

PET-RELATED EXPOSURES

Health-care providers should advise HIV-infected persons of the potential risk posed by pet ownership. However, they should be sensitive to the possible psychological benefits of pet ownership and should not routinely advise HIV-infected persons to part with their pets (DIII). Specifically, providers should advise HIV-infected patients of the following precautions.

General

- 1. Veterinary care should be sought when a pet develops diarrheal illness. If possible, HIV-infected**

persons should avoid contact with animals that have diarrhea (BIII). A fecal sample should be obtained from animals with diarrhea and examined for *Cryptosporidium*, *Salmonella*, and *Campylobacter*.

2. When obtaining a new pet, HIV-infected patients should avoid animals aged less than 6 months (or less than 1 year for cats; see Cats section, which follows), especially those with diarrhea (BIII). Because the hygienic and sanitary conditions in pet-breeding facilities, pet stores, and animal shelters are highly variable, the patient should be cautious when obtaining a pet from these sources. Stray animals should be avoided. Animals aged less than 6 months, especially those with diarrhea, should be examined by a veterinarian for *Cryptosporidium*, *Salmonella*, and *Campylobacter* (BIII).

3. Patients should wash their hands after handling pets (especially before eating) and avoid contact with pets' feces to reduce the risk for cryptosporidiosis, salmonellosis, and campylobacteriosis (BIII). Hand washing for HIV-infected children should be supervised.

Cats

4. Patients should be aware that cat ownership increases their risk for toxoplasmosis and *Bartonella* infection, as well as enteric infections (CIII). Those who elect to obtain a cat should adopt or purchase an animal that is aged greater than 1 year and in good health to reduce the risk for cryptosporidiosis, *Bartonella* infection, salmonellosis, and campylobacteriosis (BII).

5. Litter boxes should be cleaned daily, preferably by an HIV-negative, nonpregnant person; if the HIV-infected patient performs this task, he or she should wash hands thoroughly afterward to reduce the risk for toxoplasmosis (BIII).

6. To reduce the risk for toxoplasmosis, HIV-infected patients should keep cats indoors, not allow them to hunt, and not feed them raw or undercooked meat (BIII).

7. Although declawing is not generally advised, patients should avoid activities that might result in cat scratches or bites to reduce the risk for *Bartonella* infection (BII). Patients should also wash sites of cat scratches or bites promptly (CIII) and should not allow cats to lick the patients' open cuts or wounds (BIII).

8. Care of cats should include flea control to reduce the risk for *Bartonella* infection (CIII).

9. Testing cats for toxoplasmosis (EII) or *Bartonella* infection (DII) is not recommended.

Birds

10. Screening healthy birds for *Cryptococcus neoformans*, *Mycobacterium avium*, or *Histoplasma capsulatum* is not recommended (DIII).

Other

11. Contact with reptiles (e.g., snakes, lizards, iguanas, and turtles) should be avoided to reduce the risk for salmonellosis (BIII).

12. Gloves should be used during the cleaning of aquariums to reduce the risk for infection with *Mycobacterium marinum* (BIII).

13. Contact with exotic pets (e.g., nonhuman primates) should be avoided (CIII).

FOOD- AND WATER-RELATED EXPOSURES

- 1. Raw or undercooked eggs (including foods that might contain raw eggs [e.g., some preparations of hollandaise sauce, Caesar and certain other salad dressings, and mayonnaise]); raw or undercooked poultry, meat, seafood; and unpasteurized dairy products might contain enteric pathogens. Poultry and meat should be cooked until no longer pink in the middle (internal temperature, greater than 165 F [73.8 C]). Produce should be washed thoroughly before being eaten (BIII).**
- 2. Cross-contamination of foods should be avoided. Uncooked meats should not be allowed to come in contact with other foods; hands, cutting boards, counters, and knives and other utensils should be washed thoroughly after contact with uncooked foods (BIII).**
- 3. Although the incidence of listeriosis is low, it is a serious disease that occurs unusually frequently among HIV-infected persons who are severely immunosuppressed. Some soft cheeses and some ready-to-eat foods (e.g., hot dogs and cold cuts from delicatessen counters) have been known to cause listeriosis. An HIV-infected person who is severely immunosuppressed and who wishes to reduce the risk for foodborne disease can prevent listeriosis by reheating these foods until they are steaming before eating them (CIII).**
- 4. Patients should not drink water directly from lakes or rivers because of the risk for cryptosporidiosis and giardiasis (AIII). Waterborne infection might also result from swallowing water during recreational activities. Patients should avoid swimming in water that is likely to be contaminated with human or animal waste and should avoid swallowing water during swimming (BII).**
- 5. During outbreaks or in other situations in which a community "boil water advisory" is issued, boiling water for 1 minute will eliminate the risk for acquiring cryptosporidiosis (AI). Using submicron, personal-use water filters (home/office types) and/or drinking bottled water might also reduce the risk (see Cryptosporidiosis section in Disease-Specific Recommendations for information on personal-use filters and bottled water) (CIII). Current data are inadequate to support a recommendation that all HIV-infected persons boil or otherwise avoid drinking tap water in nonoutbreak settings. However, persons who wish to take independent action to reduce their risk for waterborne cryptosporidiosis may choose to take precautions similar to those recommended during outbreaks. Such decisions are best made in conjunction with a health-care provider. Persons who opt for a personal-use filter or bottled water should be aware of the complexities involved in selecting the appropriate products, the lack of enforceable standards for destruction or removal of oocysts, the cost of the products, and the difficulty of using these products consistently. Patients taking precautions to avoid acquiring cryptosporidiosis from drinking water should be advised that ice made from contaminated tap water also can be a source of infection (BII). Such persons should be aware that fountain beverages served in restaurants, bars, theaters, and other public places might also pose a risk, because these beverages, as well as the ice they might contain, are made from tap water. Nationally distributed brands of bottled or canned carbonated soft drinks are safe to drink. Commercially packaged noncarbonated soft drinks and fruit juices that do not require refrigeration until after they are opened (i.e., those that can be stored unrefrigerated on grocery shelves) also are safe. Nationally distributed brands of frozen fruit juice concentrate are safe if they are reconstituted by the user with water from a safe source. Fruit juices that must be kept refrigerated from the time they are processed to the time of consumption might be either fresh (unpasteurized) or heat-treated (pasteurized); only juices labeled as pasteurized should be considered free of risk from *Cryptosporidium*. Other pasteurized beverages and beers are also considered safe to drink**

(BII). No data are available concerning survival of *Cryptosporidium* oocysts in wine.

TRAVEL-RELATED EXPOSURES

- 1. Travel, particularly to developing countries, might result in significant risks for the exposure of HIV-infected persons to opportunistic pathogens, especially for patients who are severely immunosuppressed. Consultation with health-care providers and/or with experts in travel medicine will help patients plan itineraries (BIII).**
- 2. During travel to developing countries, HIV-infected persons are at even higher risk for foodborne and waterborne infections than they are in the United States. Foods and beverages -- in particular, raw fruits and vegetables, raw or undercooked seafood or meat, tap water, ice made with tap water, unpasteurized milk and dairy products, and items purchased from street vendors -- might be contaminated (AII). Items that are generally safe include steaming-hot foods, fruits that are peeled by the traveler, bottled (especially carbonated) beverages, hot coffee or tea, beer, wine, and water brought to a rolling boil for 1 minute (AII). Treating water with iodine or chlorine might not be as effective as boiling but can be used, perhaps in conjunction with filtration, when boiling is not practical (BIII).**
- 3. Waterborne infections might result from swallowing water during recreational activities. To reduce the risk for cryptosporidiosis and giardiasis, patients should avoid swallowing water during swimming and should not swim in water that might be contaminated (e.g., with sewage or animal waste) (BII).**
- 4. Antimicrobial prophylaxis for traveler's diarrhea is not recommended routinely for HIV-infected persons traveling to developing countries (DIII). Such preventive therapy can have adverse effects and can promote the emergence of drug-resistant organisms. Nonetheless, several studies (none involving an HIV-infected population) have shown that prophylaxis can reduce the risk for diarrhea among travelers (CDC. Health information for international travel, 1999-2000. Atlanta, Georgia: U.S. Department of Health and Human Services, 1999:202). Under selected circumstances (e.g., those in which the risk for infection is very high and the period of travel brief), the provider and patient may weigh the potential risks and benefits and decide that antibiotic prophylaxis is warranted (CIII). For those persons to whom prophylaxis is offered, fluoroquinolones (e.g., ciprofloxacin [500 mg daily]) can be considered (BIII), although fluoroquinolones should not be given to children or pregnant women. Trimethoprim-sulfamethoxazole (TMP-SMZ) (one double-strength tablet daily) also has been shown to be effective, but resistance to this drug is now common in tropical areas. Persons already taking TMP-SMZ for prophylaxis against *Pneumocystis carinii* pneumonia (PCP) might gain some protection against traveler's diarrhea. For HIV-infected persons who are not already taking TMP-SMZ, health-care providers should be cautious in prescribing this agent for prophylaxis of diarrhea because of the high rates of adverse reactions and the possible need for the agent for other purposes (e.g., PCP prophylaxis) in the future.**
- 5. All HIV-infected travelers to developing countries should carry a sufficient supply of an antimicrobial agent to be taken empirically should diarrhea develop (BIII). One appropriate regimen is 500 mg of ciprofloxacin twice a day for 3-7 days. Alternative antibiotics (e.g., TMP-SMZ) should be considered as empirical therapy for use by children and pregnant women (CIII). Travelers should consult a physician if their diarrhea is severe and does not respond to empirical therapy, if their stools contain blood, if fever is accompanied by shaking chills, or if dehydration develops. Antiperistaltic agents (e.g., diphenoxylate and loperamide) are used for the treatment of diarrhea; however, they should not be used by patients with high fever or with blood in the stool, and their use should be discontinued if symptoms persist beyond 48**

hours (AII). Antiperistaltic agents are not recommended for children (DIII).

6. Travelers should be advised about other preventive measures appropriate for anticipated exposures (e.g., chemoprophylaxis for malaria, protection against arthropod vectors, treatment with immune globulin, and vaccination) (AII). They should avoid direct contact of the skin with soil or sand (e.g., by wearing shoes and protective clothing and using towels on beaches) in areas where fecal contamination of soil is likely (BIII).

7. In general, live-virus vaccines should be avoided (EII). One exception is measles vaccine, which is recommended for nonimmune persons. However, measles vaccine is not recommended for persons who are severely immunosuppressed (DIII); immune globulin should be considered for measles-susceptible, severely immunosuppressed persons who are anticipating travel to measles-endemic countries (BIII). Another exception is varicella vaccine, which may be administered to asymptomatic nonimmunosuppressed children (BII). Inactivated (killed) poliovirus vaccine should be used instead of oral (live) poliovirus vaccine, which is contraindicated for HIV-infected persons. Persons at risk for exposure to typhoid fever should be administered an inactivated parenteral typhoid vaccine instead of the live attenuated oral preparation. Yellow fever vaccine is a live-virus vaccine with uncertain safety and efficacy in HIV-infected persons. Travelers with asymptomatic HIV infection who cannot avoid potential exposure to yellow fever should be offered the choice of vaccination. If travel to a zone with yellow fever is necessary and vaccination is not administered, patients should be advised of the risk, instructed in methods for avoiding the bites of vector mosquitoes, and provided with a vaccination waiver letter.

8. In general, killed vaccines (e.g., diphtheria-tetanus, rabies, hepatitis A, Japanese encephalitis vaccines) should be used for HIV-infected persons just as they would be used for non-HIV-infected persons anticipating travel (BIII). Preparation for travel should include a review and updating of routine vaccinations, including diphtheria-tetanus for adults and all routine immunizations for children. The currently available cholera vaccine is not recommended for persons following a usual tourist itinerary, even if travel includes countries reporting cases of cholera (DII).

9. Travelers should be informed about other area-specific risks and instructed in ways to reduce those risks (BIII). Geographically focal infections that pose a high risk to HIV-infected persons include visceral leishmaniasis (a protozoan infection transmitted by the sandfly) and several fungal infections (e.g., *Penicillium marneffe*i infection, coccidioidomycosis, and histoplasmosis). Many tropical and developing areas have high rates of tuberculosis.

* Letters and Roman numerals in parentheses indicate the strength of the recommendation and the quality of evidence supporting it (see Box, page 3).

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