CLINICAL REVIEW

Travel Medicine Considerations for North American Immigrants Visiting Friends and Relatives

Nina Bacaner, MD, MPH, DTM&H
Bill Stauffer, MD, MSPH, DTM&H
David R. Boulware, MD
Patricia F. Walker, MD, DTM&H
Jay S. Keystone, MD, FRCPC

Travel medicine traditionally focuses on assisting tourist and business travelers avoid travel-related illnesses. It is now clear that immigrants returning to their home countries, termed visiting friends and relatives (VFRs), are at particularly high risk and that traditional travel services are inadequate for protecting this population. This article will review existing data concerning the increased risk and discuss practical recommendations that may assist the primary care and travel clinicians.

International migration has risen from 120 million in 1990 to 175 million in 2002. In 2002 more than 1 million persons legally immigrated to the United States from more than 220 countries. Twenty percent of the US population are first-generation immigrants or their children are. In spite of being a minority of the population, VFRs comprised approximately 40% of US international air travelers in 2002. Similarly, in the United Kingdom, VFRs made 40% of the 2 million visitors to Africa in 2000. Although no VFR demographics exist, it is assumed that national statistics pertaining to immigration patterns reflect subsequent travel patterns for immigrants. There have been major shifts in

Context In the United States, 10% of the population was born outside of its borders. Immigrants and their children frequently return to visit their homeland, referred to as visiting friends and relatives (VFRs). They account for a disproportionately high volume of international travel.

Evidence Acquisition Searches of MEDLINE, World Health Organization, Centers for Disease Control and Prevention, International Society of Travel Medicine, and American Society of Tropical Medicine computerized databases, conference proceedings and abstracts, US Census Bureau, bibliographies of pertinent articles, and travel medicine texts. Priority was given to recent (1996-2003) evidence, addressing VFR travelers. General sources including travel medicine and immigrant health were also used.

Evidence Synthesis Immigrants visiting friends and relatives experience excessive rates of travel-related morbidity and mortality. Lack of pretravel care is common due to patient and clinician barriers to care, preexisting health beliefs, and incomplete childhood vaccinations. Travel patterns increase risk with VFRs traveling to high-risk destinations. Susceptibility to infectious and noninfectious illnesses is often increased because of multiple preexisting medical problems and extremes of age. Infectious diseases differ in etiology and magnitude from those of traditional travelers. For example with malaria, VFRs are frequently prescribed inappropriate prophylaxis or take none at all, have longer stays, spend time in high-risk areas, and do not appropriately adhere to chemoprophylaxis regimens. Effective pretravel health advice, guidelines, and services for this high-risk population are essential. There are already a number of useful and readily available databases that may aid clinicians in providing optimal travel-related preventive and therapeutic care.

Conclusions Immigrants who are visitors of friends and relatives in other countries account for a high volume of international travelers and are at markedly increased risk of travel-related illness. New strategies are needed to properly address the needs of VFR travelers. Pretravel services should be convenient, accessible, affordable, culturally competent, and if possible, located within clinics serving immigrant populations. Clinicians caring for VFRs should be knowledgeable about their travel-related risks and have access to regularly updated, detailed pretravel health information.

JAMA. 2004;291:2856-2864 www.jama.com

Author Affiliations: Community University Health Care Center, Department of Internal Medicine (Dr Bacaner) and Division of Infectious Disease and International Medicine (Drs Stauffer, Boulware, and Walker) University of Minnesota, Minneapolis; Regions Hospital, Center for International Health & International Travel Clinic, St Paul, Minn (Drs Stauffer and Walker); and Centre for Travel and Tropical Medicine, Division of Infectious Diseases, Department of Medicine, University of Toronto, Ontario (Dr Keystone). Correspondence: Jay S. Keystone, MD, FRCPC, Centre for Travel and Tropical Medicine, Toronto General Hospital, 200 Elizabeth St, ES 9-411A, Toronto, Ontario, Canada M5G 2CA (Jay.Keystone@utoronto.ca). Clinical Review Section Editor: Michael S. Lauer, MD, Contributing Editor. We encourage authors to submit papers for consideration as a Clinical Review. Please contact Michael Lauer, MD, at lauerm@ccf.org.

©2004 American Medical Association. All rights reserved.
immigration away from European predominance as before 1970 toward developing nations from Asia, Africa, Latin America, Mexico, and Central America. Therefore, with more immigrants from developing countries located largely in tropical areas, expectations are that more VFRs will be visiting those areas. Statistics show large increases in trips from the United States to tropical countries since 1970, shifting the epidemiology of imported infections (eg, malaria, severe acute respiratory syndrome).8,9

**Health Risks for VFRs**

Immigrants visiting friends and relatives assume greater risk than traditional travelers. They choose often to travel despite being pregnant, having multiple medical problems, and accompanying young children. Immigrants visiting friends and relatives frequently return to visit family members whom they had left behind or to introduce new additions to the family of origin. Last-minute travel to visit sick relatives or attending funerals is not uncommon, allowing little time for pretravel advice. Other travel reasons include finding a spouse, locating missing family, or returning for traditional or cultural ceremonies.

Many VFRs stay in family settings in which they may encounter suboptimal sanitation and increased malaria risk.10 They may be reluctant to eat differently than their hosts. Close proximity to the local population increases risk of diseases such as tuberculosis and meningococcal infection.11,12 Immigrants visiting friends and relatives tend to have prolonged stays, increasing the risk of morbidity and mortality.13,14

Motor vehicle collisions are frequent causes of injury and are associated with considerably higher mortality in developing countries.15-17 The risk of injury may be higher for VFRs because they often use high-risk, local transportation and drive independently on poorly maintained roads in dimly lit rural areas. Lack of availability or use of safety devices also increases risk.13 Furthermore, health care for injury or severe illness, especially in remote areas, is frequently inadequate.16-20 Evacuation insurance, which covers expenses for airlift or other rapid transportation needed for provision of high-quality emergency health care, is uncommonly used.

Many VFRs have experienced upheaval, armed conflict, and torture prior to emigration and may have residual posttraumatic stress disorder.21,22 Stress-related health problems may be exacerbated by travel or by seeing ailing, impoverished family members.

**Barriers to Pretravel Health Advice**

In a survey of 2000 travelers departing from Amsterdam, almost one third were VFRs returning to home countries, and 70% had not sought pretravel advice.23 Even when pretravel advice is sought, adherence to travel recommendations, suboptimal in standard travelers,24-27 may be worse among VFRs.28,29 Of 307 Canadians of Asian origin traveling to India, only 31% intended to use malaria chemoprophylaxis and fewer than 10% intended to use mosquito prevention. The majority sought pretravel advice from family practitioners of whom 76% prescribed inappropriate malaria chemoprophylaxis.30

Financial considerations often limit the use of pretravel services among VFRs, because pretravel services are rarely reimbursed by third-party payers.31,32 Language barriers, health beliefs, lack of awareness, and fear of immigration authorities may adversely affect pretravel health care. Importantly, VFRs often believe they are immune to diseases from their homeland. In some cases they may be correct either because of childhood immunization (eg, Japanese encephalitis) or previous exposure (eg, hepatitis A virus), but many infections produce little long-term protective immunity.

Malaria presents interesting dilemmas relating to partial immunity and popular beliefs. Individuals living in highly endemic areas often develop partial immunity protecting them from severe disease. In fact, most adults are either asymptomatic or experience minor illness “African flu” even when infected with *Plasmodium falciparum*. Immune priming may lead to less severe malaria than in naive individuals.33 However, persistence of partial immunity is dependent on reexposure once outside endemic areas. Therefore, even with a distant history of multiple malaria episodes, VFRs are highly vulnerable to clinical malaria. Immigrants visiting friends and relatives may seek health care practitioners with similar backgrounds and who may share their mistaken beliefs about preexisting immunity and therefore not recommend optimal malaria prevention strategies.34 Most notable among malaria-naive individuals who are at great risk of severe disease and death are the children of VFR caregivers, who were born in developed nations and travel to endemic areas.

Health care systems and clinicians also present barriers in providing optimal pretravel and posttravel care.35 Inadequate use of medically trained interpreters limits its communication. Written materials, even when in the patient’s native language, are encouraged but may be ineffective because of illiteracy. Primary care clinicians may not be knowledgeable about travel medicine or the geography and disease epidemiology of the destination country. Many clinics rely on the Centers for Disease Control and Prevention or other Web sites providing broad country or region-based recommendations. Most clinics do not have access to regularly updated pretravel health databases that offer information on regional disease distribution, seasonal factors, and ongoing epidemics (BOX).

**Recommendations and Special Issues**

There are no published recommendations and little data on providing care to this population of travelers. We present herein practical recommendations and highlight special issues arising in the care of VFR travelers (TABLE 1).

**Providing Appropriate Care.** To serve this community effectively, it is imperative to publicize and emphasize the need for comprehensive pre-

©2004 American Medical Association. All rights reserved.
travel services. Promotion of travel medicine services may be disseminated through leaflets, posters, and popular ethnic radio programs or newspapers. Ideally, quality travel medical services would be offered in primary care clinics frequented by immigrants since familiarity, trust, and ease of access might encourage use. Routine adult vaccinations that are also travel-related (eg, hepatitis A and hepatitis B) may readily be incorporated into primary care visits for other reasons. Pretravel medical services are superior when administered by a practitioner who has travel medicine training, and clinics should have designated travel medicine providers. For VFRs on limited budgets, providers may help prioritize vaccines and choose less expensive malaria prophylaxis.

Overcoming language barriers is critical. When available, medically trained, cross-cultural interpreters or multilingual health care practitioners are best. Interpreter telephone services are suboptimal. Family members should be used to translate only when absolutely necessary. Pretravel advice, medication instructions, prescription bottles, and health information about destination should be provided in appropriate languages.

Food and Waterborne Illnesses. Traveler’s diarrhea is the most common illness among travelers to the developing world, affecting 30% to 60%. Although the typical advice often quoted by health care practitioners is “Boil it, cook it, peel it, or forget it,” the effectiveness of this dogma is questionable. In addition, food recommendations traditionally given may be difficult for VFR travelers to adhere to because they are often house guests. It is more practical to stress the effectiveness of frequent handwashing, including use of hand-sanitizing solutions that simplify hand cleaning. Other simple suggestions such as using dilute halide solutions to clean vegetables, boiling drinking water, and avoiding street vendor food may help. Milk may be made safe by bringing it to a boil. Food or beverages served steaming hot are generally safe.

Cultural foods may put travelers at risk of specific infectious diseases. For example, one might advise Latin Americans to avoid white cheese (queso fresca) to prevent brucellosis and listeriosis. Fish and seafood consumption may pose further risk. An estimated 25,000 cases of ciguatera poisoning occur annually from eating affected large carnivorous reef fish of tropical and subtropical waters. The disease-
<table>
<thead>
<tr>
<th>Specific Diseases</th>
<th>VFR vs Traditional Traveler Risk of Exposure</th>
<th>Reason for Risk Variance*</th>
<th>Recommendations to Stress With VFR Travelers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and waterborne illness</td>
<td>Increased</td>
<td>Social and cultural pressure (ie, eat the meal of hosts); Less likely to obtain potable water; Less pretravel advice</td>
<td>Frequent handwashing; Avoid high-risk foods (eg, dairy products, undercooked foods); Simplify treatment regimens (ie, single-antibiotic dose such as azithromycin, 1000 mg or ciprofloxacin, 500 mg); Discuss food preparation (ie, cleaning vegetables)</td>
</tr>
<tr>
<td>Fish-related toxins and infections</td>
<td>Increased</td>
<td>Ingestion of high-risk foods; Less pretravel advice</td>
<td>Avoidance counseling of specific cultural foods (eg, raw freshwater fish)</td>
</tr>
<tr>
<td>Malaria</td>
<td>Increased</td>
<td>Longer stays; Higher-risk destinations; Less pretravel advice leading to less use of chemoprophylaxis and fewer personal protection measures; Belief that already immune</td>
<td>Education on malaria, mosquito avoidance, and the need for chemoprophylaxis; Consider cost in chemoprophylaxis; Use of insecticide-treated bednets</td>
</tr>
<tr>
<td>Tuberculosis (particularly multidrug resistant)</td>
<td>Increased</td>
<td>Increased close contact with local population; Increased contact with HIV-coinfected persons</td>
<td>Check PPD 3 to 6 months after return if history of prior negative PPD and long stay (&gt;3 months); Educate about tuberculosis signs, symptoms, and avoidance</td>
</tr>
<tr>
<td>Blood and body fluid for sexually transmitted diseases</td>
<td>Increased</td>
<td>More likely to seek substandard, local care (eg, dental); Cultural practices (eg, tattoos, female genital mutilation); Longer stays and increased chance of blood transfusion; Higher likelihood of sexual encounters with local population</td>
<td>Discuss high-risk behaviors including tattoos, piercings, dental work, sexual encounters; Purchase condoms prior to travel; Consider providing syringes, needles, and intravenous catheters for long-term travel</td>
</tr>
<tr>
<td>Schistosomiasis and helminthes</td>
<td>Increased</td>
<td>Limited access to pipe-borne water in rural areas for bathing and washing clothes</td>
<td>Avoid freshwater exposure; Use liposomal DEET preparation with freshwater exposures; Discourage child from playing in dirt; Use ground cover; Use protective footwear</td>
</tr>
<tr>
<td>Respiratory problems</td>
<td>Increased</td>
<td>Increased close exposure to fires, smoking, or pollution</td>
<td>Prepare for asthma exacerbations by considering stand-by steroids</td>
</tr>
<tr>
<td>Zoonotic diseases (eg, rickettsial, leptospirosis, viral fevers, leishmaniasis, anthrax)</td>
<td>Increased</td>
<td>Rural destinations; Stays with family where animals are kept, and increased exposure to insects; Increased exposure to mice and rats; Sleeping on floors</td>
<td>Avoid animals; Wash hands; Wear protective clothing; Perform daily tick checks; Avoid thatched roofs, mud walls in Latin America; Avoid sleeping at floor level</td>
</tr>
<tr>
<td>Envenomations (eg, snakes, spiders, scorpions)</td>
<td>Increased</td>
<td>Sleeping on floors</td>
<td>Avoid sleeping at floor level; Use footwear out-of-doors at night</td>
</tr>
<tr>
<td>Toxin ingestion (eg, medication adverse events, heavy metal ingestion)</td>
<td>Increased</td>
<td>Purchasing of local medications; Use of traditional therapies; Use of contaminated products (eg, Mexican pottery with lead glaze); Ingestion of contaminated food items (eg, large reef fish, mercury-contaminated freshwater fish)</td>
<td>Anticipate and purchase medications prior to travel; Counsel avoidance of known traditional medications (eg, Hmong bark tea with aspirin) and high-risk items (eg, large reef fish)</td>
</tr>
<tr>
<td>Yellow fever and Japanese encephalitis</td>
<td>Decreased in adults</td>
<td>Unclear, partial immunity due to previous exposure or vaccination</td>
<td>Avoid mosquitoes by taking protective measures and receiving vaccination when appropriate</td>
</tr>
<tr>
<td>Dengue fever</td>
<td>Increased (especially risk of DHF and DSS)</td>
<td>DHF and DSS occur on repeat exposure to a second serotype of dengue; VFRs more likely to have had previous exposure.</td>
<td>Avoid mosquitoes by taking protective measures</td>
</tr>
</tbody>
</table>

Abbreviations: DEET N, N-diethyl-m-toluamide; DHF, dengue hemorrhagic fever; DSS, dengue shock syndrome; HIV, human immunodeficiency virus; PPD, purified protein derivative; VFR, visiting friends and relatives.

*Hypothesis unless reference cited to support assertions.
†DEET (liposomal preparations) has been demonstrated in animal models to prevent the skin penetration of Schistosomiasis cercariae.
causing toxin is not destroyed by cooking or processing. In many cultures, the common practice is to eat the head, intestines, liver, and roe where the toxin is concentrated. Ceviche and other preparations of raw, freshwater fish (sushi, koi pla) may transmit Vibrio species (ie, cholera), gnathostomiasis, and liver flukes. Raw or poorly cooked shellfish may contain hepatitis A virus or Salmonella typhi.

When addressing treatment of traveler’s diarrhea, simplified recommendations are advisable. For example, rather than traditional self-treatment with 3 days of antibiotics, it may be preferable to recommend a single fluoroquinolone or azithromycin dose, which has been shown to be effective. With small children, proper hydration therapy should be stressed.

Insect Avoidance and Malaria Chemoprophylaxis. Barrier precautions and chemical insecticides protect travelers not only from malaria but also from other common serious diseases such as dengue. Persons previously exposed to dengue, as have many immigrants, are at increased risk of severe dengue infection with subsequent exposure. Clothing can be impregnated with permethrin, effective for 2 to 6 weeks even through multiple washings. Long-acting DEET mosquito repellents are practical and 99% effective when combined with permethrin-impregnated clothing. Specific instructions on purchasing and product use should be carefully reviewed. Insecticide-treated bednets are inexpensive and readily available in endemic countries.

Malaria is the most serious infectious risk to travelers in many parts of the world. Cases of malaria imported to industrialized countries exceed 25000 annually. Despite its frequency, malaria may be misdiagnosed as often as 60% of the time on initial presentation, especially in children. Rates of malaria are higher in VFRs than any other group of travelers. Of malaria cases imported into Brescia, Italy, from 1990 through 1998, 71% were in migrants compared with 12% among nonimmune Italians. Pooling of malaria cases in European centers found 43% occurred in nonnationals, frequently immigrant VFRs. Furthermore, the geosentinel surveillance network of International Society of Travel Medicine showed an 8-fold relative risk of acquiring malaria in VFRs compared with tourists (Joe Torresi, MD, oral communication, November 2001).

It is important to stress to VFR travelers that malaria chemoprophylaxis does not prevent infection but rather prevents clinical disease when the parasite emerges from the liver into the blood. If medication is stopped sooner than prescribed, a substantial risk of acquiring clinical malaria exists. Mefloquine, now available as a generic, is relatively inexpensive and convenient, but due to neuropsychiatric adverse effects, it is not recommended for those with depression, anxiety, or posttraumatic stress disorder, all of which are common in VFR travelers. Newly required warning sheets from dispensing pharmacies may discourage some from taking mefloquine, unless specifically reassured. An effective strategy if time permits, is to start prophylaxis with mefloquine 3 to 4 weeks before departure to monitor for adverse events. Doxycycline is inexpensive but is a daily medication and has some potential adverse effects (eg, gastrointestinal effects, photosensitivity, predisposition to candida vaginitis) and is contraindicated in pregnant women and children younger than 8 years. Atovaquone-proguanil hydrochloride (Malarone; GlaxoSmithKline, Research Triangle Park, NC) is expensive, especially with prolonged stays. Chloroquine remains an affordable choice for travel only to the few remaining countries where chloroquine is still effective. Chloroquine frequently causes itching in persons of African descent. The use of primaquine is a welcome new option especially for VFRs who are unable to tolerate mefloquine or afford atovaquone-proguanil. G-6PD enzyme levels must be checked prior to use to identify patients at risk for serious drug-induced hemolytic anemia. Occasionally, stand-by, self-administered malaria treatment will be the only affordable, tolerated option for long-term visitors although several studies have shown that it is often used incorrectly.

Immigrants visiting friends and relatives should be told to continue malaria prophylaxis even if they have been diagnosed as having malaria while abroad because of the likelihood of an incorrect diagnosis due to a false-positive smear result. In many African countries, symptomatic individuals first treat themselves with over-the-counter antimalarial instead of seeking health care. In addition to receiving inappropriate malaria treatment (ie, chloroquine in Africa), other potential hazards exist, such as halofantrine treatment in persons taking mefloquine chemoprophylaxis putting them at risk of cardiac arrhythmia. Immigrants visiting friends and relatives must be made aware that suspected malaria is a medical emergency and that they should insist on malaria smears when returning home ill even if they are afebrile or informed that they “only have a virus.” Clinicians should strongly suspect malaria in ill febrile persons having traveled to endemic areas within the last year and should be aware that multiple thick and thin smears may be necessary for diagnosis.

Tuberculosis. The tuberculosis bacillus infects one third of the world’s population. Immigrants from high-incidence countries are a well-recognized risk group for tuberculosis. Theoretically, close contact with infected populations, long-term travel, and potential exposure to persons coinfected with tuberculosis and the human immunodeficiency virus (HIV) increase risk of clinical disease. Among US-born VFR children, those who traveled within the last year were 5 times as likely to have positive tuberculin skin test results than those who did not. Preventing tuberculosis is difficult, and it is appropriate to caution patients to avoid persons with a cough.

Blood and Body Fluid Transmissible Disease. Travel may increase the risk of contracting sexual and body fluid transmissible diseases from tattoos,
sexual encounters, especially with commercial sex workers, and improperly sterilized medical equipment.84,85 Immigrants visiting friends and relatives may be at further risk from local mani- cures and shaves or from acupuncture treatments, dental care, and medical in- jections.80,82

Hepatitis B or C, sexually transmitted diseases, and HIV are highly prevalent diseases in many areas of the developing world.83 The predominance of HIV-1 non-B subtypes, and concurrent sexually transmitted diseases substantially increase the risk of HIV transmission to travelers.84,85 Immigrants visiting friends and relatives are more likely to have sexual encounters with persons in the local population than other types of travelers. Additionally, condoms purchased in developing countries may be of unreliable quality; therefore, VFR travelers should be advised to purchase condoms before travel.86

Other Travel Precautions. Commonly, VFRs purchase malaria chemo- prophylaxis, other medications, or traditional remedies at greatly reduced prices in their home country. Many of these substances are substandard or even counterfeit, leading to increased risk of drug failure or adverse effects.87,88 Recently, samples of the antimalarial drug, artesunate, purchased from shops in 5 Southeast Asian countries contained artesunate only 62% of the time, even though packaged in standard blister packs.89 An estimated 10% to 20% of medicines manufactured in China and India are counterfeit, but rates may exceed 40% to 50% in certain locales.90 In an urban area in Nigeria, 48% of 581 tested pharmaceuti- cals were substandard.91,92

Water exposure predisposes to several risks. In the United States more than 50% of children who drown were not intending to swim at the time (ie, fell into bodies of water). It should be stressed to caregivers traveling with children that caution must be exer- cised around water. Freshwater swimming or wading in slow-moving fresh water predisposes travelers to schistosomiasis or leptospirosis in endemic areas. Other environmental risks are also increased in VFRs (eg, envenomations, geohelminths, environment- ally induced asthma), and simple suggestions may prevent morbidity associated with these risks (Table 1).

To reduce risk of trauma, VFR travelers should avoid high-risk vehicles (eg, motorcycles) and should be encouraged to use safety devices whenever possible (eg, seat belts, car seats, helmets). Above all, they should avoid rural travel by road after dark.

Routine and Travel Immunizations

Official national and international or- ganizations do not formally recognize differences between VFR and non- VFR travelers when making routine travel vaccine recommendations (TABLE 2). However, some vaccines des-erve special mention because some immi- grants may be behind on routine immu- nizations and at risk with travel (eg, diptheria), have received some travel vaccines as routine in their country of origin (eg, Japanese encephalitis), or may be immune due to previous exposure to disease (eg, hepatitis A virus). In addition, VFR travelers have in- creased risk for some diseases and de- serve a low threshold for immunization (eg, typhoid, rabies). Some of the pertinent differences and special con- siderations to general vaccine recommend- ations will be discussed.

Routine Vaccines. The pretravel visit presents an opportunity to evaluate im- munization status and update routine vaccines. When time allows, serologic testing can help assess immune status in those without a clear history of disease (eg, measles) or lacking adequate documenta- tion. When routine vaccination is necessary, an accelerated schedule may be used to facilitate completion.45

Many immigrants are behind on routine immunizations.93 Although US im- migrants are required to meet minimal vaccine standards, most immigrants will
not have received certain vaccines due to their scarcity in developing countries of vaccines, such as Haemophilus influenzae, mumps, rubella, pneumococcal, or influenza. Even when a vaccine record is presented, it must be viewed cautiously because some areas of the world have excessive rates of vaccine failure (eg, eastern Europe, China).

When inspected closely, the immunization record may be difficult to interpret accurately. Furthermore, special categories of US immigrants such as refugees, asylum seekers, and international adoptees are exempt from vaccine requirements on migration. In some areas of southeast Asia, carrier rates exceed 10%. Thus, upon arrival in the United States, it is recommended that all immigrants receive hepatitis B virus screening and that nonimmune individuals be vaccinated.

Those VFR travelers not adequately immunized may be exposed to vaccine-preventable diseases that are ubiquitous (eg, tetanus). They may enter areas during outbreaks such as occurred with diphtheria in the former Russian Federation during the 1990s and is currently occurring with polio in Nigeria. Furthermore, preexisting immunity to varicella is lower in adult VFRs because in many developing countries, varicella is an infection of adolescence rather than early childhood.

Travel Vaccines. There are several factors influencing vaccine recommendations that are relevant to VFR travelers. Hepatitis A virus, the most frequently acquired vaccine-preventable travel disease, deserves special attention. Hepatitis A virus risk is based on residence location and duration, age, immigration year, and history of jaundice. Behrens et al showed that United Kingdom VFRs younger than 15 years traveling to India were at 10 times the risk of hepatitis A infection than native-born tourists. Previously, immigrants from hepatitis A virus–endemic countries were assumed to be immune from prior childhood infection. A study of 129 VFRs found that 95% were immune. However, as standards of living improve, seroprevalence declines.

A study of Thai medical students showed hepatitis A antibody seroprevalence decreased from 77% in 1981 to 7% in 2001. Another multicenter study in 6 Latin America countries found 20% to 70% of preadolescents were not immune to the hepatitis A virus. Hepatitis serology or vaccination is indicated for VFRs younger than 20 years. In older VFRs, it is cost-effective to check IgG antibodies.

Another vaccine-preventable disease disproportionately represented in VFR travelers is typhoid fever. Of imported typhoid fever cases into the United States from 1994 through 1999, the Centers for Disease Control and Prevention reports that 77% were among VFRs of whom 26% were younger than 10 years and half were acquired in fewer than 4 weeks of travel. Similarly, but less common, imported cholera is predominately found in VFR travelers. The Centers for Disease Control and Prevention statistics indicate 78% of 160 cases from 1992-1994 occurred in VFRs. In the United States, there is currently no effective cholera vaccine available. Several vaccines are currently used in other countries including an oral vaccine (CVD 103-HgR, Mutacol, Swiss Serum and Vaccine Institute, Bern, Switzerland) licensed in Canada for persons older than 2 years and the Dukoral (BS-WC, Aventis Pasteur, Toronto, Ontario) oral vaccine licensed in 18 countries that is effective against cholera and partially protective against enterotoxigenic Escherichia coli for up to 3 months.

Meningococcal meningitis occurs worldwide although most cases occur in 15 countries in Africa’s sub-Saharan meningitis belt. Large epidemics involving more than 100,000 people occur periodically throughout the region, predominantly during the dry season. Small outbreaks of Neisseria meningitidis W135 have occurred with Hajj/Omra pilgrimages and in the African meningitis belt. High rates of nosopharyngeal carriage have been documented in VFR Hajjis, including those previously vaccinated and have been responsible for spread from persons returning from travel. Vaccination is required for travel to the Hajj/Omra and is recommended for any traveler to sub-Saharan endemic areas during the dry season or during ongoing epidemics. It should be considered year round for VFRs due to their increased contact with local populations.

Up to 70,000 deaths due to rabies occur worldwide annually, the majority in Southeast Asia and the Indian subcontinent. Almost 50% of deaths occur in children. Ten percent of traditional tourists to Thailand have been shown to have a potential risk of exposure to rabies. Despite this risk, only a quarter of general practitioners provide any pretravel advice concerning rabies. In developing countries, 60% of animal bites occur in or around the home, increasing VFR risk. An animal wound, even a lick or scrape, should be extensively cleaned with soap and water. Immigrants visiting friends and relatives should avoid contact with dogs, cats, monkeys, bats, rodents, raccoons, and other animals, even if they do not seem to be behaving strangely or appear ill. Preexposure rabies vaccination should be a serious consideration in VFRs traveling for more than 30 days, especially children; however, vaccination cost is significant.

Interestingly, imported cases of yellow fever and Japanese encephalitis have occurred almost exclusively in non-VFR adults. It is unclear whether this is simply chance because there are very few imported cases or is due to previous exposure or routine childhood immunization. However, VFR children may be at increased risk.

CONCLUSIONS

Immigrants visiting friends and relatives, who account for a high volume of international travelers, have markedly increased risk of travel-related disease compared with tourists or business travelers. Factors leading to decreased likelihood of high-quality pretravel health care include financial barriers, accessibility, language, and health beliefs. New strategies are needed to address the needs of VFR travelers. Medical and public health organiz-
tions should use media resources and consider novel approaches to increase awareness and disseminate information to medical practitioners and VFRs. Research is needed to address ways in which barriers that keep VFRs from seeking and adhering to pretravel health advice can be lowered. In addition, health professionals working with VFRs need to identify methods for providing advice that ensures optimal patient satisfaction and behavioral change. Private payers and public health services should share in the cost of pretravel services which, ultimately, will lead to less morbidity and mortality and lower acute care costs to the health care system. Until these issues are better defined and addressed, VFRs will continue to be at high risk for travel-related illness, with potentially serious personal and public health implications.

Author Contributions: Study concept and design: Bacaner, Stauffer, Walker, Keystone. Acquisition of data: Bacaner, Stauffer, Keystone, Boulware. Analysis and interpretation of data: Bacaner, Stauffer, Walker, Keystone. Critical revision of the manuscript for important intellectual content: Bacaner, Stauffer, Boulware, Keystone. Obtained funding: Bacaner. Administrative, technical, or material support: Bacaner, Stauffer. Supervision: Stauffer, Keystone. Acknowledgment: We thank Phillip Fischer, MD, for manuscript review. Funding/Support: Dr Bacaner was partially supported by a Bush Medical Fellowship from the Bush Foundation, St Paul, Minn.

REFERENCES

41. Deardorff TL. Epidemiology of marine fish-
phylaxis against malaria in Danish travelers.


Schlagenhauf P, Steffen R. Stand-by treatment of the use of substandard drugs in developing countries.


Schlagenhauf P, Steffen R. Stand-by treatment of the use of substandard drugs in developing countries.


Schlagenhauf P, Steffen R. Stand-by treatment of the use of substandard drugs in developing countries.


Schlagenhauf P, Steffen R. Stand-by treatment of the use of substandard drugs in developing countries.


Schlagenhauf P, Steffen R. Stand-by treatment of the use of substandard drugs in developing countries.


Schlagenhauf P, Steffen R. Stand-by treatment of the use of substandard drugs in developing countries.


Schlagenhauf P, Steffen R. Stand-by treatment of the use of substandard drugs in developing countries.