Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Health Guidelines for Travel Abroad

Jason Lohr, MD[a,b,*], Norman Benjamin Fredrick, MD[c], Leesha Helm, MD, MPH[d], Jeffrey Cho, MD, MPH[b]

KEYWORDS

• Travel health • Travel abroad • Pretravel Assessment • Posttravel Assessment

KEY POINTS

- Primary care providers manage the majority of travel medical care. The purpose of the pretravel visit are risk assessment and mitigation.
- Encourage travelers to enroll in the Smart Traveler Enrollment Program for travel advisories.
- The Centers for Disease Control and Prevention travel website offers destination-specific, point-of-care resources for clinicians and travelers.
- Travelers who are visiting friends and relatives are a high-risk group.
- The most common syndromes in returning travelers are gastrointestinal, febrile, and dermatologic.

INTRODUCTION

Most travel medical care is provided by patients' primary care physicians; only 10% of international travelers visit a travel clinic. The main purposes for travel include vacationing, visiting friends and family, business, and for educational purposes.

PRETRAVEL CONSULTATION

The purposes of the pretravel consultation are to estimate risk and provide recommendations to mitigate risk.

Disclosure Statement: The authors have nothing to disclose.
[a] CMO, SAC Health System, 250 South G Street, San Bernardino, CA 92410, USA; [b] Family Medicine Residency Program, Loma Linda University, 1200 California Street, Suite 240 Redlands, CA 92374, USA; [c] Family and Community Medicine and Public Health Sciences, Global Health Center, Pennsylvania State University College of Medicine, 500 University Drive, Hershey, PA 17033, USA; [d] Department of Family Medicine, Pennsylvania State University College of Medicine, Penn State Health, PGY-3, 500 University Drive, Hershey, PA 17033, USA
* Corresponding author. 250 South G Street, San Bernardino, CA 92410.
E-mail address: JLLohr@sachealthsystem.org

Prim Care Clin Office Pract 45 (2018) 541–554
https://doi.org/10.1016/j.pop.2018.05.012
primarycare.theclinics.com
0095-4543/18/© 2018 Elsevier Inc. All rights reserved.

TRAVELER BACKGROUND

The initial pretravel assessment should focus on specific aspects regarding the health background of the traveler (**Box 1**). A full history and physical examination, including a review of immunizations, allergies, medications, and chronic medical conditions should be explored. Special attention and tailored recommendations should be given to those with chronic disease states, including congestive heart failure, diabetes, mental health issues, and immunocompromised states. It is important to note recent hospitalizations and surgeries and to assess the risk associated with traveling after these events. Prior travel history may provide clues regarding intolerance to certain antimalarials or other medications.

TRIP SPECIFICS

Review the itinerary of the traveler, including types of travel, the reason for travel, and accommodations. Country-specific risks and travel advisories should be discussed in detail with the traveler by reviewing resources like the Smart Traveler Enrollment Program (https://step.state.gov/). By assessing these specific aspects, the provider can obtain a wealth of knowledge that can be synthesized to help the traveler manage possible risks.

Box 1
Risk assessment

Medical history

- Medications
- Allergies
- Immunizations
- Chronic disease states
- Mental health
- Hospitalizations
- Surgeries
- Pregnancy or breastfeeding
- Previous travel
- Previous use of antimalarials, antibiotics
- Plans for repeat travel in next 1 to 2 years

Trip itinerary

- Location
- Dates and season
- Activities, mass gatherings
- Reasons for travel
- Accommodations
- Travel insurance

Data from Centers for Disease Control and Prevention. CDC yellow book 2018: health information for international travel. New York: Oxford University Press; 2017.

TRAVEL RECOMMENDATIONS TO REDUCE RISK

Preparedness for Exacerbations of Chronic Disease States

Travel can be stressful and demanding for individuals with chronic disease states. Before travel, clinicians should direct travelers to recommendations provided by national associations related to their chronic medical states for travel guidelines. In addition, travelers should be directed to check in with the US embassy or consulate in their area of travel to clarify any restrictions on medications with which they may need to travel.

Travel Insurance and International Health Care

Many health insurances do not provide adequate coverage for international travel, including repatriation and medical evacuation.[1] The following resources can be used to help travelers make a decision regarding the need for travel insurance, travel health insurance, and medical evacuation insurance.

- Department of State (www.travel.state.gov)
- International Association for Medical Assistance to Travelers (www.iamat.org)

Accessing Local Reputable Medical Facilities

The International Association of Medical Assistance to Travelers maintains a list of clinics available to members: www.iamat.org/doctors_clinics.cfm. In addition, the Joint Commission International maintains a list of accredited, certified health care facilities: www.jointcommissioninternational.org.

Health Kit

Medications for chronic conditions and prevention of disease states specific to regions of travel should be procured before initiation of travel. Individuals with preexisting conditions or allergies should consider wearing a medical alert bracelet or card in their wallet. See **Table 1** for a list of suggested travel health kit items.

Table 1
Health kit item checklist

Prescription Medications	Over-the-Counter Medications	Injury/Illness Prevention
Regular medications	Tylenol	Insect repellant for skin and clothing[a]
Diarrheal antibiotics	Aspirin	Bed net[a]
Antimalarial[a]	Ibuprofen	Alcohol-based sanitizer, hand wipes
Medication for altitude sickness[a]	Antacid	Latex condoms
Contact lenses/glasses[a]	Laxative	Ear plugs
Epinephrine pen[a]	Oral rehydration	Safety equipment (helmet, child safety seat)
Diabetes testing supplies and insulin[a]	Loperamide	Sunscreen
Needles or syringes[a]	Antihistamine	Water purification tablets
Medical bracelet or necklace[a]	Decongestant	
Preexposure or postexposure HIV medications[a]	Cough suppressant or drops	
	Sleep aid	
	Saline eye or nose drops	

Abbreviation: HIV, human immunodeficiency virus.

[a] If indicated.

Data from Centers for Disease Control and Prevention. CDC yellow book 2018: health information for international travel. New York: Oxford University Press; 2017.

Providers should recommend travelers carry documentation of the following:

- Health insurance, supplemental insurance,
- Proof of vaccinations,
- List of medications and preexisting conditions, and
- Contact card with emergency contact, location of travel, hospitals and clinics, US embassy or consulate number, health care provider contact information.

Important Travel Risks

The World Health Organization has cited that, among deaths in travelers, 18% to 24% are caused by injuries, whereas only 2% are caused by infectious disease.[1]

Motor vehicle safety

Among US travelers in foreign countries, motor vehicle accidents are the leading cause of death, making up approximately 27% of all nonnatural deaths in 1 study.[1] Contributing factors include lack of familiarity with infrastructure in the area of traveled, lack of seat belt use, alcohol use, travel fatigue, poor visibility, and increased risk for road-related accidents.[1] Prevention strategies include using seatbelts and child safety seats, avoiding night-time driving, increasing awareness of driving hazards, using helmets when driving motorcycles or motorbikes, avoiding alcohol or cellphone use before or during driving, using marked taxis for travel, avoiding travel in overcrowded buses, and remaining alert while crossing streets.[1]

Swimming

Drowning is the fourth leading cause of death of international US travelers.[1] Avoidance of swimming alone and the use of a life jacket with water-related activities should be encouraged. Swimming should be avoided when local water conditions or currents are unknown and if a traveler has recently used alcohol.

Crime and violence

Of nonnatural death causes in foreign travelers, 21% can be attributed to crime and violence.[1] Clinicians should encourage travelers to familiarize themselves with crime trends in the areas they are traveling to. Information can be accessed from the Overseas Security Advisory Council website (www.osac.gov). Travelers can also familiarize themselves with security updates by accessing the Department of State's Bureau of Consult Affairs recommendations for travel safety at http://travel.state.gov. Special precaution should be taken to protect against pickpocketing and individuals should attempt to keep money worn under clothing secured to the neck or waist. Travelers should limit traveling alone or at night time, keep all valuables secure, keep all doors and windows locked, use recommended safe modes of transportation, and avoid resistance if confronted in a robbery. The nearest US embassy should be contacted if concerns related to crime, violence, accidents, medical concerns, or specific travel questions arise.

Counterfeit, adulterated, or expired medications

Travelers should be educated about the risks of procuring medications while traveling including but not limited to medication side effects secondary to use of inappropriately compounded medications, counterfeit medications, and use of uncommon medication additives.[1] Clinicians should recommend obtaining all medications before travel to ensure that individuals are using authentic medications with known side effects and appropriate dosing.

Infections While Abroad

Immunizations

Maintenance of an accurate immunization history is necessary to provide adequate protection for the traveler. Immunization records should be obtained and reviewed and, if unreliable, titers for measles, mumps, rubella, and hepatitis A should be obtained. Sufficient time should be taken before travel to ensure travel-specific vaccines can be administered and appropriate immunity achieved (**Table 2**). The risks and benefits of immunizations should be discussed. In addition, vaccines with waning immunity should be addressed as well, especially in the case of immunocompromised travelers. Assessing return travel to similar areas with the next 1 to 2 years from the initial trip will help clinicians to assess the need for specific immunizations. Travelers should be given an updated immunization record to travel with. Country-specific recommendations for vaccines can be accessed by clinicians at the Centers for Disease Control and Prevention (CDC) travel website (https://wwwnc.cdc.gov/travel).

Malaria

Several important diseases are transmitted by mosquitos, of which malaria is among the most important. Most of the 1700 cases of malaria diagnosed in the United States annually are among returned travelers.[1] **Box 2** outlines strategies for malaria prevention.

From dawn to dusk, mosquitoes that transmit Dengue, Yellow Fever, Zika, and Chikungunya are active and bite whereas, from dusk to dawn, mosquitoes that carry malaria, West Nile, and Japanese encephalitis are active. Providers should review the CDC's Malaria Maps, and Malaria Information by Country Table and take note of the special considerations mentioned on the drug selection guide: https://www.cdc.gov/malaria/travelers/drugs.html.

Antimalarials should always be purchased before travel, because in some countries drugs that are sold may be counterfeit.[1] Clinicians should also warn travelers that if symptoms of malaria occur, including flulike illness while traveling or after returning home, immediate medical attention should be sought. Antimalarials alone do not prevent transmission and should be used in conjunction with preventive measures, including repellants for skin and clothing in addition to appropriate clothing and mosquito netting.[1,6]

Traveler's diarrhea

Traveler's diarrhea often occurs suddenly with loose, frequent stools in about 30% to 70% of travelers.[7] Poor food handling practices are thought to put travelers at highest risk for traveler's diarrhea. Preventative measures include specific food and beverage selection, frequent handwashing, frequent use of alcohol-based hand sanitizers with greater than 60% alcohol content, and consideration of vaccination against typhoid and hepatitis A.[8] **Table 3** contains recommendations for traveler's diarrhea treatment based on severity.

Respiratory illness

Respiratory illness occurs in 20% of returning travels, with upper respiratory infections being the most common respiratory illness. Risks include exposures in hotels, cruise ships, aircrafts and tour group. Individuals with comorbidities including asthma and chronic obstructive pulmonary disease are at higher risk for respiratory illnesses.[1] Prevention tips include minimizing contact with individuals with cough or congestive symptoms, frequent handwashing, and vaccination before travel. Viral etiologies such as rhinovirus, are more common causal

Table 2
Travel vaccines, including routine vaccines of high priority in travelers

Vaccine	Indication	Administration
Hepatitis A	All travelers ≥1 y of age	2 doses
Hepatitis B	All travelers	• 3 doses • Administer ≥6 mo before travel
Influenza	All travelers ≥6 mo of age	• 1 dose • Booster: annual
Tetanus, diphtheria, pertussis (Td, Tdap)	All travelers	• Td every 5 y for adult travelers • Tdap: Adolescents age 11–18 y, or age ≥19 if no Tdap administered prior • Pregnancy between 27 and 36 wk gestation
Cholera	• Age 18–64 • Individuals at high risk (health care workers)	• 1 dose • Booster: undetermined
Japanese encephalitis	• Travelers to high-risk areas (Asia, Western Pacific) • >1 mo travel • Travel to rural areas	• 2 doses on days 0 and 28 • Booster: 1 y
Meningococcal meningitis	• Travelers to specific areas of Africa associated with meningitis • Travelers to crowded spaces (dormitories)	• Age 2–55, 1 dose MenACWY • Age ≥56 who have never received the vaccine, 1 dose MPSV4 • Booster: 5 y after last dose if individual received dose at age ≥7
Polio	• Travelers to countries with increased prevalence of polio (eg, Pakistan, Afghanistan, Nigeria)	• 4 dose childhood series (2, 4, 6–18 mo, and 4–6 y of age) Plus • Single dose inactivated virus for all adults ○ Booster: not indicated ○ Administer 4 wk to 12 mo before travel
Rabies	• Travelers to remote, rural areas • Long-term travelers • Wildlife workers, spelunkers	• 3 doses on days 0, 7, 21 or 28 • Booster: If at high risk, check serology every 2 y, and administer booster if low antibodies • If low risk: No booster indicated
Typhoid fever	• All travelers to low-income nations, rural travel, or high-risk areas • Duration of travel >1 mo	• Oral: 1 tab taken every other day for 7 d for 5-y protection • IM: 1 dose for 2 y of protection • Booster: repeat oral or IM at appropriate interval
Yellow fever	• Travelers to tropical Africa and South America • Not indicated for travelers <9 mo of age	• Single dose • Contraindicated in immunosuppressed individuals • Increased risk of adverse events for first time recipients age >60 y

Abbreviations: IM, intramuscularly; MPSV4, meningococcal polysaccharide vaccine.
Data from Refs.[1–5]

agents, although coronaviruses (Middle East respiratory syndrome in the Arabian Peninsula) and avian influenza (Asia) should also be included in a clinician's differential.[1] Viral causes can also put individuals at risk for superimposed bacterial infections.

Box 2
Strategies to prevent malaria

Long-sleeved pants, shirts, and socks

Permethrin-treated clothing

Permethrin-treated bed nets

Mosquito repellants (≥20% DEET)

Chemoprophylaxis

Data from Alpern JD, Dunlop SJ, Dolan BJ, et al. Personal protection measures against mosquitoes, ticks, and other arthropods. Med Clin North Am 2016;100(2):303–16.

Bloodborne illness

Travelers should be cautioned against obtaining tattoos and piercings in low-income areas of the world, because the risk of human immunodeficiency virus and hepatitis C transmission secondary to use of unclean needles is high in these areas.[1]

Exposure to human immunodeficiency virus

Travelers should be cautioned about the risk of human immunodeficiency virus specifically associated with certain practices, including needle sharing, risky sexual behaviors, or exposure in a health care setting. In the case of health care workers or individuals who plan to be involved with high-risk behaviors, the physician should discuss having postexposure prophylaxis available to them in case of exposure. Preexposure prophylaxis can reduce the risk of human immunodeficiency virus infection by up to 70%.[1] Immediate attention by a physician should be sought out if concern for exposure arises to ensure appropriate counseling and the possible need for postexposure prophylaxis.

Sexual health

Travelers should be cautioned against high-risk sexual activities that may lead to the transmission of sexually transmitted infections, unwanted pregnancy, or bloodborne infections. Consistent contraceptive methods should be used in a traveler who does

Table 3
Treatment of traveler's diarrhea based on severity

Mild: tolerable diarrhea, does not interfere for activity, often resolves within 2–5 d	Moderate: distressing diarrhea, interferes with activity	Severe: incapacitating diarrhea, prevent activity
Loperamide or bismuth subsalicylate; hydration	Hydration Antibiotics may be used including 1. Fluoroquinolones 2. Azithromycin 3. Rifaximin Loperamide can be used in conjunction with antibiotics or as a monotherapy.	Emergency care Antibiotics should be used including 1. Azithromycin (preferred) 2. Fluoroquinolones or rifaximin (can be used for nondysenteric, severe traveler's diarrhea).

Data from de Saussure PPH. Management of the returning traveler with diarrhea. Therap Adv Gastroenterol 2009;2(6):367–75.

decide to be sexually active. Health care resources overseas should be provided for travelers, including reputable clinics to seek out if concerns for sexually transmitted infections and/or pregnancy arise.

Venous Thrombosis and Embolism

Travelers at increased risk for development of deep venous thrombosis who are traveling long distances should be advised to walk as often as possible, use appropriately fitted compression stockings that provide 15 to 30 mm Hg at the ankle, hydration, and to perform calf exercises as often as possible. The use of aspirin for deep venous thrombosis prevention is not recommended.[1]

Jet lag

When traveling between time zones, travelers can often develop a mismatch between their natural 24-hour circadian rhythm and the time of day. When traveling through more than 3 time zones, sleep-related difficulty, mood changes, mental clarity, and gastrointestinal disturbance can occur with jet lag. During the pretravel assessment, the clinician can discuss this in detail with the traveler and set expectations. Changes to diet and physical activity, sunlight exposure, the use of melatonin and melatonin-receptor analogs, consideration of hypnotic medications with discussion of risks and benefits, and a combination of these therapies can be discussed with the traveler before initiation of travel. Avoidance of alcohol as a sleep aid should be discussed with travelers as well as encouraging hydration during the trip.

SPECIAL POPULATIONS

Immunocompromised Travelers

According to the 2018 CDC Yellow Book, immunocompromised travelers make up 1% to 2% of travelers seen in US travel clinics.[1] The immunocompromised status may be due to a medical condition, medication, or treatment. Common examples are noted in **Box 3**.

Special points to remember for immunocompromised travelers:

- Response to vaccines may be limited.
- Live vaccines are contraindicated in severely immunosuppressed individuals.

Box 3
Examples of immunocompromised travelers

Chronic oral steroids greater than or equal to 20 mg per day of prednisone or equivalent

Posttransplant on medication

Renal failure on dialysis

Current or recent (<3 months) chemotherapy

Asplenia

Chronic liver disease

Human immunodeficiency virus infection with a CD4 count of less than 200

Autoimmune diagnosis on biologics

Data from Centers for Disease Control and Prevention. CDC yellow book 2018: health information for international travel. New York: Oxford University Press; 2017.

- Increased risk of foodborne and waterborne infections (*Salmonella*, *Shigella*, *Campylobacter*, *Giardia*, *Listeria*, and *Cryptosporidium*).
- Avoid swallowing water during water-based activities.
- Avoid eating raw seafood.

Traveling while pregnant

Key points for pregnant travelers[1]:

- Obstetric emergencies are sudden and can be life threatening. Having an emergency plan and access to appropriate obstetric care is recommended.
- Before booking, check with the airline or cruise ship regarding any limitations on travel. Some limit travel based on gestational age.
- During air travel the cabin is pressurized to 6000 to 8000 feet. This will not affect a fetus in a normal pregnancy, but could cause fetal problems in women with cardiovascular conditions, sickle cell disease, or severe anemia (hemoglobin <8 g/dL).
- During air travel, frequent stretching, walking, and isometric exercises are recommended to decrease risk of deep venous thrombosis, which is increased in pregnancy.
- Treatment of choice for traveler's diarrhea is hydration and, if indicated, azithromycin.
- Owing to the risk of birth defects, the CDC recommends that pregnant women do not travel to areas where Zika is present. If travel cannot be avoided, avoidance of mosquito bites is extremely important. More information can be found at the CDC Zika website (http://www.cdc.gov/zika/pregnancy/index.html).
- Most live virus vaccines are contraindicated during pregnancy except for yellow fever, for which pregnancy is considered a precaution by the Advisory Committee on Immunization Practices.
- Malaria is more serious in pregnant than in nonpregnant women and puts both the mother and the fetus at risk. Malaria chemoprophylaxis is highly encouraged. Chloroquine and mefloquine (depending on the region) are the drugs of choice. Doxycycline and primaquine are contraindicated due to possible effects on the fetus, whereas atovaquone-proguanil lacks available safety data.

Traveling with Children

According to the CDC, an estimated 1.9 million American children travel internationally each year.[1] Typically, children are exposed to the same risks as adults, but the consequences can be more severe and children are less likely to receive travel advice than adults.

The most common health problems among child travelers were[1]:

- Diarrheal illnesses,
- Dermatologic diagnosis (animal/insect bites, cutaneous larva migrans, sunburn),
- Febrile illnesses (malaria), and
- Respiratory disorders.

Key points when traveling with children[1]:

- Diarrheal diseases are more common and can be more likely to cause dehydration. Treatment should focus on oral rehydration solution and if indicated antibiotics for traveler's diarrhea. Children should be given a nonfluoroquinolone such as azithromycin, which can be given as a single daily dose (10 mg/kg) for 3 days.

- Car crashes and drowning are the leading 2 causes of death in children while traveling. Car seats are often not available so parents should bring their own. Life vests should always be used around water.
- Avoidance of mosquito and other bug bites is critical, especially in malaria endemic areas. Repellents with DEET should not be used on infants less than 2 months and after 2 months, only repellents with 30% or less DEET should be used.
- Malaria prophylaxis is also recommended for children in malaria endemic areas. Dosing will need to be adjusted based on weight. Doxycycline should not be given to children less than 8 years old because of the risk of teeth staining, and atovaquone-proguanil should not be used in children weighing less than 5 kg.
- Rabies is more common in children owing to less fear in approaching animals. If there is exposure to any animal bite, seek medical care immediately. Consider rabies vaccine if planning to spend more than 3 months in endemic area.

Visiting Friends and Relatives

A traveler who is returning home to visit friends or relatives is considered a visiting friends and relatives traveler. Today, visiting friends and relatives travelers make up more than one-half of all international travelers.[1] They are least likely to seek pretravel advice and more likely to develop problems while traveling because they typically stay longer at a destination, eat local food in people's homes, and often do not take the same precautions as other travelers.

Key points for visiting friends and relatives travelers[1]:

- Malaria risk is 8 to 10 times higher than for a non-visiting friends and relatives traveler. Malaria immunity weans after living outside of a malaria endemic region, so when returning to the endemic region, malaria prophylaxis and mosquito bite avoidance is recommended. Malaria prevention medication should be started several weeks before international travel.
- Foodborne illnesses are more common and any immunity to local bacteria can also wean with time after living outside the community. Avoidance of food at room temperature, raw fruits and vegetables, tap water, and ice from tap water is recommended.
- These travelers are also at increased risk of tuberculosis and sexually transmitted diseases.

POSTTRAVEL ASSESSMENT

General Approach

Worldwide, 8% of travelers develop illnesses severe enough to seek a health care provider.[1] The majority of travelers present to primary care for posttravel illnesses. Data gathered from a directed history can elucidate the cause of a traveler's symptoms. Knowledge of the travel itinerary and incubation periods is essential to narrowing down a differential diagnosis based on geography and timing after travel.

Common Syndromes

According to a large-scale study by GeoSentinal, a global surveillance network, the most common syndromes in returned travelers are gastrointestinal (34.0%), febrile (23.3%), and dermatologic (19.5%).[9]

Table 4
Top infectious causes of persistent traveler's diarrhea listed in decreasing order of frequency in each column

Protozoa	Bacteria
1. *Giardia lamblia* (most common overall)	1. *Clostridium difficile*
2. *Entamoeba histolytica*	2. *Campylobacter jejuni*
3. *Cryptosporidium parvum*	3. *Salmonella* spp.
4. *Cyclospora cayatanensis*	4. *Shigella* spp.

Data from de Saussure PPH. Management of the returning traveler with diarrhea. Therap Adv Gastroenterol 2009;2(6):367–75.

Gastrointestinal Illness

Many cases of traveler's diarrhea can be treated empirically, and 80% to 90% of cases are bacterial. See **Table 4** for top infectious causes of persistent traveler's diarrhea. Azithromycin should be preferentially used in travelers returning from South and Southeast Asia owing to the increasing resistance to fluoroquinolones.[7] Severe symptoms, including fever, tenesmus, and gross blood, should prompt further testing, including stool culture. If stool is tested for ova and parasites, 3 or more stool specimens should be collected to increase sensitivity.[7] Some organisms, such as *Cryptosporidium* and *Cyclospora*, require specific testing. Testing for *Clostridium difficile* should be performed if the traveler recently used antibiotics or malaria chemoprophylaxis. A minority of travelers have persistent diarrhea lasting more than 2 weeks, which can be from (1) persistent infection or an untreated coinfection, (2) postinfectious processes like postinfectious irritable bowel syndrome, which can be diagnosed using the Rome criteria, or (3) unmasking of a previously undiagnosed gastrointestinal disease.[7]

Febrile Illness

Fever in a returned traveler needs to be evaluated immediately owing to the potential for a rapidly progressing, life-threatening illness like malaria. Those who arrive from areas where malaria is endemic should be evaluated with thick and thin blood films and malarial antigen tests, if available. Blood smears should be repeated if suspicion is high and initial smears are negative. Other important causes to consider include dengue fever, enteric fever (typhoid, paratyphoid), and rickettsial diseases (eg, African tick bite fever), among others. It is also important to keep in mind other common causes of fever including influenza, which occurs year round in tropical climates. See **Table 5** for the top febrile illnesses to consider in returned travelers based on location. Those with fever accompanied by alarming symptoms should be thoroughly

Table 5
Top febrile illnesses to consider in returned travelers based on location

Febrile Illness	Location
Malaria (21%)	Sub-Saharan Africa, Oceania (especially Papua New Guinea)
Dengue fever (6%)	Southeast Asia, Central and South America, Caribbean
Enteric fever (2%)	South Central Asia (ie, Indian subcontinent)
Rickettsioses (2%)	Southern Africa (especially African tick bite fever in South Africa)

Data from Leder K, Torresi J, Libman MD, et al. GeoSentinel surveillance of illness in returned travelers, 2007–2011. Ann Intern Med 2013;158(6):456–68.

Box 4
Top 10 tropical[a] dermatologic conditions to consider in returned travelers

1. Cutaneous larva migrans
2. Arthropod bite
3. Myiasis (bot fly, tumbu fly)
4. Injuries including animal bites
5. Scabies
6. Cutaneous leishmaniasis
7. Tungiasis
8. Swimmer's itch
9. Rickettsial infection
10. Dengue fever

[a] Many cosmopolitan causes (eg, cellulitis) excluded from this list.
Data from Lederman ER, Weld LH, Elyazar IR, et al. Dermatologic conditions of the ill returned traveler: an analysis from the GeoSentinel Surveillance Network. Int J Infect Dis 2008;12(6):593–602; and O'Brien BM. A practical approach to common skin problems in returning travellers. Travel Med Infect Dis 2009;7(3):125–46.

evaluated as soon as possible, which may be best conducted in the emergency department. In 25% to 40% of patients with fever, no specific cause was identified.[9,10]

Dermatologic Conditions

Rashes are common in returned travelers. One of the most common skin findings is the classic pruritic migratory serpiginous rash of cutaneous larva migrans.[11] Exposure occurs when skin (eg, bare feet) comes in contact with contaminated sand or soil. Animal bites and scratches, most commonly received from dogs and monkeys, are also common in returned travelers and may require rabies postexposure prophylaxis in up to 12% of cases.[9] See **Box 4** for the top tropical dermatologic conditions to consider in returned travelers.

Screening Asymptomatic Returned Travelers

Currently, there are no CDC guidelines for asymptomatic returned travelers.

Table 6
Common medications for altitude illness

Drug	Indication	Dose
Acetazolamide	AMS, HACE prevention	125 mg PO BID starting 12 h prior
	AMS treatment	250 mg PO BID
Dexamethasone	AMS, HACE prevention	4 mg PO every 12 h
	AMS, HACE treatment	8 mg PO once, then 4 mg PO every 6 h
Nifedipine	HAPE prevention/treatment	30 mg SR PO every 12 h

Abbreviations: AMS, acute mountain sickness; BID, twice per day; HACE, high altitude cerebral edema; HAPE, high altitude pulmonary edema; PO, by mouth.
Data from Centers for Disease Control and Prevention. CDC yellow book 2018: health information for international travel. New York: Oxford University Press; 2017.

Box 5
Recommendations to prevent motion sickness

Air	Sit at window seat over wing and look out window
Motor vehicle	Sit in front seat, semireclining position, avoid head motion, view horizon
Sea	Chose cabin in middle of ship near the waterline

Data from Centers for Disease Control and Prevention. CDC yellow book 2018: health information for international travel. New York: Oxford University Press; 2017.

SPECIAL CIRCUMSTANCES SECTION

Altitude Illness

Altitude illness is most common at altitudes of 8200 feet (2500 m) or more, although it can occur at lower elevations.[1] The main issue in altitude sickness is hypoxemia, which is exacerbated during sleep. Respiratory depressants such as alcohol and sleep medications should be avoided; acetazolamide and stimulants may speed acclimatization. Moderate-to-vigorous physical activity can exacerbate hypoxemia and should be avoided for the first 48 hours. Physical conditioning does not predict acclimatization. Contraindications to traveling to altitude include severe heart or lung disease, sickle cell anemia, high-risk pregnancy, and cerebral pathology.

There are 3 altitude syndromes: acute mountain sickness, high altitude cerebral edema, and high altitude pulmonary edema. Treatment involves immediate descent, medications (**Table 6**), oxygen supplementation, and pressurization bags if rapid descent is not feasible.

SCUBA Diving

SCUBA-related illnesses can be divided into 2 categories: barotrauma and decompression illness. The primary risk factors are dive depth, bottom time, and speed of ascent.[1] Decompression illness can occur even when all precautions are taken. The Divers Alert Network is a resource that can be accessed by both divers and health care providers at http://www.diversalertnetwork.org/ or at their 24-hour emergency hotline (919-684-9111).

Motion Sickness

Motion sickness is not a true pathology, but a normal response to the external stimulation that is created by the vestibular system. The most common forms are sea sickness, motor vehicle sickness, and air sickness. It has been noted to be more common in women and less common in frequent travelers either owing to habituation or self-selection. See **Box 5** and **Table 7** for recommendations for motion sickness prevention and management.

Table 7
Common preventive medications for motion sickness

Drug	Dose	Side Effects
Dimenhydrinate (Dramamine)	50 mg PO every 4–6 h	Sedation
Meclizine (Antivert)	25–50mg 1 hour before travel, every 24 h	Mild sedation
Scopolamine patch (Transderm Scop)	1 patch applied every 72 h	Dry mouth, blurry vision

Abbreviation: PO, by mouth.

Data from Centers for Disease Control and Prevention. CDC yellow book 2018: health information for international travel. New York: Oxford University Press; 2017.

Box 6
Mass gathering examples

Measles exposure at amusement parks in the United States.

Meningitis (meningococcal vaccine is required for the Hajj) and respiratory infections (Coronavirus) among Hajj pilgrims.

Concern for Zika at Rio, Brazil Olympics.

Exposure to flu during sports events, concerts, conventions.

Mass Gatherings

Defined as at least 1000, but can be more than 25,000, people gathered at a specific location for a specific purpose.[1] Often these gatherings can strain the local resources and increase the risk of disease transmission among the attendees. Common challenges among attendees are hypothermia, heat exhaustion, dehydration, sunburn, but worsening of underlying chronic diseases (eg, heart failure, diabetes) also occurs. And at times there can be other dangers such as unsafe transportation, stampedes, collapse of structures, fire, terrorism and other forms of violence. See **Box 6** for examples of mass gatherings.

REFERENCES

1. Centers for Disease Control and Prevention. CDC yellow book 2018: health information for international travel. New York: Oxford University Press; 2017.
2. Centers for Disease Control and Prevention. Vaccines & immunizations. 2017. Available at: https://www.cdc.gov/vaccines/terms/usvaccines.html. Accessed February 1, 2018.
3. Amicizia D, Domnich A, Panatto D, et al. Epidemiology of tick-borne encephalitis (TBE) in Europe and its prevention by available vaccines. Hum Vaccin Immunother 2013;9(5):1163–71.
4. Centers for Disease Control and Prevention (CDC). Tick-borne encephalitis among US travelers to Europe and Asia—2000-2009. MMWR Morb Mortal Wkly Rep 2010;59(11):335–8.
5. Lo Re V 3rd, Gluckman SJ. Travel immunizations. Am Fam Physician 2004;70(1):89–99.
6. Alpern JD, Dunlop SJ, Dolan BJ, et al. Personal protection measures against mosquitoes, ticks, and other arthropods. Med Clin North Am 2016;100(2):303–16.
7. de Saussure PP. Management of the returning traveler with diarrhea. Therap Adv Gastroenterol 2009;2(6):367–75.
8. Innis BL, Snitbhan R, Kunasol P, et al. Protection against hepatitis A by an inactivated vaccine. JAMA 1994;271(17):1328–34.
9. Leder K, Torresi J, Libman MD, et al. GeoSentinel surveillance of illness in returned travelers, 2007–2011. Ann Intern Med 2013;158(6):456–68.
10. Thwaites GE, Day NP. Approach to fever in the returning traveler. N Engl J Med 2017;376(6):548–60.
11. Lederman ER, Weld LH, Elyazar IR, et al. Dermatologic conditions of the ill returned traveler: an analysis from the GeoSentinel Surveillance Network. Int J Infect Dis 2008;12(6):593–602.