permitted by local laws, long-term travelers can have visiting friends or relatives, or other members of their company or organization, bring additional medication.

### Support Groups

Currently sober travelers with substance use disorders might want to attend Alcoholics Anonymous (AA), Narcotics Anonymous (NA), or comparable meetings while overseas. AA and NA websites provide lists of meetings by country (see Sec. 3, Ch. 5, Substance Use & Substance Use Disorders, for more details). Travelers should confirm availability and language of meetings in advance.

### Traveling with Psychotropic Medications

Customs regulations in some countries prohibit importation of medications used to treat mental health disorders. Customs officials might confiscate Schedule II drugs (www.dea.gov/drug-information/drug-scheduling) commonly used to treat attention deficit disorder (e.g., narcotics or stimulants, including amphetamines and methylphenidate). Rules vary by country, and travelers should check with the host country's embassy before traveling. Health care providers, including pharmacists, in the destination country might be able to provide guidance to colleagues about medication restrictions.

Advise travelers to carry medications in their original containers, along with a letter from the prescribing physician indicating the medical reason for the prescription. Remind them that customs officials might seize their medication even if they adhere to these guidelines.

## STRESSORS & COUNTERMEASURES

### Culture Shock

Nearly anyone visiting a foreign culture can experience culture shock. With culture shock, travelers lose their sense of mastery over their environment, and even routine tasks of everyday life become a challenge. Separation from family and support systems, unfamiliar behavior and language, and new threats to health and safety can aggravate culture shock. Foreknowledge of the phenomenon will help minimize the stress experienced, as will advance study of the culture, language, and health and security threats and possible countermeasures.

For most travelers, culture shock is a limited syndrome that does not usually go beyond variations in mood, energy, sleep, and attitudes toward the host country culture, like an adjustment disorder. Advise travelers that symptoms lasting >12 months could require assessment. In addition, suggest regular exercise, moderation in intoxicant use, adequate sleep and nutrition, and relaxation techniques (e.g., meditation, yoga, biofeedback) to help reduce the stress associated with international travel.

### Jet Lag

Jet lag is a common, manageable stressor for most international travelers. Travelers and travel health providers can find more details about this condition and what to do about it in Sec. 8, Ch. 4, Jet Lag.

### Travel During a Pandemic

The coronavirus disease 2019 (COVID-19) pandemic has exacerbated travel-associated stress and concerns over becoming a possible conduit for disease transmission. Any steps travelers can take (see Box 2-13) to gain some measure of control over their personal health and to mitigate COVID-19–related risk factors might help assuage some of this stress. Recommended information resources for travelers include the Centers for Disease Control and Prevention website (www.cdc.gov/coronavirus/2019-ncov/travelers/); the US Department of State website (https://travel.state.gov/content/travel/en/traveladvisories/COVID-19-Country-Specific-Information.html); and/or the embassy or ministry of health website for the traveler's destination.

Advise travelers to review a variety of travel health insurance options and to consider purchasing policies that cover cancellations of travel and that provide for emergency medical care and medical evacuations due to COVID-19. Remind travelers that their travel experience could differ from what they had planned or expected; to have

### BOX 2-13 Addressing potential stressors associated with travel during the coronavirus disease 2019 (COVID-19) pandemic: a checklist for travelers

- ☐ Be up to date with your COVID-19 vaccinations (including all recommended boosters) at least 2 weeks before travel.
- ☐ Do your research. Be prepared to comply with all requirements (e.g., pretravel vaccination and testing, post-arrival quarantine and providing contact information) for your international travel destination and for the United States; be aware that requirements can change between when you book your travel and when travel takes place.
- ☐ Get tested for COVID-19 before departure if required by your destination or recommended by current guidance.
- ☐ Obtain accepted formats for demonstrating proof of vaccination and negative test results; be prepared to provide before departure or on arrival.
- ☐ Identify (before travel, if possible) COVID-19 testing locations at your destination.
- ☐ Have contingency plans (e.g., alternative housing arrangements, reserve budget) in case of travel delays, cancellations, or itinerary modifications.
- ☐ Use personal protective measures (e.g., mask wearing) throughout your journey, including at places of congregation (e.g., airports, bus stations, train stations), on various modes of transportation (e.g., airplanes, buses, ships, trains), and at your destination.



contingency plans in place in case of travel delays or interruptions; and to avoid crowded places, particularly in destinations where vaccine coverage is low or case rates and hospitalizations due to COVID-19 are high. For travelers with a low level of risk tolerance, those whose underlying health conditions place them at greater risk for severe COVID-19, or those who are considering travel with young, vaccine-ineligible children, it also might be appropriate to discuss and counsel delaying travel until some future date.

## POSTTRAVEL MENTAL HEALTH ISSUES

Travelers who witness or who are directly involved in traumatic or life-threatening events can experience acute stress disorder (ASD) or posttraumatic stress disorder (PTSD). Examples of such events include motor vehicle accidents, assault or rape, terrorist incidents, natural disasters, or war. The work performed by humanitarian aid workers, disaster relief workers, and war correspondents increases their risk of developing subclinical or overt ASD or PTSD. For travelers who have had traumatic experiences, clinicians should inquire about recurrent, intrusive recollections, distressing dreams, and feeling as if the event is happening repeatedly; avoiding thoughts, feelings, activities, places, or people that lead to memories of the event; diminished interest in activities, inability to experience positive emotions, or an inability to remember significant details of the event; and difficulty sleeping or concentrating, irritability, or an exaggerated startle response.

Symptoms of PTSD can occur months or even years after an event. Thus, clinicians should educate returning travelers about the possibility of having such symptoms in the future. If there is concern about a traveler's possible reaction to a traumatic event, refer them to a mental health professional.

People who have lived away from their home culture for extended periods of time (e.g., expatriate employees and their families) can experience reverse culture shock, which includes symptoms and a clinical course like that of culture shock. For example, first-year college students who spent their high school years abroad might find their "home" culture strange, compared with their fellow students who could be uninterested in their overseas experiences. Adults returning from abroad can experience a decreased standard of living or can find their "home" culture changed in unanticipated ways.

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# LGBTQ+ TRAVELERS

Patricia Walker

Lesbian, gay, bisexual, transgender, queer (LGBTQ+) travelers share many of the same hopes and desires as other people when traveling: to have a safe, happy, and memorable trip. LGBTQ+ travelers have similar risk-taking behaviors as other travelers, which are influenced more by age, gender, socioeconomic status, mental health considerations, and substance use, rather than sexual attraction or identity. LGBTQ+ travelers face some unique risks, however, and clinicians counseling them should tailor their advice accordingly.

## OVERVIEW

LGBTQ+ travelers contribute greatly to economic development and can convey powerful positive messages related to human rights worldwide. The United Nations World Trade Organization Second Global Report on LGBTQ+ Tourism in 2017 acknowledged that LGBTQ+ persons travel more frequently, demonstrate higher than average spending patterns, and demonstrate brand awareness and loyalty. LGBTQ+ travelers have long been aware of gay-friendly destinations in the United States, including Provincetown, Massachusetts, and Fire Island, New York; and in Europe, including Mykonos, Greece, and Sitges, Spain. Human rights have improved in some countries, and the international tourism industry has become more responsive to LGBTQ+ travelers; many international travel destinations are now recognized as gay friendly.

Open for Business is a coalition of leading global companies dedicated to LGBTQ+ inclusion, and recognizes the powerful advantages of inclusive, diverse societies that improve economic, business, and individual performance. The travel industry has long recognized that marketing to the LGBTQ+ community makes economic sense; the International Gay and Lesbian Travel Association was founded in 1983, and provides free travel resources and information, while working to promote quality and safety for LGBTQ+ travelers worldwide.

LGBTQ+ travelers are as diverse as other travelers in terms of how, where, and with whom they prefer to travel; risk-taking behavior; gender

expression; skin color; citizenship; and income. In a 2015 study conducted by Global Marketing, behavior of gay men travelers differed from lesbian travelers in several ways: gay men were more likely to travel with other adults, visit gay bars, and have more disposable time and income; lesbian travelers were more likely to travel with family, be more interested in child-friendly rather than LGBTQ+ friendly environments, and have travel preferences and budget constraints more closely aligned to people who are not LGTBQ+ than to gay men. People who are transgender might be more likely to travel for medical reasons, seeking high-quality and affirmational medical and surgical care.

Technology also has changed how LGBTQ+ travelers interact with others while traveling. In one study, 31% of gay men use dating apps while traveling, compared with 4% of lesbian travelers and 15% of all Americans. Men who used the internet to set up dates prior to travel reported far more sexual partners and were much more likely to report having sex with a new partner.

There is no single standard message for counseling the LGBTQ+ traveler (see Box 2-14). During the pretravel consultation with LGBTQ+ travelers, include routine travel advice and specific counseling tailored to the itinerary and planned activities (see Sec. 2, Ch. 1, The Pretravel Consultation). Focused counseling for the LGBTQ+ traveler should include, at a minimum, a discussion of infectious disease risks, legal considerations, safety and security issues, and screening and counseling for potential mental health problems and substance use disorders.

## INFECTIOUS DISEASE COUNSELING

A paucity of research data on LGBTQ+ travelers has been published; a 2021 English language, no date filter, PubMed search found only 41 articles, 30 of which focused on men who have sex with men (MSM) and 2 of which were case reports concerning transgender travelers (1 on genital dermatitis, the other on deep venous thrombosis). Studies have been reported on MSM from Australia, Belgium, Canada, China, Denmark, India, Sweden, Vietnam and those going to Mardi Gras in New Orleans or Key West, Florida, but no studies specific to lesbian travelers have been published.

A 2019 review article on MSM who travel provides advice for clinicians counseling this specific patient population. Studies on MSM behavior while traveling show mixed results—some engage in more high-risk sexual behavior during travel, and some less. A greater risk for acquisition of sexually transmitted infections (STIs) has been shown in MSM who travel, use social apps or illicit drugs, engage in unprotected anal intercourse, join mass gatherings (including Gay Pride), and engage in circuit parties.

In a meta-analysis of foreign travel and sexual behavior, the pooled rate of casual sex was 19.5% for all women and 24.8% for all men. In the same analysis, the rate of unprotected intercourse among women who had casual travel sex was 62.1% and 62.3% among men.

The US Preventive Services Taskforce recommends behavioral counseling for all sexually active adolescents and for adults who are at increased

### BOX 2-14 Counseling LGBTQ+ travelers: a checklist for clinicians

- ☐ Assess each patient's travel-related risk behaviors
- ☐ Ask direct questions regarding sexual identity and behavior
- ☐ Consider screening people at risk for hepatitis B virus, hepatitis C virus, and HIV infection per national guidelines
- ☐ Discuss diseases specific to sexual practices and use of gloves and dental dams
- ☐ Provide clear counseling and online resources (Table 2-13) regarding legal, cultural, and safety issues
- ☐ Provide direct advice on safer sex and sexually transmitted infection prevention, including consistent condom use and HIV preexposure and postexposure prophylaxis
- ☐ Provide nonjudgmental and detailed counseling specific to LGBTQ+ travelers' risks
- ☐ Update vaccines per schedules, including hepatitis A, hepatitis B, human papillomavirus, and others, as appropriate

risk for STIs. Provide nonjudgmental counseling to LGBTQ+ travelers. The Gay and Lesbian Medical Association has resources to assist clinicians counseling LGTBQ+ patients.

Counsel travelers that safe sex is proven to reduce the risk of receiving or transmitting chlamydia, gonorrhea, hepatitis A and B, HIV, human papillomavirus (HPV), pubic lice, and syphilis. Depending on a patient's sexual risk behavior, counsel them on the use of condoms, dental dams, and gloves to reduce risk for STIs. See Sec. 9, Ch. 12, Sex & Travel, for general counseling recommendations on sex and travel.

### Enteric Infections

Patients who engage in oral–anal sex might be unaware of their risk for acquiring enteric infections, both bacterial (e.g., *Salmonella*, *Shigella*) and parasitic (e.g., *Blastocystis* spp., *Dientamoeba fragilis*, *Giardia*). Counsel patients on use of dental dams and careful washing of hands and genitalia, before and after sex. Offer typhoid vaccination per national guidelines (see Sec. 5, Part 1, Ch. 24, Typhoid & Paratyphoid Fever).

### Hepatitis A

Hepatitis A virus (HAV) is transmitted via the fecal–oral route during person-to-person sexual contact and from contaminated food and water. Hepatitis A outbreaks have been reported among MSM. Counsel LGBTQ+ travelers on safer sex, including the use of dental dams, and recommend HAV vaccination.

### Hepatitis B

Hepatitis B virus (HBV) is transmitted via percutaneous or mucus membrane exposure to body fluids infected with HBV. MSM have a higher seroprevalence of HBV; offer vaccination to this group irrespective of travel plans. Consider screening for HBV infection in high-risk, previously unvaccinated travelers, including MSM.

### Hepatitis C

Hepatitis C virus is generally transmitted via parenteral routes but can be transmitted sexually. Hepatitis C outbreaks have been reported among MSM and have been associated with unprotected anal intercourse, genital ulcerative disease, and traumatic sexual practices (e.g., fisting [inserting a hand in the rectum]). Counsel patients on safer sex practices, including the use of condoms and gloves.

### HIV

Assess sexual risk behavior and counsel travelers, including people at risk for sexual assault, on use of preexposure prophylaxis (PrEP) and postexposure prophylaxis (PEP). Remind patients that long-term travel, particularly for work, might require HIV testing. Countries might deny entry to people with evidence of HIV infection, and carrying PrEP might be mistaken as evidence of such. See Sec. 5, Part 2, Ch. 11, Human Immunodeficiency Virus / HIV, and Sec. 3, Ch. 1, Immunocompromised Travelers, for additional information.

### Human Papillomavirus

Human papillomavirus (HPV) is highly prevalent among MSM. HPV infection is associated with penile, anal, and oropharyngeal cancers and precancers. Offer HPV vaccination per national guidelines.

### Invasive Meningococcal Disease

Invasive meningococcal disease (IMD) is a risk for travelers going to the African meningitis belt and among Hajj pilgrims (see Sec. 5, Part 1, Ch. 13, Meningococcal Disease). Another, less well-known group at risk for IMD are MSM, who may have higher carriage rates for *Neisseria meningitidis*. Potential risk behaviors for IMD include regularly visiting crowded venues; traveling to mass gatherings (e.g., Gay Pride festivals); using illegal drugs; and having multiple sexual partners. Recommend vaccination for HIV-positive travelers. Some local public health authorities have also recommended routine vaccination against meningococcal disease for MSM.

## LEGAL CONSIDERATIONS

LGBTQ+ travelers face unique legal issues and risks while traveling abroad. Many countries have made strides toward combating discrimination against LGBTQ+ persons, but many other countries continue to discriminate against and abuse LGBTQ+ persons. Over 70 countries still consider consensual same-sex sexual relations a crime that

can carry severe punishment, including the death penalty. Many countries do not legally recognize same-sex marriage or allow or recognize LGBTQ+ adoptions. Attitudes, even within countries with legal protections, will vary among people and communities where LGBTQ+ persons travel.

The United Nations (UN) has been addressing human rights abuses of the LGBTQ+ community since the 1990s. In a 2015 speech, UN Deputy Commissioner for Human Rights Flavia Pansieri summarized the abuses of the LGBTQ+ community, including murder, rape, mob attacks, abuse by police and prison officials, criminal sanctions, arrest and imprisonment, blackmail and harassment, forced medications and surgeries in medical settings to try to change sexual orientation, forced sterilization of people who are transgender, humiliation, discrimination, job loss, evictions, and refusal of medical treatment. Such issues are a reality in many countries, and clinicians should offer LGBTQ+ travelers resources on differing international laws, attitudes, and customs, and emphasize the realities of behavior constraints that can make a trip safer (Table 2-13).

Travel health providers also should remind LGBTQ+ travelers that they are subject to the



## Table 2-13 Online resources for LGBTQ+ travelers

| ORGANIZATION | RESOURCE | AVAILABLE FROM |
|---|---|---|
| EQUALDEX | Explore the progress of LGBTQ+ rights across the world | www.equaldex.com |
| Gay and Lesbian Medical Association | Resources for patients | www.glma.org/index.cfm?fuseaction=Page.viewPage&pageId=938&parentID=534 |
| International Gay and Lesbian Travel Association | | www.iglta.org |
| ILGA World: International Lesbian, Gay, Bisexual, Trans and Intersex Association | | https://ilga.org |
| National Alliance on Mental Illness | LGBTQI | www.nami.org/Your-Journey/Identity-and-Cultural-Dimensions/LGBTQI |
| National Center for Transgender Equality | Issues: Travel | https://transequality.org/issues/travel |
| The Trevor Project: Saving Young LGBTQ Lives | | www.thetrevorproject.org |
| US Department of State | Country Reports on Human Rights Practices | www.state.gov/reports-bureau-of-democracy-human-rights-and-labor/country-reports-on-human-rights-practices/ |
| | Country Information | https://travel.state.gov/content/travel/en/international-travel/International-Travel-Country-Information-Pages.html |
| | LGBTI Family Travel Tips | https://travel.state.gov/content/dam/NEWTravelAssets/pdfs/LGBTI%20Pocket%20Card-Pride%20Weekend_FINAL.pdf |
| | LGBTI Travelers | https://travel.state.gov/content/travel/en/international-travel/before-you-go/travelers-with-special-considerations/lgbti.html |

laws of any country to which they are traveling, and encourage travelers to read about their destinations before departure. The US Department of State annually publishes Country Reports on Human Rights Practices, which includes a detailed, country-by-country report of issues pertinent to the LGBTQ+ community and offers the printable LGBTQ+ Family Travel Tips pocket card at their website (see Table 2-13 for the website address).



## SAFETY & SECURITY

A general approach to travel safety and security is outlined in Sec. 4, Ch. 11, Safety & Security Overseas. As with many travelers, the joy of feeling more freedom to express oneself while traveling, coupled with substance use, could result in behaviors that put travelers at risk. Each traveler's perception of and willingness to accept risk also varies (see Sec. 2, Ch. 2, . . . *perspectives*: Travelers' Perception of Risk).

LGBTQ+ travelers should be aware that gay-friendly neighborhoods might not reflect societal acceptance and safety in a country overall. LGBTQ+ persons have a lifetime of experience assessing situations to determine whether they can safely be themselves. When traveling, LGBTQ+ persons should be aware of sociocultural differences that can affect their true situational safety. The US Department of State notes that authorities in some countries could be involved in entrapment campaigns, with law enforcement monitoring websites, mobile phone apps, or meeting places. Counsel patients to be cautious connecting with the local community. The US Department of State offers tips for the LGBTQ+ community for staying safe while abroad, including researching destinations, updating passports, packing important documents, living abroad with a foreign national spouse or partner, visa issues, and adoption issues.

Advise transgender travelers that the Transportation Security Administration (TSA) offers specific screening considerations for transgender passengers, including information on reporting prostheses or discrimination at screening checkpoints, at the TSA website, www.tsa.gov/transgender-passengers.

Although published data are lacking, media reports suggest that people who are openly lesbian, whether single or coupled, and people who are transgender might be at greater risk for physical and sexual assault worldwide. LGBTQ+ travelers should contact the nearest US embassy or consulate (www.usembassy.gov) if they have troubles while abroad; the Department of State website assures travelers that consular officers will protect their privacy and will not generalize, make assumptions, or pass judgment.

## MENTAL HEALTH & SUBSTANCE USE

LGBTQ+ identity can be a source of strength and courage for many, but the lack of acceptance, overt discrimination, rejection, and denial of rights can lead to or exacerbate mental health issues among this population. Lesbian, gay, and bisexual adults are more than twice as likely as other adults to experience a mental health condition, and people who are transgender are >4 times more likely to experience a mental health condition than people who are cisgender (persons whose gender identity corresponds with their birth sex). Adolescents and young adults are at particularly high risk for suicide, and LGBTQ+ youth are more than twice as likely to experience persistent feelings of sadness and hopelessness than their peers who are not LGTBQ+. Transgender youth face further disparities and are twice as likely to experience depressive symptoms, seriously consider suicide, and attempt suicide compared with cisgender lesbian, gay, bisexual, queer, and questioning youth.

LGBTQ+ adults are twice as likely to experience a substance use disorder, and people who are transgender are 4 times as likely. Heavy drinking, binge drinking, tobacco use, and use of illicit drugs, including amyl nitrate (known as poppers), cannabis, MDMA (known as ecstasy or Molly), and amphetamines are more common in segments of the LGBTQ+ community. Several studies outline the association of recreational drug use with riskier sexual behavior during travel, including unprotected anal intercourse in MSM.

As outlined in Sec. 2, Ch. 12, Mental Health, travel medicine providers should screen for depression and anxiety in people planning extended or frequent travel; participants in humanitarian or disaster relief work; and anyone

intending to take up long-term or semipermanent residence in another country. Little research and no published guidelines are available on LGBTQ+ travelers and mental health or substance abuse outcomes during and after travel, but the available data on prevalence of mental health issues and substance use suggest screening is appropriate for all LGBTQ+ travelers, including adolescents, for both mental health and substance use or abuse concerns.



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US Department of State. LGTBI family travel tips. Available from: https://travel.state.gov/content/dam/NEWTravelAssets/pdfs/LGBTI%20Pocket%20Card-Pride%20Weekend_FINAL.pdf.

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# COMPLEMENTARY & INTEGRATIVE HEALTH APPROACHES TO TRAVEL WELLNESS

David Shurtleff, Kathleen Meister, Shawn Stout

Travelers often ask their health care providers about the use of complementary or integrative health approaches for travel-related illnesses and conditions. Claims made about dietary supplements, herbal products (see Box 2-15), and other complementary approaches for travel-related health problems may not be supported by evidence. Be prepared to discuss what is known about the reported benefits of complementary and integrative health approaches and to counsel travelers on their possible side effects or interactions with prescribed vaccines or medications.

## CLAIMS VERSUS SCIENCE

### Altitude Illness

Many natural products, including coca leaf, garlic, *Ginkgo biloba*, and vitamin E, have been promoted for preventing or treating altitude illness. For more information on altitude illness, see Sec. 4, Ch. 5, High Elevation Travel & Altitude Illness.

#### COCA LEAF

Coca leaf, chewed or made into tea, has been used for altitude illness, but no strong evidence has shown that it works or that it has adverse effects.

### BOX 2-15 Dietary supplements & unproven therapies

- Unproven therapies are discussed in this chapter only for educational purposes and are not recommended for use. The Centers for Disease Control and Prevention only endorses therapies approved by the US Food and Drug Administration (FDA).
- FDA regulates dietary supplements, but the regulations are generally less strict than those for prescription or over-the-counter drugs. Learn more at www.nccih.nih.gov/health/supplements/wiseuse.htm.
- Clinicians and travelers should consult the FDA's safety advisories to learn the latest regarding product recalls and safety alerts: www.fda.gov/food/recalls-outbreaks-emergencies/alerts-advisories-safety-information.
- Two major safety concerns about dietary supplements are potential drug interactions and product contamination. Analyses of supplements sometimes find differences between labeled and actual ingredients. For example, products marketed as dietary supplements have been found to contain illegal hidden ingredients, such as prescription drugs.

Travelers should be aware that using coca leaf will cause a positive drug test result for cocaine metabolites.

#### GARLIC

No evidence supports claims that garlic helps reduce altitude illness. Garlic supplements appear safe for most adults. Possible side effects include breath and body odor, heartburn, and upset stomach. Some people have allergic reactions to garlic. Short-term use of most commercially available garlic supplements poses only a limited risk for drug interactions.

#### *GINKGO BILOBA*

Studies of *Ginkgo biloba* for preventing altitude illness are inadequate to justify recommendations about its use. Products made from standardized ginkgo leaf extracts appear to be safe when used as directed. However, ginkgo can increase the risk of bleeding in some people and interact with anticoagulants. In addition, studies by the National Toxicology Program showed that rodents developed liver and thyroid tumors after being given a ginkgo extract for up to 2 years.

#### VITAMIN E

One study investigated vitamin E, in combination with other antioxidants, for altitude illness; no significant benefit was observed.

## Colds & Flu

Although colds and flu are not uniquely travel-related hazards, many people try to avoid these illnesses during a trip. Complementary health approaches that have been advocated for preventing or treating colds or influenza include echinacea, garlic and other herbs, nasal saline irrigation, probiotics, vitamin C, zinc products, and others.

#### ECHINACEA

Numerous studies have tested the herb echinacea to see whether it can prevent colds or relieve cold symptoms. A 2014 systematic review concluded that echinacea has not been convincingly shown to be effective; however, a weak effect was not ruled out.

#### GARLIC & OTHER HERBS

No strong evidence supports claims that garlic, Chinese herbs, oil of oregano, or eucalyptus essential oil prevent or treat colds, or that the homeopathic product Oscillococcinum prevents or treats influenza or influenza-like illness.

#### NASAL SALINE IRRIGATION

Nasal saline irrigation (e.g., use of neti pots), can be useful and safe for chronic sinusitis. Nasal saline irrigation also can help relieve the symptoms of acute upper respiratory tract infections, but the evidence is not definitive. Even in places where tap water is safe to drink, people should use only sterile, distilled, boiled-then-cooled, or specially filtered water for nasal irrigation to avoid the risk of introducing waterborne pathogens.

#### PROBIOTICS

Probiotics might reduce susceptibility to colds or other upper respiratory tract infections and the

duration of the illnesses, but the quality of the evidence is low or very low.

### VITAMIN C

Taking vitamin C supplements regularly reduces the risk of catching a cold among people who perform intense physical exercise, but not in the general population. Taking vitamin C on a regular basis might lead to shorter-duration colds, but taking it only after cold symptoms appear does not. Vitamin C supplements appear to be safe, even at high doses.

### ZINC

Zinc taken orally, often in the form of lozenges, within 24 hours of symptom onset might reduce the duration of a cold. No firm recommendation currently can be made, however, regarding prophylactic zinc supplementation because of insufficient data. When taken in large doses, side effects from zinc can include nausea and diarrhea, copper deficiency, and decreased absorption of some medications. Intranasal use of zinc can cause anosmia (loss of sense of smell), which can be long-lasting or permanent.

## Coronavirus Disease 2019

A variety of dietary supplements, including elderberry, melatonin, colloidal silver, vitamin C, vitamin D, and zinc have each been suggested to prevent or treat coronavirus disease 2019 (COVID-19). Except for colloidal silver ( for which no plausible mechanism of action exists), the listed supplements have theoretical applications in preventing or treating COVID-19; evidence of efficacy from clinical trials is limited, however, and without clear demonstration of benefit.

In addition, use of colloidal silver and zinc carries health and safety concerns. Colloidal silver (and other silver products) can cause argyria, a permanent blue-gray discoloration of the skin and other organs. High-dose supplementation with zinc can cause nausea and diarrhea, copper deficiency, and decreased absorption of some medications. The National Institutes of Health (NIH) COVID-19 Treatment Guidelines (www.covid19treatmentguidelines.nih.gov) recommend against supplementation with zinc above the recommended dietary allowance because of these risks and the lack of evidence of clinical benefit.

The NIH COVID-19 Treatment Guidelines provide up-to-date guidance on dietary supplements and COVID-19 for health care providers and travelers. For additional information on COVID-19 prevention and treatment, see Sec. 5, Part 2, Ch. 3, COVID-19.



## Homeopathic Vaccines

Proponents of homeopathy claim that products called nosodes, or homeopathic vaccines, are effective substitutes for conventional immunizations. No credible scientific evidence or plausible scientific rationale supports these claims. For more information on travel vaccines, see Sec. 2, Ch. 3, Vaccination & Immunoprophylaxis—General Principles.

## Insect Repellents

Many products are promoted as "natural" insect repellents, and their use can appeal to people who prefer not to use synthetic products. Products promoted as natural mosquito repellents include citronella products, neem oil (a component of agricultural insecticide products promoted on some websites for home use), and oil of lemon eucalyptus (OLE). Essential oils and other natural products are promoted to repel bed bugs. Travelers should use only Environmental Protection Agency (EPA)–registered insect repellents; more information is available at the EPA website (www.epa.gov/insect-repellents/find-repellent-right-you).

### BOTANICALS

Laboratory-based studies found that botanicals, including citronella products, worked for shorter periods than products containing DEET (N,N-diethyl-m-toluamide or N,N-diethyl-3-methyl-benzamide). For people who choose to use botanicals, the Centers for Disease Control and Prevention (CDC) recommends EPA-registered products containing OLE (oil of lemon eucalyptus). Limited evidence suggests that neem oil could be beneficial as a natural repellent. For more information on insect repellents, see Sec. 4, Ch. 6, Mosquitoes, Ticks & Other Arthropods).

### BED BUG REPELLENTS

No evidence supports effectiveness of natural products marketed to repel bed bugs. Instead, encourage travelers to follow steps to detect and avoid bed bugs (e.g., inspecting mattresses, keeping their luggage off the floor or bed). More information is available at CDC's Parasites website (www.cdc.gov/parasites/bedbugs) and in Section 4, Box 4-10, Recommended protective measures to avoid or reduce bed bug exposure.

## Jet Lag & Sleep Problems

Complementary approaches suggested for jet lag or other sleep problems include aromatherapy and herbs (e.g., chamomile, kava, valerian); the dietary supplement melatonin; and relaxation techniques. See Sec. 8, Ch. 4, Jet Lag, for more information.

### AROMATHERAPY

Very little evidence supports the belief that aromatherapy or the herbs chamomile or valerian help with insomnia. Major side effects are uncommon, but chamomile can cause allergic reactions. Another herb, kava, also is promoted for sleep, but good research on its effectiveness is lacking. More importantly, kava supplements have been linked to a risk of severe liver damage.

### MELATONIN

Some evidence suggests that melatonin supplements can help with sleep problems caused by jet lag in people traveling either east or west. Melatonin is sold as a dietary supplement; dietary supplements are less strictly regulated than drugs. The amounts of ingredients in dietary supplements can vary, and product contamination is a potential concern. A 2017 analysis of melatonin supplements sold in Canada found that their actual melatonin content ranged from <83% to >478% of the labeled content and that substantial lot-to-lot variation was evident. Also, 26% of products contained serotonin as a contaminant.

Melatonin supplements appear to be safe for most people who use them for discrete periods of time; an absence of studies examining the effects associated with continued use makes it challenging to know with certainty its long-term safety and tolerability. In a 2019 systematic review of mostly short-term trials of melatonin for sleep problems, the most frequently reported adverse events were daytime sleepiness (1.66%), dizziness (0.74%), headache (0.74%), other sleep-related adverse events (0.74%), and hypothermia (0.62%). Almost all adverse events were considered mild–moderate in severity and tended to resolve either spontaneously or after discontinuing treatment.

Caution people with epilepsy or who take an oral anticoagulant against using melatonin without medical supervision. In addition, advise travelers not to take melatonin early in the day, because it can cause sleepiness and delay adaptation to local time.

### RELAXATION TECHNIQUES

Relaxation techniques (e.g., progressive relaxation and other mind and body practices, including mindfulness-based stress reduction) can help with insomnia, but their effectiveness for jet lag has not been established.

## Malaria

Many consumer websites promote "natural" ways to prevent or treat malaria, which often involve dietary changes or herbal products (e.g., quinine from the cinchona tree [*Cinchona* spp.]) or extracts and material from the artemisia plant (*Artemisia annua* L. or sweet wormwood). Strongly urge patients to follow official recommendations, including the use of malaria chemoprophylaxis, and not to rely on unproven "natural" approaches to prevent or treat such a serious disease. Recommended drugs to prevent and treat malaria are described in Sec. 5, Part 3, Ch. 16, Malaria.

## Motion Sickness

Complementary approaches advocated for preventing or treating motion sickness include acupressure and magnets, ginger, homeopathic remedies, and pyridoxine (vitamin $B_6$).

### ACUPRESSURE & MAGNETS

Research does not support the use of acupressure or magnets for motion sickness.

### GINGER

Although some studies have shown that ginger might ease pregnancy-related nausea and vomiting, no strong evidence shows that it helps with motion sickness. In some people, ginger can have mild side effects (e.g., abdominal discomfort). Research has not definitively shown whether ginger interacts with medications, but concerns have been raised that it could interact with anticoagulants. The effect of using ginger supplements with common over-the-counter drugs for motion sickness (e.g., dimenhydrinate [Dramamine]) is unknown.

### HOMEOPATHIC REMEDIES

No evidence supports claims that homeopathic products prevent or alleviate motion sickness.

### PYRIDOXINE (VITAMIN $B_6$)

Although an American Congress of Obstetrics and Gynecology 2015 Practice Bulletin Summary recommends pyridoxine (vitamin $B_6$) alone or in combination with doxylamine (an antihistamine) as a safe and effective treatment for nausea and vomiting associated with pregnancy, no evidence supports claims that pyridoxine prevents or alleviates motion sickness. Taking excessive doses of pyridoxine supplements for long periods of time can affect nerve function.

## Sun Protection

Many "natural sunscreen" products are promoted online, as are recipes for homemade sunscreen and advice on consuming dietary supplements or drinking teas to protect against sun damage. No studies have proven that any dietary supplement or herbal product, including aloe vera, beta carotene, epigallocatechin gallate (EGCG; a green tea extract), or selenium reduces the risk for skin cancer or sun damage. For more information, see Sec. 4, Ch. 1, Sun Exposure.

## Travelers' Diarrhea

A variety of products, including activated charcoal, goldenseal, grapefruit seed extract, and probiotics are claimed to prevent or treat travelers' diarrhea (TD). Counsel travelers about food and water safety precautions. For more information, see Sec. 2, Ch. 8, Food & Water Precautions.

### ACTIVATED CHARCOAL

No solid evidence supports claims that activated charcoal helps with TD, bloating, stomach cramps, or gas. The side effects of activated charcoal have not been well documented but were mild when it was tested on healthy people. Children should not be given activated charcoal for diarrhea and dehydration because it can absorb nutrients, enzymes, and antibiotics in the intestine and mask the severity of fluid loss.

### GOLDENSEAL

No high-quality research has been published on goldenseal for TD. Studies show that goldenseal inhibits cytochrome P450 enzymes, raising concerns that goldenseal might increase the toxicity or alter the effects of some drugs.

### GRAPEFRUIT SEED EXTRACT

Claims that grapefruit seed extract can prevent bacterial foodborne illnesses are not supported by research. People who need to avoid grapefruit because it interacts with medicine they are taking should also avoid grapefruit seed extract.

### PROBIOTICS

To date, insufficient evidence exists to draw definite conclusions about the efficacy of probiotics for the prevention of TD. Although some studies have had promising results, meta-analyses have reached conflicting conclusions. Interpretation of the evidence is difficult because studies have used a variety of microbial strains, some studies were not well controlled, and the optimal doses and duration of use have not been defined. For more information, see Sec. 2, Ch. 6, Travelers' Diarrhea.

# UNTESTED THERAPIES USED IN OTHER COUNTRIES

CDC does not recommend traveling to other countries for untested medical interventions or to buy medications that are not approved in the United States. For more information see the chapters in Section 6, Health Care Abroad.

## TALKING TO TRAVELERS ABOUT COMPLEMENTARY HEALTH APPROACHES

Given the vast number of complementary or integrative interventions and the wealth of potentially misleading information about them that can be found on the internet, discussing the use of these approaches with patients can seem daunting. Be proactive, though, because surveys show that many patients are reluctant to raise the topic with health care providers. Federal agencies (e.g., the National Center for Complementary and Integrative Health [NCCIH]) offer evidence-based resources (www.nccih.nih.gov/health/providers) to help providers and their patients have meaningful discussions about complementary approaches.



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# PRIORITIZING CARE FOR RESOURCE-LIMITED TRAVELERS

Zoon Wangu, Elizabeth Barnett

Travelers seen in pretravel clinic consultations often have financial constraints and must pay out of pocket for pretravel care, because many health insurance plans provide no or limited coverage for travel immunizations and prophylactic medications. Optimizing care for travelers without adequate insurance coverage or with only modest means can challenge the abilities of even the savviest travel medicine clinician. As an example, the estimated cost of a pretravel consultation for a backpacker from the United States planning a 4-week trip to West Africa could easily exceed $1,000 for the initial consultation and vaccinations, excluding malaria prophylaxis.

Travelers on a limited budget might be at increased risk for travel-associated infections

because they are more likely to visit remote areas, stay in more modest accommodations, and eat in restaurants with lower hygiene standards. However, the total cost of hospitalization, treatment, and lost wages after becoming ill with a vaccine- or prophylaxis-preventable disease can easily exceed the upfront cost of vaccination and prophylaxis, making the pretravel consultation particularly important. Travelers also must consider the cost and benefit of purchasing travel health insurance and medical evacuation insurance before travel (see Sec. 6, Ch. 1, Travel Insurance, Travel Health Insurance & Medical Evacuation Insurance). Use the pretravel consult as an opportunity to help guide travel health recommendations for travelers with financial constraints.

## VACCINES

### Required Travel Vaccines

Only meningococcal and yellow fever vaccines are required categorically, and then only for some travelers: meningococcal vaccine for pilgrims traveling to Mecca during the Hajj, and yellow fever vaccine for travelers to certain countries in Africa and South America (see Sec. 2, Ch. 5, Yellow Fever Vaccine & Malaria Prevention Information, by Country). Prioritize administration and documentation of these vaccines; travelers without them could be denied entry to their destination. Be aware that even travelers staying only briefly in a yellow fever-endemic country (e.g., during an airport layover) might still need evidence of vaccination to be permitted entry to other countries on their itinerary.

In a few specific circumstances, travelers to polio-affected countries might be asked to show proof of polio vaccination before departure if their stay is >4 weeks (see Sec. 5, Part 2, Ch. 17, Poliomyelitis). Travelers and clinicians should check the Centers for Disease Control and Prevention (CDC) Travelers' Health website (https://wwwnc.cdc.gov/travel/destinations/list/) for the latest recommendations for their destinations.

### Routine Vaccines

All travelers should be current with routine vaccines before international travel, regardless of destination. The benefits of routine vaccines extend beyond the travel period, and many provide lifelong immunity. Because these vaccines are mass-produced as part of scheduled national childhood and adult vaccination programs, associated costs generally are low, and many insurance companies reimburse the patient for the cost of administration. Travelers also can obtain these vaccines in a health department or primary care setting, where costs might be lower than at a travel clinic.

For travelers not up to date with routine vaccines, prioritize administration of those that protect against diseases for which the traveler is most likely to be at general risk (e.g., hepatitis A, influenza, and measles). Children in the United States routinely receive hepatitis A vaccine, but it is not included in the adult immunization schedule. Some travelers might be immune to diseases for which travel medicine providers would consider immunization; pretravel antibody testing might be covered by insurance when vaccines are not. Assess the time to departure to decide whether to test rather than vaccinate.

### Recommended Travel Vaccines

When prioritizing recommended vaccines, consider time until departure (see Last-Minute Travelers, Sec. 2, Ch. 11), risk for disease at the destination, effectiveness and safety of the vaccine, and likelihood of future benefit because of repeat travel. As previously noted, hepatitis A vaccine is not currently listed as a routine vaccine for US adults; however, this vaccine can provide lifelong immunity and clinicians should consider administering it to any traveler not previously vaccinated. Hepatitis B vaccine is recommended for all US adults under age 60; since hepatitis B acquisition is not frequently associated with travel, however, vaccination against hepatitis B might be a lower priority for travelers with limited resources, unless their destinations are areas of high disease incidence or they plan to engage in activities that place them at increased risk of exposure to bloodborne pathogens (see Sec. 5, Part 2, Ch. 8, Hepatitis B).

Typhoid vaccine is ≈50%–80% effective in preventing disease, and protection is not long-lasting. Thus, typhoid vaccine is more critical for travelers to higher-risk destinations where

acquiring typhoid is more likely, and to areas where typhoid is harder to treat because of multidrug resistance (e.g., Southeast Asia and the Indian subcontinent).

### CORONAVIRUS DISEASE 2019

Clinicians should discuss and recommend vaccination against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), regardless of destination (see Sec. 5, Part 2, Ch. 3, COVID-19).

### JAPANESE ENCEPHALITIS

Review the traveler's itinerary in detail to determine the need for Japanese encephalitis (JE) vaccine (see Sec. 5, Part 2, Ch. 13, Japanese Encephalitis). Some travelers might be able to obtain the single-dose JE vaccine, which is much less expensive and is available outside the United States, but bear in mind (and educate travelers about) issues surrounding quality of vaccines in many countries (see Sec. 6, Ch. 3, . . . *perspectives*: Avoiding Poorly Regulated Medicines & Medical Products During Travel). Whether or not travelers accept the JE vaccine, provide instructions for when and how to use insect repellents and other measures to prevent mosquito bites (see Sec. 4, Ch. 6, Mosquitoes, Ticks & Other Arthropods).

### RABIES

When considering rabies vaccine for resource-limited travelers, factor in the risk for animal exposure, access to local health care, and availability of rabies immune globulin and rabies vaccine at the traveler's destination (see Sec. 5, Part 2, Ch. 18, Rabies). Advise travelers who decline preexposure immunization to devise a plan of action in case an exposure occurs. In many areas, rabies vaccine or rabies immune globulin are difficult or impossible to obtain, and travelers might need to be medically evacuated to receive full and proper postexposure prophylaxis.

## MALARIA PROPHYLAXIS

Every pretravel consultation should include detailed advice about preventing mosquito bites (see Sec. 4, Ch. 6, Mosquitoes, Ticks & Other Arthropods). Malaria risk varies widely depending on destination, accommodations, and activities during travel. Costs associated with the different regimens vary widely. Providers should stay up to date on the cost of antimalarial medications in their region and at pharmacies, so they can recommend the most cost-effective drug based on the traveler's planned itinerary. If travelers ask whether they can purchase antimalarial drugs at their destination, advise them about the risk of inappropriate, substandard, and counterfeit medications and discourage them from this practice (see Sec. 6, Ch. 3, . . . *perspectives*: Avoiding Poorly Regulated Medicines & Medical Products During Travel).

## TRAVELERS' DIARRHEA

Travelers' diarrhea (TD) is among the most common travel-related illnesses. Consider prescribing antibiotics to travelers to treat incapacitating diarrhea. Prophylaxis is indicated only in select patients at high risk for complications from TD (Sec. 2, Ch. 6, Travelers' Diarrhea). As with antimalarial drugs purchased at the destination, advise travelers about the risk of purchasing counterfeit antibiotics overseas.

## PREVENTIVE BEHAVIORS

For each traveler, weigh the potential severity of illness against the affordability and availability of immunization or prophylaxis, as well as the level of protection provided. In cases where a disease is potentially deadly but where affordable, effective chemoprophylaxis options exist (e.g., malaria), work with the traveler to identify an acceptable prescribed chemoprophylaxis regimen and emphasize the importance of not eschewing medication due to cost.

In addition, educate all travelers about the importance of employing preventive behaviors that can serve to reduce their exposure risks: avoiding animals, using insect bite precautions, following safe sex practices, washing their hands or using alcohol-based hand sanitizer frequently, and observing food and water precautions to the best of their ability. Strongly advise all travelers, and especially those unable to afford some of the more costly immunizations or prophylactic medications, to practice these behaviors. In the era of the COVID-19 pandemic, offer advice about mask use, encourage travelers to take note of the level of SARS-CoV-2 infection at

their destination, and to be mindful about avoiding large gatherings. Reassure travelers that the actions they take to avoid preventable health risks also can protect against travel-associated conditions that are more prevalent than certain vaccine-preventable diseases.



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# TELEMEDICINE

Taylan Bozkurt, José F. Flórez-Arango, Matt Levi, Scott Norton

Telemedicine means "practicing medicine at a distance," but in common usage it refers to providing diagnostic and therapeutic services via electronic transfer of medical information. Telemedicine encounters can be as simple as patients asking providers health-related questions via the telephone or secure email or as complex as real-time monitoring of the health of astronauts at the International Space Station.

Many analyses of telemedicine programs focus on cost savings for medical organizations or on the benefits provided to distinct population subsets such as underserved urban populations or populations for whom transportation is difficult (e.g., patients in nursing homes, correctional facilities, remote areas). Few analyses have looked at total costs across the entire health care system.

## BENEFITS OF TELEMEDICINE

Benefits of telemedicine include expanding access to specialty care, expediting delivery of care (minimizing wait times), and providing opportunities to confirm or obviate the need for someone to see a provider in person—an advantage for individuals or populations for whom an in-person visit is impractical, inconvenient, arduous, or costly.

Telemedicine has several unique uses for the practice of travel medicine. For instance, telemedicine can be used as an alternative to the in-person pretravel consultation. Moreover, travelers can use telemedicine to maintain continuity of care for existing conditions, enabling them to travel farther and longer by extending the interval between in-person visits. Notably, travelers who develop acute illnesses or injuries, have exacerbations of existing conditions, experience high-risk exposures, or need to seek medical advice while abroad can use telemedicine platforms to discuss issues with a trusted provider.

Travel health providers also benefit from using telemedicine. When a traveler seeks medical care in the country they are visiting, the local provider

can use telemedicine to obtain additional information from the patient's regular providers or health records. Clinicians who conduct posttravel evaluations can obtain prompt consultative support when travelers present with unusual clinical findings.



## CONDUCTING A REMOTE PRETRAVEL CONSULTATION

Telemedicine provides a convenient way to deliver pretravel consultations with the same elements as an in-person visit. Providers should continue to follow the same professional standards used during in-person consultations, including adherence to a code of ethics, security and privacy practices, and clinical guidelines. What can and cannot be done in a remote consultation varies by state; clinicians should check with their state's medical board about any restrictions. Furthermore, the policies and practices of telehealth programs underwent major changes during the coronavirus disease 2019 (COVID-19) pandemic and will continue to change; providers will need to remain current with what is and is not permissible. A valuable resource on telemedicine, including requirements by state, is prognoCIS (https://prognocis.com/wp-content/uploads/2017/01/Telemedicine-Whitepaper.pdf), and many additional online resources related to telemedicine standards, guidelines, and practice are available (Table 2-14).

### Table 2-14 Online telemedicine resources

| ORGANIZATION OR SOURCE | RESOURCE | AVAILABLE FROM |
|---|---|---|
| American Medical Association | AMA Telehealth Quick Guide | www.ama-assn.org/practice-management/digital/ama-telehealth-quick-guide |
| | Digital Health Payment | www.ama-assn.org/practice-management/digital/digital-health-payment |
| American Telemedicine Association | ATA's CDC Yellowbook page | www.americantelemed.org/resource/cdc-yellowbook/ |
| | Resources | www.americantelemed.org/resource/ |
| | Telehealth. Is. Health | www.americantelemed.org |
| Center for Connected Health Policy | Resources & Reports | www.cchpca.org/resources/ |
| Federation of State Medical Boards | The Appropriate Use of Telemedicine Technologies in the Practice of Medicine (2022) | www.fsmb.org/siteassets/advocacy/policies/fsmb-workgroup-on-telemedicineapril-2022-final.pdf |
| The National Academy of Medicine | The Role of Telehealth in an Evolving Health Care Environment (Workshop Summary, 2012) | www.nap.edu/catalog/13466/the-role-of-telehealth-in-an-evolving-health-care-environment |
| prognoCIS | The Physician's Guide to Telemedicine in 2018 | https://prognocis.com/wp-content/uploads/2019/01/Telemedicine-Whitepaper.pdf |

## Table 2-14 Online telemedicine resources (continued)

| ORGANIZATION OR SOURCE | RESOURCE | AVAILABLE FROM |
|---|---|---|
| US Department of Health and Human Services: Centers for Medicare & Medicaid Services | COVID-19 Emergency Declaration Blanket Waivers for Health Care Providers | www.cms.gov/files/document/summary-covid-19-emergency-declaration-waivers.pdf |
| | General Provider Telehealth and Telemedicine Tool Kit | www.cms.gov/files/document/general-telemedicine-toolkit.pdf |
| | Medicare Coverage and Payment of Virtual Services (video) | https://youtu.be/Bsp5tIFnYHk |
| | Medicare Telemedicine Health Care Provider Fact Sheet | www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet |
| | Telehealth | www.cms.gov/Medicare/Medicare-General-Information/Telehealth |
| | Medicare Learning Network Fact Sheet: Telehealth Services | www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/TelehealthSrvcsfctsht.pdf |
| US Department of Health and Human Services: Health Resources & Services Administration | Learn More about Telehealth: for Providers | www.telehealth.hhs.gov/providers/ |
| US Department of Health and Human Services: Office for Civil Rights | Health Information Privacy | www.hhs.gov/hipaa/index.html |
| World Health Organization: Pan American Health Organization | Teleconsultations during a Pandemic | https://www3.paho.org/ish/images/docs/covid-19-teleconsultations-en.pdf |

Medical practices should provide patients with a resource that outlines the expectations and outcomes of telemedicine before they schedule a consultation, including the limitations of a remote consultation. For example, the ability to conduct a complete physical examination is limited, but current technology can help replicate a near in-person quality of inspection, auscultation, palpation, and various other core elements of a physical examination. Intake information, including medical history, prior medical records, and diagnostic information can all be requested from patients and made available to providers in advance of the consultation. Encourage patients to set up and test their connections to the telemedicine software or equipment before the encounter.

At the time of the consultation, establish informed consent with the patient and ensure that the patient is in an appropriate care setting. Depending on state regulations, a patient might need to be in a location where the provider is licensed to practice medicine at the time of the consultation (see Legal Issues: Privacy & Security, later in this chapter). Depending on circumstances, a telepresenter (e.g., another health care provider or translator) might need to be with the patient to assist with the intake and exam.

### Prescribing Medications & Vaccines

Depending on state and country-specific regulations, medications and vaccines can be prescribed during a telemedicine encounter. Where applicable, pharmacies or other allied health care providers can receive certain prescriptions electronically or over the phone, and eligible providers can dispense the medications or administer vaccines.

Yellow fever vaccine is available only at designated yellow fever vaccine clinics, and travelers might need to schedule a separate visit to receive it. For medications (e.g., malaria prophylaxis) and vaccines not routinely stocked at a local pharmacy, the traveler should allow time for the pharmacy to order them.

## WHEN A TRAVELER IS ABROAD

US-based health care providers, regardless of their level of expertise in travel medicine, might be asked to provide a consultation for someone traveling outside the United States. The provider's willingness, comfort, and ability to provide a remote consultation under these circumstances will vary with the type of question or nature of the problem, their ability to charge for services, the technical quality of the communication, and perhaps the time of day. Providers must remember that the same security and privacy practices apply during a telemedicine consult as in a conventional, in-person, domestic consultation.

The Centers for Disease Control and Prevention (CDC) does not endorse procuring medication or filling prescriptions abroad because of the risk for counterfeit drugs (see Sec. 6, Ch. 3, . . . *perspectives*: Avoiding Poorly Regulated Medicines & Medical Products During Travel). In an emergency, however, such as when a traveler's medication is lost or stolen, a provider might be able to help locate local, reputable sources for replacement.

## LEGAL ISSUES: PRIVACY & SECURITY

### US Federal Law & International Law

Telemedicine consultations must comply with state and federal privacy and security laws, including the Health Insurance Portability and Accountability Act (HIPAA). In addition, providers should investigate specific legal requirements of the country where the traveler is located; some countries have strict requirements related to the transfer of personal health data, and even a patient's written consent might not be sufficient to allow this.

Communicating with patients abroad deserves a careful assessment of data and protection laws relative to the originating (i.e., overseas) location, type of service, and means of electronic transmission. Providers must ensure that the technology and video software chosen to conduct remote pretravel consultations and telemedicine encounters, whether store-and-forward (asynchronous) or live interactive video (synchronous), is HIPAA-compliant and meets the privacy and data security requirements of the countries involved. Although encryption is not specifically addressed under HIPAA, ensuring technology is encrypted will help providers safeguard patient health information.

Providers should communicate with at-home patients via an established patient portal or other HIPAA-compliant method. In urgent or unexpected situations, however, patients often will communicate via their personal email accounts, many of which are not encrypted. Remember that no data storage system or transmission of data over the internet, or any other public network, is guaranteed to be secure.

### US State Laws & Regulations

In the United States, each state has its own telemedicine laws and regulations, most of which address reimbursement issues (e.g., informing providers and insurance carriers which telemedicine services are reimbursed) but not the practice of telemedicine. Therefore, providers must perform due diligence to ensure that they conduct telemedicine encounters in accordance with the laws and regulations applicable in their local jurisdiction.

In response to the COVID-19 pandemic, some states modified licensure requirements to support cross-state telemedicine. Providers should check with the Federation of State Medical Boards to ensure they are following all state and federal policies (see Table 2-14). Without appropriate licensing, some states do not permit providers to practice telemedicine or to prescribe certain

medications across state lines. Therefore, travel medicine clinics and providers must carefully read medical board regulations before embarking on telemedicine consults across state lines. No state prohibits the practice of telemedicine across state lines, but many do require providers to have required licensure. For example, a provider living in State A conducting a telemedicine encounter with a patient in State B would need to be licensed in both states. The standards for maintaining privacy and security during an international telemedicine consult are the same as for domestic consults.

In addition, providers—particularly solo practitioners or those not part of a larger health care network or system—should explore whether a business associate agreement or contract is needed. When working with international partners (e.g., companies based outside the country in which the provider practices), additional legal issues can arise and should be considered.

## TECHNOLOGY ISSUES

Providers should consider the bandwidth and connectivity needed for live interactive video telemedicine encounters. Connectivity can be inadequate in some places, and website accessibility can be made difficult because of internal firewalls. Mobile hotspots can be used in some situations in lieu of dial-up or Ethernet connections.

Some telemedicine vendors have optimized software to work in low-bandwidth settings; others have focused on markets where high-bandwidth networks are more widely available. Providers should have their technology vendor provide information about minimum bandwidth requirements that they can review with patients to ensure a seamless telemedicine encounter.



### BOX 2-16 PHOTOGRAPHS IN TELEMEDICINE: ADVICE FOR TRAVELERS

One of the most common ways that travelers use telemedicine is by sending photographs of travel-associated rashes and minor injuries to their home providers with implicit requests for a diagnosis and for treatment recommendations. Nowadays, most such photos are digital images taken with smart phones. Although the cameras on smart phones are seemingly simple to use, travel medicine providers often find these photographs blurry (due to poor focusing, motion artifact, or improper depth of field), poorly lit, or marred by distracting objects in the foreground or background. Even with well-focused, well-lit photographs, discerning which body part is being shown or which lesion is the one in question can be difficult. The following recommendations can help travelers take more useful, information-laden photographs.

#### PICTURES SHOULD SHOW

Distribution (i.e., the parts of the body that are involved)
Configuration and arrangement of lesions with respect to one another (grouping)
A primary lesion (e.g., an undamaged blister)
Lesions with secondary changes (e.g., an open or eroded blister)

#### MARK THE LESION

If several lesions are present, or if the lesion is subtle, indicate the specific lesion using a marking pen or (for digital images) editing software.

#### USE GOOD LIGHTING

Take pictures in a well-lit room, or outdoors in a shaded area.

#### TAKE SEVERAL PICTURES

An orientation view should show the entire body or affected body part; the location of the lesion should be obvious in the picture.
A mid-distance view should center on the lesion and show an anatomical landmark (e.g., belly button, armpit) for orientation and size.
A close-up view can be physically close (under 18") using the camera's macro function or from farther away if using a zoom lens.
Take pictures both straight-on and from different angles.
Make sure the lesion is in the center of the picture; the lesion should fill most of frame but also include some normal skin around it.
Include a scale/size comparison in the picture (use either a ruler or measuring tape or a standard object like a pencil, paper clip, or US coin).
Show the normal opposite side for comparison (e.g., a swollen elbow and the uninvolved elbow).
For lesions on the head, neck, and face, remove jewelry; and for hair problems, focus on scalp.
Take as many pictures as necessary; send sharply focused, well-lit photos only; blurry pictures are not helpful, even if they are 5MB.

Although not required, providers also should recommend that patients use private, secure connections and avoid using public Wi-Fi such as that available in hotels, internet cafes, and airports, because these connections can pose privacy and security risks.



## REIMBURSEMENT

Much like reimbursement for face-to-face encounters, providers need to ensure that their clinic meets certain legal requirements and payer guidelines. In the United States, the pretravel consultation might not be reimbursed by health insurance companies, so a telemedicine practice might be primarily fee-for-service. If corporate personnel are traveling for work and their companies are paying for the associated health care they receive, providers should make certain the company permits their employees to engage in telemedicine and will reimburse for this service.

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# RISK MANAGEMENT ISSUES IN TRAVEL MEDICINE

Andrés Henao-Martínez, Carlos Franco-Paredes



Travel medicine providers, just as practitioners in other medical specialties, are at risk for legal action. Claims for medical negligence could involve failure of duty of care; failure to uphold the standard of practice; care resulting in physical, financial, or psychological loss; and loss caused directly by the failure to reach the standard of care.

Although travel medicine practitioners come from many backgrounds, in the travel medicine arena they are preventive medicine specialists. As such, in giving advice, travel medicine practitioners provide education and not generally "hands on" patient care. Although misunderstandings and legal action might occur despite best efforts, certain guidance is helpful.

**Communication**. The likelihood of a lawsuit is lessened by good communication between the provider and the traveler. Providers should verbally cover all elements of a pretravel consultation during the visit or provide written material for the patient to take home. Because time is a limitation, clinics should provide handouts on how to avoid common health problems not discussed during the consultation. Written information about medications being given or prescribed also is helpful.

**Documentation**. Clinics should have a method for documenting all aspects of the consultation and include an area within the record for the provider to comment on the patient's questions or responses to recommendations. Many electronic medical records enable the provider to add items unique to travel health and to add comments regarding the consultation.

**Identification of problems**. Providers should consult with their risk management personnel or legal advisors in the event of a contentious office visit or exchange after the visit. Nonjudgmental documentation of all communications between traveler and provider is critical.

## EXAMPLES OF RISK MANAGEMENT ISSUES IN TRAVEL MEDICINE

### Prescription Medications

#### FLUOROQUINOLONES

Fluoroquinolone use can be associated with central nervous system adverse events, peripheral neuropathy, and tendinopathies (e.g., tendinitis, tendon rupture). Lawsuits regarding these problems occur, and whether a single dose of a fluoroquinolone used for the self-treatment of travelers' diarrhea can lead to such events is unknown. Thus, even though prescriptions come from pharmacies with directions and adverse event information, discuss these potential adverse events with patients.

#### MEFLOQUINE

Mefloquine can cause serious neuropsychiatric adverse events, including visual hallucinations, psychosis, insomnia, seizures, dizziness, nightmares, and motor and sensory neuropathies. These adverse events can persist after the drug is discontinued. Do not prescribe mefloquine to patients with a seizure disorder or a psychiatric disorder (e.g., depression, generalized anxiety disorder, psychosis, schizophrenia). The Centers for Disease Control and Prevention (CDC) also recommends against mefloquine use in patients with cardiac conduction abnormalities.

(continued)

## RISK MANAGEMENT (CONTINUED)

Travelers receiving a prescription for mefloquine should receive a copy of the US Food and Drug Administration (FDA) medication guide (www.accessdata.fda.gov/drugsatfda_docs/label/2008/019591s023lbl.pdf).

Because of its low cost and convenient weekly dosing, however, mefloquine remains an attractive option for some travelers. Therefore, when recommending mefloquine for malaria prophylaxis, document clearly and carefully the reasons for selecting this drug over other antimalarial drugs. Review the medical history for potential contraindications and include a note to that effect in the patient's record.

### PRIMAQUINE & TAFENOQUINE

Primaquine and tafenoquine can cause potentially fatal hemolysis in glucose-6-phosphate dehydrogenase (G6PD)–deficient patients. Screen for G6PD deficiency in anyone receiving a prescription for either of these medications. People who are pregnant or lactating should not receive primaquine or tafenoquine.

### DRUG–DRUG INTERACTIONS

Drug–drug interactions can occur among medications prescribed for travelers, and clinicians should include medication reconciliation as an essential part of the traveler's history. Electronic medical records and other pharmacy aids are useful to alert clinicians of drug interactions when they are making decisions about travel medication prescriptions. Use caution when prescribing fluoroquinolones and macrolides for travelers taking other QT interval–prolonging agents. Concurrent use of antibiotics with cholera or oral typhoid vaccines can diminish the body's immune response to the vaccine. Antibody-containing products might affect live attenuated vaccines.

### OFF-LABEL USE

Providers sometimes find it useful to recommend medications to travelers that are not approved by the FDA for the specified purpose. Examples include use of primaquine alone for malaria prophylaxis and rifaximin to prevent travelers' diarrhea. Providers will sometimes recommend medications for uses other than those considered standard of care; document the discussion with the traveler prior to prescribing, along with the traveler's acceptance.

### Vaccine Side Effects & Contraindications

To deliver effective and safe vaccinations, carefully review the patient's past medical history, allergies, and vaccination history. Failure to administer a vaccine correctly can cause an adverse event or result in a traveler acquiring a preventable disease abroad. If a patient refuses a vaccine, discuss with them the reasons why and then document any relevant conversations regarding the risk of acquiring a disease. Counsel travelers known to be immunocompromised, or whose immune status precludes a protective antibody response to vaccination, about the possibility of decreased vaccine-related immunity.

Serious vaccine-associated adverse events could be due to a variety of causes. Allergic reactions to vaccine components are possible. Immunocompromised travelers might suffer adverse events after receiving live vaccines. Inquire about the traveler's allergies, history of pregnancy, breastfeeding status, immunosuppressive medications, and immunocompromised status—information that is crucial to minimizing vaccine-associated adverse events. Have vaccine information statements available, and provide these to each vaccinated traveler (www.cdc.gov/vaccines/hcp/vis/index.html).

Document each patient's history and the data used to make decisions, especially when a vaccine is not given or when administering a vaccine despite precautions about its use. Make certain patients understand any risks associated with deviating from Advisory Committee for Immunization Practices–recommended dosing

schedules (e.g., those used for the accelerated delivery of some vaccines). Document the discussion in the patient's record.

### Deep Vein Thrombosis

Long-distance air travel increases the risk for deep vein thrombosis (DVT) and pulmonary embolism by approximately 3-fold. The association is stronger with flights of longer duration. Counsel patients about DVT, recommend measures to decrease risk for DVT (e.g., occasional walking, selecting an aisle seat, exercises), and document this discussion in the medical record (see Sec. 8, Ch. 3, Deep Vein Thrombosis & Pulmonary Embolism).

### Medical Clearance for International Assignments

Providers should be aware of the potential legal entanglements incurred when a prospective international business traveler who is unfit for international assignment is cleared, and then a negative outcome ensues. See a more complete discussion of this topic in Sec. 9, Ch. 1, The International Business Traveler.

## SUMMARY & RECOMMENDATIONS

Maintaining a standard of care in one's practice is important protection for both patient and health care provider. Clinic providers should have adequate training in travel medicine and engage in continuing education. Travel medicine clinics should have at least 1 provider who has earned the Certificate in Travel Health (CTH) awarded by the International Society of Travel Medicine (ISTM) upon successful completion of the CTH examination. Providers also should remain current in the field of travel medicine by accessing continuing education programs offered by CDC and ISTM (see Sec. 1, Ch. 4, Improving the Quality of Travel Medicine Through Education & Training). Following standards of care and the recommendations in this chapter could help reduce the risk for legal action against the provider and the travel medicine clinic.

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. . . *perspectives* chapters supplement the clinical guidance in this book with additional content, context, and expert opinion. The views expressed do not necessarily represent the official position of the Centers for Disease Control and Prevention (CDC).

# 3 Travelers with Additional Considerations

## IMMUNOCOMPROMISED TRAVELERS

Camille Kotton, Andrew Kroger, David Freedman

Immunocompromised people make up 1%–2% of patients seen in US travel clinics, and they largely pursue itineraries like those of immunocompetent travelers. Pretravel preparation for people with a suppressed immune status, whether due to a health condition, medication, or other treatment, is complex. During the pretravel consult for an immunocompromised traveler, consider additional issues (e.g., the patient's increased risk for travel-associated infections and diseases, the effects travel can have on the patient's underlying condition, and the patient's response or adverse reactions to pretravel vaccines and travel medications). Key points to emphasize with immunocompromised travelers during a pretravel visit are summarized in Box 3-01.

For more information on altered immunocompetence and vaccine administration, see the Advisory Committee on Immunization Practices (ACIP) General Best Guidelines for Immunization: Altered Immunocompetence

*CDC Yellow Book 2024.* Jeffrey Nemhauser, Oxford University Press. 
DOI: 10.1093/oso/9780197570944.003.0003

## BOX 3-01 Key patient education points for immunocompromised travelers

**DEVELOP A PLAN IN CASE OF ILLNESS**

Identify clinics or hospitals in the destination country capable of providing care to immunocompromised patients

Know how to access and use US embassy resources

Purchase supplemental insurance to cover trip cancellation due to illness, the cost of health care received abroad, and medical evacuation

**FOOD & WATER PRECAUTIONS**

Follow safe food and water precautions (see Sec. 2, Ch. 8, Food & Water Precautions)

Pack and regularly use antibacterial hand wipes or an alcohol-based hand sanitizer containing ≥60% alcohol

**MULTIDRUG-RESISTANT ORGANISMS**

Immunocompromised people have an augmented risk for infection with multidrug-resistant organisms

Alert your health care provider(s) about any post-travel illness and provide travel information details

**MEDICATIONS**

Bring extra medications in case of travel delays; ensure medications are labeled and in original packaging

Avoid taking medications purchased at destination due to potential drug–drug interactions

Drugs purchased at destination might also be counterfeit, falsely labeled, falsified, spurious, or substandard (see Sec. 6, Ch. 3, . . . *perspectives*: Avoiding Poorly Regulated Medicines & Medical Products During Travel)

**SUN PROTECTION**

Immunocompromised people have dramatically increased rates of skin cancer

Some medications used by immunocompromised people increase their risk of photosensitivity

Use sun protection regularly (see Sec. 4, Ch. 1, Sun Exposure)

**BRING A TRAVEL HEALTH/FIRST AID KIT** (see Sec. 2, Ch. 10, Travel Health Kits)



(www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.pdf).

## PRETRAVEL CONSIDERATIONS

Guidance regarding travel-related prophylaxis and vaccination for immunocompromised individuals is less evidence-based than routine guidance for travelers; the recommendations included here are based on the best available data and the practices of experienced clinicians.

**Causes of Immunosuppression**. Clinicians should recognize that different underlying conditions and medications produce varying degrees of immunocompromise.

**Consultation with Other Providers**. With permission, consider consulting with the traveler's primary or specialty care provider(s) to identify whether the underlying medical condition is stable, to discuss fitness for travel, and to verify medications and doses. Travel medicine providers also can use such a consultation to evaluate whether any travel-related disease-prevention measures could destabilize the underlying medical condition, either directly or through drug interactions.

**Contraindications & Other Health Risks**. Providers should assess whether the traveler's conditions, medications, and treatments constitute contraindications to, decrease the effectiveness of, or increase the risk for adverse events from any of the disease-prevention measures recommended for the proposed trip. Depending on the destination, prevention measures might include immunizations or medications for malaria chemoprophylaxis and/or self-treatment for travelers' diarrhea. Providers also should assess whether health hazards at the destination could exacerbate any underlying conditions or cause more severe health outcomes in an immunocompromised traveler, and determine whether specific interventions are available to mitigate these risks.

**Emergency Planning**. All international travelers should have plans in place in the event they become ill overseas; this is an even more critical component of pretravel preparation for immunocompromised travelers. An

immunocompromised traveler should have a plan for when and how to seek care overseas, including a plan for medical evacuation, if necessary, and a plan for how to pay for it. For more details, see the chapters in Sec. 6, Ch. 1, Travel Insurance, Travel Health Insurance & Medical Evacuation Insurance, and Sec. 6, Ch. 2, Obtaining Health Care Abroad.

**Immune Status & Vaccinations**. The traveler's immune status is particularly relevant to vaccinations. Overall considerations for vaccine recommendations (e.g., destination, likely risk for exposure to disease) are the same for immunocompromised travelers as for other travelers. Providers should weigh the risk for severe illness or death from a vaccine-preventable disease against potential adverse events from administering a live vaccine to an immunocompromised patient. In some cases, an immunocompromised traveler might be unable to tolerate recommended immunizations, in which case the traveler should consider changing the itinerary, altering the planned travel activities, or deferring the trip.

## APPROACH TO IMMUNIZATIONS

Take a careful history and consider the nature of underlying diseases when preparing anyone for international travel. Keep in mind that not all medical conditions necessitate special considerations for pretravel immunizations (see Table 3-01). Recommend and provide all appropriate travel vaccines to those with chronic health conditions. Two categories of travelers requiring special consideration with regard to immunizations are those with limited immune deficits and those with severe immune compromise. Vaccine recommendations for different categories of immunocompromised adults are listed in Table 3-02 and Table 3-03.



### Table 3-01 Health conditions & treatments that do not require specialized immunization precautions at the pretravel visit

| HEALTH CONDITION OR TREATMENT | CIRCUMSTANCES UNDER WHICH NO SPECIALIZED PRECAUTIONS ARE REQUIRED |
|---|---|
| Cancer History | Received last chemotherapy treatment ≥3 months previously and malignancy in remission.<br>For patients receiving immunotherapy agents (e.g., checkpoint inhibitors), discuss all travel and vaccination plans directly with the oncologist; waiting times for vaccination can be longer. |
| Corticosteroid treatments | Short- or long-term daily or alternate-day therapy with <20 mg of prednisone or equivalent.<br>Maintenance steroids at physiologic doses (replacement therapy).<br>Steroid inhalers or topical steroids (i.e., skin, ears, or eyes).<br>Intraarticular, bursal, or tendon steroid injections.<br>>1 month since high-dose (≥20 mg/day of prednisone or equivalent for ≥2 weeks) steroid use.[1] |
| Hematopoietic stem cell transplant recipients or CAR-T cell recipients | Meets all criteria: >2 years posttransplant; not on immunosuppressive drugs; no evidence of ongoing malignancy; and without graft-versus-host disease. |
| Multiple sclerosis or autoimmune disease (e.g., inflammatory bowel disease, rheumatoid arthritis, systemic lupus erythematosus) | Not receiving immunosuppressive or immunomodulatory drug therapy, although definitive data are lacking |

[1]After short-term (<2 weeks) therapy with daily or alternate-day dosing of ≥20 mg of prednisone or equivalent, some experts will wait ≥2 weeks before administering live vaccines.

## Table 3-02 Immunization of immunocompromised adults: live vaccines*

| LIVE VACCINES | HIV INFECTION CD4 COUNT ≥200/ML | HIV INFECTION CD4 COUNT <200/ML | SEVERE IMMUNOSUPPRESSION (NON-HIV) | ASPLENIA | RENAL FAILURE |
|---|---|---|---|---|---|
| Bacillus Calmette-Guérin (BCG) | CONTRAINDICATED | CONTRAINDICATED | CONTRAINDICATED | USE AS INDICATED | USE AS INDICATED |
| Cholera[1] | NO DATA | NO DATA | NO DATA | USE AS INDICATED | USE AS INDICATED |
| Ebola[2] | CONSIDER | CONSIDER | CONSIDER | USE AS INDICATED | USE AS INDICATED |
| Influenza, live attenuated | CONTRAINDICATED | CONTRAINDICATED | CONTRAINDICATED | CONTRAINDICATED | PRECAUTION |
| Measles-mumps-rubella[3] | RECOMMENDED | CONTRAINDICATED | CONTRAINDICATED | USE AS INDICATED | USE AS INDICATED |
| Smallpox/monkeypox[4] (JYNNEOS) | NO DATA | NO DATA | NO DATA | NO DATA | NO DATA |
| Typhoid, Ty21a | CONTRAINDICATED | CONTRAINDICATED | CONTRAINDICATED | USE AS INDICATED | USE AS INDICATED |
| Varicella (adults)[5] | CONSIDER | CONTRAINDICATED | CONTRAINDICATED | USE AS INDICATED | USE AS INDICATED |
| Yellow fever[6] | PRECAUTION | CONTRAINDICATED | CONTRAINDICATED | USE AS INDICATED | OTHER CONSIDERATIONS[7] |

*A determination that a vaccine is *contraindicated* or has a *precaution* is based on Advisory Committee on Immunization Practices (ACIP) recommendations. *Use as indicated* means the vaccine should be used the same in travelers as in non-travelers with this condition. *Recommended* means the vaccine is recommended for all patients in this category.

[1]No safety or efficacy data exist regarding use of the current formulation of CVD 103-HgR vaccine in HIV-positive adults or people with severe immunosuppression. Limited data from an older formulation of the CVD 103-HgR suggest no association between the vaccine and serious or systemic adverse events, and slightly lower immunogenicity of the vaccine in HIV-positive versus HIV-negative adults.

[2]Providers need to weigh the risk associated with vaccination against the risk for Ebola disease in HIV-positive and severely immunosuppressed patients.

[3]Measles-mumps-rubella (MMR) vaccination is recommended for all HIV-infected patients aged ≥12 months with (for patients aged <6 years) CD4+ T-lymphocyte count ≥15% or (for patients aged ≥6 years) CD4+ T-lymphocyte count ≥15% and CD4+ T-lymphocyte counts ≥200/mL for ≥6 months, if they are without evidence of measles immunity. IG can be administered for short-term protection of people facing high risk of measles and for whom MMR vaccine is contraindicated. Additional guidance is available from www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm.

[4]Some experts would consider JYNNEOS a non-live vaccine since it is replication-incompetent.

[5]Varicella vaccine should not be administered to people who have cellular immunodeficiencies, but people with impaired humoral immunity (including congenital or acquired hypoglobulinemia or dysglobulinemia) can be vaccinated. HIV-positive adults with CD4+ T-lymphocyte counts ≥200 cells/mL can receive 2 doses of vaccine spaced at 3-month intervals. VariZIG (varicella zoster–specific immune globulin) is recommended for people exposed to varicella or herpes zoster if they do not have evidence of varicella immunity and have contraindications to vaccination.

[6]For details, see Sec. 5, Part 2, Ch. 26, Yellow Fever. Yellow fever (YF) vaccination is a precaution for asymptomatic HIV-infected people with CD4+ T-lymphocyte counts of 200–499/mL. YF vaccination is not a precaution for people with asymptomatic HIV infection and CD4+ T-lymphocyte counts ≥500/mL. ACIP also considers YF vaccine contraindicated for symptomatic HIV patients without AIDS and with CD4+ T-lymphocyte counts <200/mL.

[7]No data suggest increased risk of serious adverse events after use of YF vaccine in people with renal failure; varying degrees of immune deficit might be present, however, and providers should carefully weigh vaccine risks and benefits before deciding to vaccinate people with this condition.

## Table 3-03 Immunization of immunocompromised adults: non-live vaccines*

| NON-LIVE VACCINES | HIV INFECTION CD4 COUNT ≥200/ML | HIV INFECTION CD4 COUNT <200/ML | SEVERE IMMUNOSUPPRESION (NON-HIV) | ASPLENIA | RENAL FAILURE |
|---|---|---|---|---|---|
| COVID-19 | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED |
| DTaP | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED |
| *Haemophilus influenzae* type b (Hib) | USE AS INDICATED | USE AS INDICATED | OTHER CONSIDERATIONS[1] | RECOMMENDED[2] | USE AS INDICATED |
| Hepatitis A[3] | RECOMMENDED | RECOMMENDED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED |
| Hepatitis B[4] | RECOMMENDED | RECOMMENDED | USE AS INDICATED | USE AS INDICATED | RECOMMENDED[5] |
| Human papillomavirus[6] | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED |
| Influenza, inactivated or recombinant | RECOMMENDED | RECOMMENDED | RECOMMENDED | RECOMMENDED | RECOMMENDED |
| Japanese encephalitis[7] | NO DATA | NO DATA | NO DATA | NO DATA | NO DATA |
| Meningococcal conjugate (ACWY)[8] | RECOMMENDED | RECOMMENDED | USE AS INDICATED | RECOMMENDED | USE AS INDICATED |
| Meningococcal group B | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | RECOMMENDED | USE AS INDICATED |
| PCV15 followed by PPSV23[9] | RECOMMENDED | RECOMMENDED | RECOMMENDED | RECOMMENDED | RECOMMENDED |
| PCV20[9] | RECOMMENDED | RECOMMENDED | RECOMMENDED | RECOMMENDED | RECOMMENDED |
| Polio (IPV) | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED |
| Rabies | USE AS INDICATED | OTHER CONSIDERATIONS[10] | OTHER CONSIDERATIONS[10] | USE AS INDICATED | USE AS INDICATED |

(*continued*)

## Table 3-03 Immunization of immunocompromised adults: non-live vaccines (continued)

| NON-LIVE VACCINES | HIV INFECTION CD4 COUNT ≥200/ML | HIV INFECTION CD4 COUNT <200/ML | SEVERE IMMUNOSUPPRESION (NON-HIV) | ASPLENIA | RENAL FAILURE |
|---|---|---|---|---|---|
| Td or Tdap | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED |
| Tick-borne encephalitis | NO DATA | NO DATA | NO DATA | NO DATA | NO DATA |
| Typhoid, Vi | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED | USE AS INDICATED |
| Zoster, recombinant (RZV)[11] | RECOMMENDED | RECOMMENDED | RECOMMENDED | USE AS INDICATED | USE AS INDICATED |

Abbreviations: COVID-19, coronavirus disease; PCV13, 13-valent pneumococcal conjugate vaccine; PPSV23, 23-valent pneumococcal polysaccharide vaccine.
**Use as indicated* means the vaccine should be used the same in travelers as in non-travelers with this condition. *Recommended* means the vaccine is recommended for all patients in this category.
[1]Recipients of a hematopoietic stem cell transplant should be vaccinated with a 3-dose regimen 6–12 months after a successful transplant, regardless of vaccination history; administer doses ≥4 weeks apart.
[2]In adults, Hib is recommended for people with asplenia only if they have not previously received Hib vaccine.
[3]Routinely indicated for all men who have sex with men, patients with chronic hepatitis, patients with HIV infection, injection drug users, and others.
[4]Hepatitis B vaccination is indicated for people at risk for infection by sexual exposure, including sex partners of hepatitis B surface antigen (HBsAg)-positive people, sexually active people who are not in a long-term mutually monogamous relationship, people seeking evaluation or treatment for a sexually transmitted disease, men who have sex with men, people at risk for infection by percutaneous or mucosal exposure to blood, current or recent injection drug users, household contacts of HBsAg-positive people, residents and staff of facilities for developmentally disabled people, health care and public safety workers with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids, people with end-stage renal disease, international travelers to regions with high or intermediate levels (HBsAg prevalence >2%) of endemic hepatitis B virus infection (see Map 5-07), people with chronic liver disease, people <60 years of age with diabetes, and people with HIV infection.
[5]Adult patients ≥20 years old receiving hemodialysis or with other immunocompromising conditions should receive
1 dose of 40 µg/mL Recombivax HB administered on a 3-dose schedule at 0, 1, and 6 months or 2 doses of 20 µg/mL, or (Engerix-B) administered simultaneously on a 4-dose schedule at 0, 1, 2, and 6 months. Test for antibodies to hepatitis B virus surface antigen serum after vaccination, and revaccinate if initial antibody response is absent or suboptimal (<10 mIU/mL). HIV-infected nonresponders might react to a subsequent vaccine course if CD4+ T-lymphocyte counts rise to 500/mL after institution of highly active antiretroviral therapy. Heplisav-B (HepB-CpG) is a non-aluminum adjuvanted vaccine and should be administered as 2 doses, 1 month apart, in people ≥18 years of age, including hemodialysis and immunocompromised people. Postvaccination serologic testing is recommended. See text for discussion of other immunocompromised groups.
[6]Human papillomavirus (HPV) vaccine (3 dose schedule at 0, 1–2, and 6 months) is recommended through age 26 years.
[7]No safety or efficacy data exist regarding the use of IXIARO in immunocompromised people. In general, inactivated vaccines can be administered safely to people with altered immunocompetence, using the usual doses and schedules, but the effectiveness might be suboptimal. The inactivated, Vero cell–derived Japanese encephalitis vaccine, IXIARO, is the only Japanese encephalitis vaccine available in the United States; other types of Japanese encephalitis vaccines, including live vaccines, are available internationally but are not included here.
[8]Refer to Table 5-03. Meningococcal vaccines licensed & available in the United States: recommendations for travelers to or residents of countries where meningococcal disease is hyperendemic or epidemic
[9]On October 20, 2021, the ACIP approved recommendations to use PCV20 alone, or PCV15 in series with PPSV23, for all adults aged ≥65 years and for adults aged 19–64 years with underlying medical conditions who have not previously received a pneumococcal conjugate vaccine or whose vaccination history is unknown. Official guidance on use of these vaccines is being developed.
[10]For postexposure prophylaxis, both vaccine (5 doses at day 0, 3, 7, 14, 28) and immune globulin should be given to immunocompromised people regardless of previous vaccination status.
[11]For patients with altered immunocompetence, RZV is recommended for people ≥18 years old. RZV is recommended for people ≥50 years old without altered immunocompetence. Patients with renal disease or asplenia who are taking immunosuppressive medication should receive RZV beginning at 18 years of age.

## Preparing Travelers with Limited Immune Deficits

### ASPLENIA

Asplenia is associated with varying degrees of immune deficit. For vaccination purposes, people with asplenia generally are not considered immunocompromised, and live vaccines are not contraindicated. People with anatomic or functional asplenia (including those with sickle cell disease or complement deficiency) and people taking eculizumab or ravulizumab (complement inhibitors used to treat paroxysmal nocturnal hemoglobinuria and atypical hemolytic uremic syndrome) are susceptible to overwhelming and rapidly progressive sepsis with certain bacterial pathogens, despite indicated immunizations.

Although response to vaccines might be diminished compared with people who have a functioning spleen, immunization against *Haemophilus influenzae* type b, and meningococcal (MenACWY and MenB) and pneumococcal disease, is recommended for patients with asplenia, regardless of travel plans. Because age-appropriate dosing and schedules for this population differ from competent hosts, consult the recommended immunization schedules (www.cdc.gov/vaccines/schedules/hcp/index.html) and the guidelines in Table 3-02 and Table 3-03.

Advise asplenic travelers to seek immediate medical attention if they develop a fever and to be prepared to initiate broad-spectrum antibiotic self-treatment. Moreover, people with asplenia should consider avoiding travel to destinations lacking immediate access to high-standard medical care.

### ASYMPTOMATIC HIV INFECTION

Asymptomatic adults with HIV and CD4+ T-lymphocyte counts of 200–499/mL are considered to have limited immune deficits and should be vaccinated according to the guidelines in Table 3-02 and Table 3-03. To categorize risk in people living with HIV, use CD4+ T-lymphocyte counts performed while the patient is receiving antiretroviral drugs, rather than nadir counts. The Advisory Committee on Immunization Practices (ACIP) recommends hepatitis A (HepA), hepatitis B (HepB), meningococcal (MenACWY), and pneumococcal vaccines for all HIV-positive patients, regardless of travel plans. Live attenuated influenza vaccine (LAIV) is contraindicated in all patients with HIV, regardless of CD4+ T-lymphocyte count.

The Infectious Diseases Society of America (IDSA) has identified a knowledge gap in the optimal time to initiate vaccination after starting antiretroviral therapy. Many clinicians advise a 3-month delay after immune reconstitution (usually 6 months after initiation of antiretroviral therapy) if possible, before immunizations are administered in order to maximize the immune response to vaccination. Although seroconversion rates and geometric mean titers of antibody response to vaccines might be less than those measured in healthy controls, most vaccines can elicit protective antibody levels in HIV-infected patients in this category.

Transient increases in HIV viral load, which return quickly to baseline, have been observed after administration of several different vaccines; this generally does not occur in patients whose viral loads are well controlled on antiretroviral therapies. The clinical significance of these increases is not known, but the increases do not preclude the use of any vaccine.

#### HEPATITIS A VACCINE

Because response to HepA vaccine might be reduced in people with HIV infection, perform postvaccination serologic testing on all people with HIV infection ≥1 month after they complete the HepA vaccine series. Consider repeating the vaccine series for patients with poor immune response (i.e., hepatitis A virus [HAV] IgG titer <10 mIU/mL), particularly those who later demonstrate improved immune status (e.g., increased CD4+ T-lymphocyte counts, decreased HIV viral load). If HAV IgG titers are still <10 mIU/mL ≥1 month after the revaccination series, additional vaccination is not recommended; instead, counsel the person on the need to receive HepA immune globulin after an exposure or for higher-risk travel.

#### HEPATITIS B VACCINE

In a study of people infected with HIV who had no immune response to 1 or 2 courses of recombinant HepB vaccine, 2 doses of adjuvanted vaccine (Heplisav-B) were 87% effective in achieving seroprotection.

#### INTRAVENOUS IMMUNOGLOBULIN

People with HIV might receive periodic doses of intravenous immunoglobulin (IVIG), which can interfere with the immune response to MMR and varicella vaccine. If considering vaccination with MMR or varicella vaccine, administer the vaccines ≈14 days before the next scheduled IVIG dose.

#### MEASLES-MUMPS-RUBELLA VACCINE

Two doses of measles-mumps-rubella (MMR) vaccine are recommended for all HIV-infected individuals aged ≥12 months who do not have evidence of current severe immunosuppression (i.e., individuals aged ≤5 years must have CD4+ T-lymphocyte percentages ≥15% for ≥6 months; individuals aged >5 years must have CD4+ T-lymphocyte percentages ≥15% and CD4+ T-lymphocyte counts ≥200 lymphocytes/mL for ≥6 months). Specific recommendations are available for MMR vaccine in people living with HIV (see www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.pdf).

### CHRONIC DISEASES

Factors to consider when assessing the level of immune competence of patients with chronic diseases include clinical stability, comorbidities, complications, duration, severity, and any potentially immunosuppressing treatment (see Sec. 3, Ch. 3, Travelers with Chronic Illnesses). The pretravel health consultation is an opportunity to ensure that these individuals are vaccinated with recommended routine vaccinations (e.g., HepB and pneumococcal vaccines).

### COMPLEMENT DEFICIENCIES

Patients with complement deficiencies can receive any live or inactivated vaccine.

### DYSGAMMAGLOBULINEMIAS

Many people with hypogammaglobulinemia or dysgammaglobulinemia receive periodic doses of IVIG, which can interfere with the immune response to MMR and varicella vaccine. If considering vaccination MMR or varicella vaccine, administer the vaccines ≈14 days before the next scheduled IVIG dose.

### MULTIPLE SCLEROSIS

Modern multiple sclerosis (MS) therapy often includes aggressive and early immunomodulatory therapy, even for patients with stable disease. Inactivated vaccines, including HepB, human papillomavirus, influenza, tetanus, and recombinant zoster vaccines generally are considered safe for people with MS. In the event of a clinical relapse, however, delay vaccination until patients have stabilized or begun to improve, typically 4–6 weeks after the relapse began. Although safety and efficacy data are lacking, inactivated vaccines are theoretically safe for people with MS being treated with interferon medication, glatiramer acetate, mitoxantrone, fingolimod, or monoclonal antibody class drugs (e.g., natalizumab, ocrelizumab, rituximab). Published studies are lacking on the safety and efficacy of other vaccines (e.g., HepA, meningococcal, pertussis, pneumococcal, polio, typhoid).

#### LIVE VACCINES

Do not administer live vaccines to people with MS during therapy with immunosuppressant drugs (e.g., azathioprine, cladribine, cyclophosphamide, methotrexate, mitoxantrone, ponesimod, teriflunomide); during chronic corticosteroid therapy; or during therapy with any immunosuppressive biologic agents, including alemtuzumab, natalizumab, ocrelixumab, ocrelizumab, ofatumumab, ozanimod, rituximab, and siponimod. Although definitive studies of glatiramer acetate and interferon therapy are lacking, MS experts generally do not classify them as immunosuppressive medications, and their use does not preclude live vaccine administration. Published studies suggest that live viral MMR and varicella vaccines are safe for people with stable MS if administered 1 month before starting, or at the appropriate interval after discontinuing, immunosuppressive therapy (see Vaccine Considerations for Travelers with Severe Immune Compromise, later in this chapter).

#### YELLOW FEVER VACCINE

A small case series published in 2011 reported worsening of MS symptoms and plaques in 5 of 7 patients with relapsing-remitting MS who received yellow fever (YF) vaccine. In contrast, two other

studies (published in 2020 and 2021) identified no exacerbations among 55 people with MS who received YF vaccine at different stages of their disease and who were taking a wide variety of medications. Before administering YF vaccine to people with MS who are receiving disease-modifying therapy or nataluzimab, consider the risk of YF virus infection at the destination, as well as potential vaccine-associated risks. Because the effects of YF vaccination in patients receiving disease-modifying therapy or nataluzimab have not been fully studied, decisions about YF vaccination should be made in consultation with the patient's neurologist. For brief exposures (e.g., only a few days in a YF endemic area) vaccinating travelers with MS against YF likely should be avoided. Weigh the risks and benefits of vaccination for travelers anticipating more prolonged exposures.

## Preparing Travelers with Severe Immune Compromise

### SEVERELY IMMUNOCOMPROMISING CONDITIONS

Severely immunocompromised people include those with aplastic anemia, graft-versus-host disease, symptomatic HIV/AIDs, some congenital immunodeficiencies, active leukemia or lymphoma, or generalized malignancy. Others with severe immune compromise include people who recently received radiation therapy or checkpoint inhibitor treatment (therapy of autoimmune complications of treatment is immunosuppressive); people receiving active immunosuppression for solid organ transplants; and both chimeric antigen receptor (CAR)-T cell and hematopoietic stem cell transplant (HSCT) recipients (≤2 years of transplantation or still taking immunosuppressive drugs).

In most cases, severely immunocompromised people should not receive live vaccines, and inactivated vaccines will likely be less effective. These patients should consider postponing travel until their immune function improves. For people likely to travel in the future, usual travel-related vaccines can be initiated before beginning immunosuppressive therapies, if feasible. Whenever possible, administer inactivated vaccines ≥2 weeks and live vaccines ≥4 weeks before immunosuppression.

#### SYMPTOMATIC HIV/AIDS

Clinicians need to know an HIV-infected traveler's current CD4+ T-lymphocyte count for the pretravel consultation. People with HIV and CD4+ T-lymphocyte counts <200/mL, a history of an AIDS-defining illness without immune reconstitution, or clinical manifestations of symptomatic HIV are considered to have severe immunosuppression (see Sec. 5, Part 2, Ch. 11, Human Immunodeficiency Virus / HIV), and they should not receive live viral or live bacterial vaccines because of the risk that the vaccine could cause serious systemic disease. For MMR vaccine, severe immunosuppression is defined as CD4+ T-lymphocyte percentages <15% in any age group or CD4+ T-lymphocyte counts <200/mL in people >5 years old (see www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm).

Recommend that newly diagnosed, treatment-naïve patients with CD4+ T-lymphocyte counts <200/mL delay travel pending reconstitution of CD4+ T-lymphocyte counts with antiretroviral therapy and, ideally, complete suppression of detectable viral replication. Delaying travel helps minimize the risk for infection and avoid immune reconstitution illness while away.

#### CHRONIC LYMPHOCYTIC LEUKEMIA & HEMATOPOIETIC STEM CELL TRANSPLANT

People with chronic lymphocytic leukemia have poor humoral immunity, even early in the disease course, and rarely respond to vaccines. Hematopoietic stem cell transplant (HSCT) recipients who received vaccines before their transplant should be revaccinated routinely afterward, regardless of the source of the transplanted stem cells. Begin complete revaccination with standard childhood vaccines 6 months after HSCT, with the caveat that MMR and varicella vaccines should be administered 24 months after transplant and only if the recipient is immunocompetent. Thus, HSCT recipients ideally should delay travel ≥2 years after transplant to allow for full revaccination.

Administer inactivated influenza vaccine beginning ≥6 months after HSCT and annually thereafter. A dose of inactivated influenza vaccine can be given ≥4 months after transplant if there is a community outbreak.

#### SOLID ORGAN TRANSPLANT RECIPIENTS

For solid organ transplant recipients, the risk for infection is greatest in the first year after transplant; recommend to travelers that they should postpone trips to high-risk destinations until after that time.

## MEDICATIONS THAT COMPROMISE THE IMMUNE SYSTEM

A variety of medications and biologic agents compromise the immune system. Regard anyone taking these medications as severely immunocompromised. Doses of inactivated vaccines received while receiving immunosuppressive medications or during the 2 weeks before starting such medications should not be counted toward a primary vaccination series or relied upon to induce adequate immune responses. Patients should be revaccinated with all indicated inactivated vaccines at least 3 months after potent immunosuppressive therapy is discontinued.

#### ALKYLATING AGENTS

Regard anyone taking alkylating agents (e.g., cyclophosphamide) as severely immunocompromised.

#### ANTIMETABOLITES

Regard anyone taking antimetabolites (e.g., 6-mercaptopurine, azathioprine, methotrexate) as severely immunocompromised.

#### BIOLOGIC AGENTS

Immunosuppressive or immunomodulatory biologic agents can produce immunocompromise by the mechanisms outlined in Table 3-04. B cell–depleting agents (cladribine, ocrelizumab, ofatumumab, ozanimod, rituximab, siponimod) and lymphocyte-depleting agents (alemtuzumab, thymoglobulin) induce major immunosuppression. Consideration of the clinical context in which these were given is important, especially in hematologic malignancies.

#### CANCER CHEMOTHERAPEUTIC AGENTS

Cancer chemotherapeutic agents are classified as severely immunosuppressive, as demonstrated by increased rates of opportunistic infections and blunting of responses to certain vaccines among patient groups. Some of these agents are less immunosuppressive than others (e.g., tamoxifen and trastuzumab, given to breast cancer patients, are less immunosuppressive than alkylating agents or antimetabolites), but clinical data to support safety with live vaccines are lacking. Vaccination following immunotherapies (e.g., checkpoint inhibitors, CAR-T cell treatments) has not been well studied, and until additional data are available, avoid vaccinating patients receiving these treatments with live attenuated vaccines for 3–6 months after treatment or until they have had immune reconstitution.

#### HIGH-DOSE CORTICOSTEROIDS

Most clinicians consider a dose of >2 mg/kg of body weight or ≥20 mg per day of prednisone (or its equivalent) in people who weigh >10 kg, when administered for ≥2 weeks, as sufficiently immunosuppressive to raise concern about the safety of vaccination with live vaccines. Furthermore, the immune response to vaccines could be impaired. Clinicians should wait ≥1 month after discontinuation of high-dose systemic corticosteroid therapy before administering a live-virus vaccine.

#### TRANSPLANT-RELATED IMMUNOSUPPRESSIVE DRUGS

Regard anyone receiving transplant-related immunosuppressive drugs as severely immunocompromised. Examples of transplant-related immunosuppressive drugs include azathioprine, belatacept, cyclosporine, everolimus, mycophenolate mofetil, prednisone, sirolimus, and tacrolimus.

#### TUMOR NECROSIS FACTOR BLOCKERS

Tumor necrosis factor (TNF) blockers (e.g., adalimumab, certolizumab pegol, etanercept, golimumab, infliximab) blunt the immune response to certain chronic infections and certain vaccines. When used alone or in combination regimens with other disease-modifying agents to treat rheumatoid disease, TNF blockers are associated with an impaired response to HepA, influenza, and pneumococcal vaccines, suggesting that for better protection, all doses in the HepA and pneumococcal series should be given before travel. The use of live vaccines is contraindicated for most people receiving these therapies.

## Table 3-04 Immunosuppressive & immunomodulatory biologic agents that preclude use of live vaccines[1]

| GENERIC NAME | TRADE NAME | MECHANISM OF ACTION |
|---|---|---|
| Abatacept | Orencia | Binds CD80 and CD86, thereby blocking interaction with CD28 |
| Acalabrutinib | Calquence | Tyrosine kinase inhibitor |
| Adalimumab | Humira | Binds and blocks TNF-α |
| Alemtuzumab | Campath | Binds CD52 antigen |
| Anakinra | Kineret | Blocks IL-1 |
| Atezolizumab | Tecentriq | Blocks Programmed Cell Death Ligand 1 (PD-L1) |
| Avelumab | Bavencio | Blocks Programmed Cell Death Ligand 1 (PD-L1) |
| Basiliximab | Simulect | Blocks the IL-2Ra receptor chain |
| Belatacept | Nulojix | Binds CD80 and CD86, thereby blocking interaction with CD28 |
| Bevacizumab | Avastin | Binds VEGF |
| Certolizumab pegol | Cimzia | Blocks TNF-α |
| Cetuximab | Erbitux | Binds to EGFR, and inhibits the binding of EGF and TGF-α |
| Dasatinib | Sprycel | Bcr-Abl tyrosine kinase inhibitor |
| Dimethyl fumarate | Tecfidera | Activates the nuclear erythroid 2-related factor 2 transcriptional pathway |
| Etanercept | Enbrel | Blocks TNF-α |
| Fingolimod | Gilenya | Sphingosine 1-phosphate receptor modulator |
| Glatiramer acetate | Copaxone | Immunomodulatory; target unknown |
| Golimumab | Simponi | Blocks TNF-α |
| Ibritumomab tiuxetan | Zevalin | Binds to CD20 cells |
| Ibrutinib | Imbruvica | Tyrosine kinase inhibitor |
| Imatinib mesylate | Gleevec, STI 571 | Signal transduction inhibitor/protein-tyrosine kinase inhibitor |
| Infliximab | Remicade | Blocks TNF-α |
| Interferon α | Pegasys, PegIntron | Immunomodulatory |

(*continued*)

## Table 3-04 Immunosuppressive & immunomodulatory biologic agents that preclude use of live vaccines (continued)

| GENERIC NAME | TRADE NAME | MECHANISM OF ACTION |
|---|---|---|
| Interferon beta-1a | Avonex, Rebif | Immunomodulatory; target unknown |
| Interferon beta-1b | Betaseron | Immunomodulatory; target unknown |
| Lenalidomide | Revlimid | Immunomodulatory |
| Natalizumab | Tysabri | Binds α4-integrin on leukocytes, which inhibits adhesion |
| Nivolumab | Opdivo | Activates CD8 cells by targeting the PD-1 pathway |
| Ocrelizumab | Ocrevus | Binds CD20 |
| Ofatumumab | Arzerra | Binds CD20 |
| Panitumumab | Vectibix | Binds EGFR, inhibiting the binding of other ligands |
| Pembrolizumab | Keytruda | Activates CD8 cells by targeting the PD-1 pathway |
| Rilonacept | Arcalyst | Binds and blocks IL-1 |
| Rituximab | Rituxan | Binds CD20 |
| Sarilumab | Kevzara | Binds IL-6 |
| Secukinumab | Cosentyx | Selectively binds to the interleukin-17A (IL-17A) cytokine |
| Sunitinib malate | Sutent | Multikinase inhibitor |
| Tocilizumab | Actemra | Binds IL-6 |
| Tofacitinib | Xeljanz | JAK kinase inhibitor |
| Trastuzumab | Herceptin | Binds to the Human EGFR 2 (HER2) |
| Ustekinumab | Stelara | Binds to IL-12 and IL-23 |
| Vedolizumab | Entyvio | Binds integrin $\alpha_4\beta_7$ |
| Zanubrutinib | Brukinsa | Tyrosine kinase inhibitor |

Abbreviations: CD, cluster of differentiation; CTLA, cytotoxic T-lymphocyte antigen; EGFR, epidermal growth factor receptor; IL, interleukin; PD, programmed cell death protein; TGF, transforming growth factor; TNF, tumor necrosis factor; VEGF, vascular endothelial growth factor.

[1]This table is based primarily on conservative expert opinion, given the lack of clinical data. Numerous agents often are given in combination with other agents (especially chemotherapy) and are immunosuppressive when given together. The list provides examples but is not inclusive of all biologic agents that suppress or modulate the immune system. Not all therapeutic monoclonal antibodies or other biologic agents result in immunosuppression; details of individual agents not listed here must be reviewed before determining whether live viral vaccines can be given. Interferon and glatiramer acetate given to patients with multiple sclerosis (MS) are immunomodulators and are generally not classified by MS experts as immunosuppressive so do not preclude live vaccine administration (except perhaps yellow fever vaccine), but clinical data to support safety with live vaccines are lacking.

## VACCINE CONSIDERATIONS FOR TRAVELERS WITH SEVERE IMMUNE COMPROMISE

Inform severely immunocompromised people that their response to vaccination might be muted. The immunosuppressive regimen does not predict the decrease in response to vaccination. No basis exists for interpreting laboratory studies of general immune parameters to predict vaccine safety or efficacy. Recent data in solid organ transplant recipients vaccinated before transplant suggest that a prolonged phase of protective antibody titers can exist after transplant. In general, serologic testing for response to most travel-related vaccines is not clinically recommended.

The length of time clinicians should wait after discontinuation of immunosuppressive therapies before administering a live vaccine is not uniform and depends on the therapy. For cancer chemotherapy, radiation therapy, and highly immunosuppressive medications (exclusive of lymphocyte-depleting agents and organ transplant immunosuppression), the waiting period is 3 months. For lymphocyte-depleting agents (alemtuzumab, rituximab), the waiting period is ≥6 months, although IDSA guidelines suggest that the waiting period should be ≥1 year. For immunosuppressive corticosteroid regimens, the waiting period is 1 month.

Restarting immunosuppression after live vaccination has not been studied, but some experts would recommend waiting ≥1 month. Special considerations for travelers with severe immune compromise apply for several travel-related vaccines.

### CHOLERA

The safety and effectiveness of the oral live attenuated bacterial cholera vaccine, Vaxchora, has not been established in immunocompromised people. An older formulation of CVD 103-HgR vaccine was not associated with serious or systemic adverse events in patients with HIV, although the data are limited.

### EBOLA

Safety and efficacy of Ebola Zaire live recombinant vaccine (ERVEBO, rVSV-ZEBOV vaccine [Merck Sharp & Dohme Corp.]) has not been adequately assessed in immunocompromised adults. A small number of adults living with HIV have been vaccinated with ERVEBO, and additional studies are ongoing to investigate its use in people living with HIV without severe immune compromise. The risk from vaccination with ERVEBO in immunocompromised people should be weighed against the risk for Ebola virus disease.

### HEPATITIS A

Data indicate that immunocompromised people, notably those being treated with immunosuppressive drugs, can have inadequate or slow seroconversion after a single dose of HepA vaccine. Limited data also suggest that modified dosing regimens, including a doubling of the standard antigen dose or administration of additional doses prior to travel, might increase response rates.

Solid organ transplant candidates who are unvaccinated, undervaccinated, or seronegative for HepA should receive a 2-dose HepA vaccine series. People with immunocompromising conditions should start a 2-dose HepA vaccine series as soon as travel is considered. Immunocompromised people traveling in <2 weeks should simultaneously receive the initial dose of HepA vaccine and HepA immune globulin (IG); administer the vaccine and the IG in separate limbs. Testing for the presence of HAV antibody after vaccination is recommended for immunocompromised people whose subsequent clinical management depends on knowledge of their immune status and people for whom revaccination might be indicated. Because response to HepA vaccine might be reduced in people with HIV infection, perform postvaccination serologic testing on all people with HIV infection ≥1 month after they complete the HepA vaccine series.

### HEPATITIS B

The humoral immune response to HepB vaccine is reduced in immunocompromised children and adults. Limited data indicate that modified dosing regimens could increase response rates. As with dialysis patients, use a 3-dose series of 40 μg Recombivax HB at 0, 1, and 6 months, or a 4-dose series of 40 μg Engerix-B at 0, 1, 2, and 6 months. Heplisav-B (HepB-CpG) is an adjuvanted vaccine and is administered as 2 doses, 1 month apart, in

people ≥18 years old. Postvaccination serologic testing after any HepB vaccination series is recommended to confirm response and guide the need for revaccination in immunocompromised people.

**JAPANESE ENCEPHALITIS**

Although recommended for numerous destinations (see Sec. 5, Part 2, Ch. 13, Japanese Encephalitis), no data are available on the safety or efficacy of Japanese encephalitis (JE) vaccines in immunocompromised patients. JE vaccine should be given to at-risk travelers. As with other vaccines, immunocompromised patients likely will have decreased intensity and durability of protection, and more frequent booster doses might be indicated.

**RABIES**

Immunocompromised people deemed at risk for vaccine-preventable rabies should receive a 3-dose series of vaccine on days 0, 7, and 21 or 28, but not the 2-dose series (day 0 and day 7) recommended in 2021 for immunocompetent people. Furthermore, administer the vaccine as an intramuscular injection, not as an intradermal injection as recommended by some authorities outside the United States. Serologic postvaccination testing might be indicated. For postexposure rabies prophylaxis, all severely immunocompromised people should generally receive rabies vaccine at days 0, 3, 7, 14, and 28, plus human rabies immune globulin, regardless of previous vaccination history.

**SMALLPOX / MONKEYPOX**

JYNNEOS (Imvamune, Imvanex) is an approved by the US Food and Drug Administration (FDA) vaccine for prevention of smallpox and monkeypox, but it is not commercially available. JYNNEOS is a live, attenuated, nonreplicating, virus-derived vaccine that is indicated for first responders participating in smallpox or monkeypox outbreaks. Unlike the live, replication-competent smallpox vaccine (ACAM2000), JYNNEOS is not contraindicated for use in immunocompromised people and should be safe. Immunocompromised people might, however, have a diminished immune response to the vaccine.

**TICK-BORNE ENCEPHALITIS**

Immunocompromised people might have a diminished immune response to killed tick-borne encephalitis vaccine, which is FDA-approved and safe for this population.

**TYPHOID FEVER**

CDC recommends administering injectable Vi capsular polysaccharide vaccine (Typhim Vi, ViCPS) rather than live, oral *Salmonella typhi* vaccine Ty21A (Vivotif) for at-risk, immunocompromised patients. Data on the safety and efficacy of typhoid vaccines in immunocompromised patients are lacking.

**YELLOW FEVER**

***CONTRAINDICATIONS***

In general, strongly discourage unvaccinated travelers with severe immune compromise from traveling to destinations where infection with YF virus is a risk. Severe immunosuppression is a contraindication to YF vaccination because these patients are at increased risk of developing a serious adverse event (e.g., life-threatening YF vaccine–associated viscerotropic disease, YF vaccine–associated neurologic disease). Additionally, YF vaccination is contraindicated in people with a history of a thymus disorder associated with abnormal immune cell function (e.g., myasthenia gravis or thymoma); this contraindication applies regardless of whether the person has undergone therapeutic thymectomy (see Sec. 5, Part 2, Ch. 26, Yellow Fever). No data are available to support IgA deficiency as a contraindication to YF vaccination.

If patients are unable to avoid travel to areas where YF vaccination is recommended (see Maps 5-10 and 5-11) and the immunocompromised traveler is previously unvaccinated, inform them of YF risk, carefully instruct them in methods to avoid mosquito bites, and provide them with a vaccination medical waiver in their International Certificate of Vaccination or Prophylaxis (see https://wwwnc.cdc.gov/travel/page/icvp, and Sec. 5, Part 2, Ch. 26, Yellow Fever). Travelers falling into this category might choose to travel during periods of lower disease activity. Warn travelers that some countries with YF vaccine entry requirements might not honor YF vaccination

waiver documents and that the traveler might be refused entry or quarantined.

*PRECAUTIONS (RELATIVE CONTRAINDICATIONS)*

ACIP considers certain conditions with limited immune deficits (e.g., asymptomatic HIV infection) to be precautions (as opposed to contraindications) to administration of YF vaccine. For these patients, offer YF vaccine if travel to YF-endemic areas is unavoidable, and monitor vaccine recipients closely for possible adverse effects. If country entry requirements, and not true exposure risk, are the only reasons to vaccinate a traveler with asymptomatic HIV infection or a limited immune deficit, the physician should provide a waiver (see https://wwwnc.cdc.gov/travel/page/icvp, and Sec. 5, Part 2, Ch. 26, Yellow Fever).

Studies show that higher CD4+ T-lymphocyte counts and suppressed HIV viral loads seem to be the key determinants for developing protective neutralizing antibodies after YF vaccination. Patients with undetectable viral loads respond well to YF vaccination regardless of CD4+ T-lymphocyte counts, although data are limited in those with CD4+ T-lymphocyte counts <200/mL. Because vaccine response might be suboptimal, such vaccinees are candidates for serologic testing 1 month after vaccination. For information about serologic testing, contact the state health department or CDC's Division of Vector-Borne Diseases at 970-221-6400. Current data from clinical and epidemiologic studies are insufficient to evaluate the actual risk for severe adverse effects associated with YF vaccine among recipients with limited immune deficits.

*BOOSTER DOSES*

Because a single dose of YF vaccine provides long-lasting protection, ACIP no longer recommends booster doses for most travelers. Additional doses of YF vaccine are recommended, however, for some people who might not have as robust or sustained immune response to YF vaccine.

People who received HSCT after receiving a dose of YF vaccine and who are sufficiently immunocompetent to be safely vaccinated should be revaccinated if travel puts them at risk for YF. People infected with HIV when they received their last dose of YF vaccine should receive a dose every 10 years if they continue to be at risk for YF and if their current CD4+ T-lymphocyte counts do not indicate precautions or contradictions. Recent data suggest that YF vaccination before solid organ transplant, even long before transplant, generally provides protective antibody levels after transplant.

**ZOSTER**

Although no extra pretravel indication exists, many travel clinics administer zoster vaccines. In 2021, the FDA approved the use of recombinant zoster vaccine (RZV), now the only available preparation in the United States, for all immunocompromised people ≥18 years of age.

ACIP recommends 2 doses of recombinant zoster vaccine for all adults ≥19 years old who are or who will be immunodeficient or immunosuppressed due to disease or therapy, regardless of travel plans. Qualifying underlying conditions include, but are not limited to, HSCT or solid organ transplant recipients, hematologic and or generalized cancer, HIV, and people receiving immunosuppressive therapy.

## HOUSEHOLD CONTACTS

### Routine Vaccines

Three live vaccines (MMR, rotavirus, and varicella) should be administered to susceptible household contacts and other close contacts of immunocompromised patients when indicated. If a varicella vaccine recipient has a rash after vaccination, direct contact with susceptible household contacts with altered immunocompetence should be avoided until the rash resolves. Educate immunocompromised patients about the risk for fecal–oral transmission of poliovirus in countries where the oral polio vaccine is used, since there have been reports of reversion to wild type virus with associated clinical disease.

For influenza vaccination, choose inactive influenza vaccine (IIV); household and other close contacts of mildly or moderately immunocompromised patients can safely receive LAIV if they are unable to receive IIV. LAIV is contraindicated in close contacts and caregivers of severely

immunocompromised people who require a protected environment.

### Smallpox / Monkeypox Vaccine

ACAM2000 is a live, replicating smallpox vaccine, indicated for use in military personnel and laboratory workers with potential exposure to the virus. Recipients of the vaccine can transmit the virus to household and intimate contacts; therefore, vaccinated family or household members should implement infection control measures, particularly those with immunocompromise. JYNNEOS is an FDA-approved but not commercially available live nonreplicating smallpox/monkeypox vaccine that would not be contraindicated in immunocompromised individuals or their contacts.

### Yellow Fever Vaccine

Yellow fever vaccine can be administered to household contacts when indicated.

## MALARIA PROPHYLAXIS & TREATMENT

Malaria infection and the drugs used to treat it can exacerbate an immunocompromised traveler's underlying condition. Moreover, asplenia, HIV, and some immunosuppressive regimens can predispose travelers to more serious malaria infection. For these reasons, stress the need for malaria prophylaxis and strict adherence to mosquito bite avoidance to immunocompromised travelers to malaria-endemic areas (see Sec. 2, Ch. 5, Yellow Fever Vaccine and Malaria Prevention Information, by Country; Sec. 4, Ch. 6, Mosquitoes, Ticks & Other Arthropods; and Sec. 5, Part 3, Ch. 16, Malaria).

### People Infected with HIV

Malaria is more severe in people infected with HIV; malaria infection increases HIV viral load and could exacerbate disease progression. In addition, take extra care when researching potential drug interactions in people with HIV who are receiving antiretroviral therapy. The University of Liverpool offers an interactive web-based resource for assessing possible drug interactions (www.hiv-druginteractions.org; a mobile application also is available).

#### CHEMOPROPHYLAXIS

Some older maintenance regimens for HIV have been noted to interact with drugs used for malaria chemoprophylaxis. Notably, chloroquine, mefloquine, and primaquine can interact with older maintenance regimens for HIV, particularly those containing protease inhibitors (PIs). Efavirenz lowers serum levels of both atovaquone and proguanil, but no evidence suggests clinical failure of these agents when used concurrently. Efavirenz also potentially can increase the production of hemotoxic primaquine metabolites.

Most current first-line regimens for HIV (integrase and entry inhibitors) have few drug interactions. Commonly used integrase inhibitors (bicetegravir, cabotegravir, dolutegravir, elvitegravir, raltegravir), and nucleoside/nucleotide reverse transcriptase inhibitor (NRTI) combinations (brand names include Descovy-Tivicay, Truvada-Tivicay) have no known interactions with CDC-recommended malaria chemoprophylactic drugs; the cobicistat booster co-formulated with elvitegravir (Stribild, Genvoya) theoretically could increase mefloquine levels. The emtricitabine, rilpivirine, tenofovir alafenamide (TAF)/tenofovir disoproxil fumarate (TDF) combinations (Odefsey and Complera) similarly have no interactions with antimalarial drugs.

#### TREATMENT

Malaria treatment regimens, including artemisinin derivatives, quinine/quinidine, lumefantrine (part of the artemether/lumefantrine combination, Coartem), and atovaquone and proguanil potentially could have interactions with many non-nucleoside reverse transcriptase inhibitors (NNRTIs), PIs, and the CCR5 receptor antagonist, maraviroc. Seek advice from CDC or other malaria experts when treating patients for malaria who are also on antiretrovirals.

### Organ Transplant Recipients

In organ transplant recipients, atovaquone-proguanil might be the most appropriate malaria prophylactic agent because other antimalarials can interact with calcineurin inhibitors and mTor inhibitors (cyclosporine, everolimus, sirolimus, tacrolimus). Chloroquine, doxycycline mefloquine, and primaquine can elevate calcineurin

inhibitor levels. Chloroquine and mefloquine can interact with calcineurin inhibitors to prolong the QT interval. Some travel-related medications need to be dose-adjusted according to altered hepatic or renal function.

## ENTERIC INFECTIONS

Many foodborne and waterborne infections (e.g., those caused by *Campylobacter*, *Cryptosporidium*, *Giardia*, *Listeria*, *Salmonella*, or *Shigella*) can be severe or become chronic in immunocompromised people. Provide all travelers with instruction on safe food and beverage precautions; travelers' diarrhea can occur despite strict adherence. Meticulous hand hygiene, including frequent and thorough handwashing with soap and water, is the best prevention against gastroenteritis. Travelers should wash hands after contact with public surfaces, after any contact with animals or their living areas, and before preparing or eating food.

### Travelers' Diarrhea

Selecting antimicrobial drugs for appropriate self-treatment of travelers' diarrhea (see Sec. 2, Ch. 6, Travelers' Diarrhea) requires special consideration of potential drug interactions in patients already taking medications for chronic medical conditions. Fluoroquinolones, rifaximin, and rifamycin SV are active against several enteric bacterial pathogens and are not known to have major interactions with highly active antiretroviral therapy (HAART) drugs. Macrolide antibiotics can, however, interact with HAART drugs. Fluoroquinolones and azithromycin are generally well tolerated in combination with calcineurin inhibitors and mTor inhibitors, but in rare instances increase a prolonged QT interval (caution in those >500 ms).

### Waterborne Diseases

To reduce the risk for cryptosporidiosis, giardiasis, and other waterborne infections, immunocompromised travelers should avoid swallowing water during swimming and other water-based recreational activities and should not swim in water that might be contaminated with sewage or animal waste. Travelers with liver disease should consider avoiding direct exposure to salt water because of the risk for *Vibrio* spp. exposure, and all immunocompromised people should avoid raw seafood. Patients and clinicians should be aware of the risk for infection or colonization with multidrug-resistant organisms during travel; remind immunosuppressed travelers who become ill to report recent travel to their doctors.

## REDUCING RISK FOR OTHER DISEASES

Geographically focal infections that pose an increased risk for severe outcomes for immunocompromised people include visceral leishmaniasis (see Sec. 5, Part 3, Ch. 15, Visceral Leishmaniasis) and inhaled fungal infections such as *Talaromyces marneffei* (formerly *Penicillium marneffei*) in Southeast Asia, and coccidioidomycosis (see Sec. 5. Part 4, Ch. 1, Coccidioidomycosis / Valley Fever) and histoplasmosis (see Sec. 5, Part 4, Ch. 2, Histoplasmosis) in the Americas.

### Coronavirus Disease 2019

People with immunocompromising conditions or who are on immunosuppressive therapy are at increased risk for severe illness, hospitalization, and death if infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19). Moreover, moderately or severely immunocompromised people might routinely shed infectious virus for ≤20 days (see Sec. 5, Part 2, Ch. 3, COVID-19).

Counsel moderately and severely immunocompromised people to be up to date with their COVID-19 vaccinations (www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/immuno.html) before travel. Because people who are immunocompromised might have a less robust immune response to COVID-19 vaccines, even those whose vaccinations are up to date should maintain awareness of the COVID-19 situation at their destination. In the pretravel consultation, discuss the possible options of reconsidering travel or delaying travel to destinations where COVID-19 transmission is currently high and risk for infection is greater.

CDC also provides COVID-19 cruise ship information at www.cdc.gov/coronavirus/2019-ncov/travelers/cruise-travel-during-covid19.

html. SARS-CoV-2 spreads easily on cruise ships; outbreaks can overwhelm onboard medical capacity, and ship-to-shore medical evacuations can be challenging (see Sec. 8, Ch. 6, Cruise Ship Travel).

In addition to helping ensure that moderately and severely immunocompromised travelers are up to date with their COVID-19 vaccinations, provide information on the importance of taking protective measures (e.g., wearing a well-fitting mask or respirator while in public indoor spaces, avoiding spending time in poorly ventilated indoor locations). Suggest to immunocompromised travelers that they also consider wearing a well-fitting mask or respirator when outdoors during sustained close contact with others. Advise close contacts (e.g., household members, caregivers) of immunocompromised people to adhere to the same precautions. For the latest guidance and recommendations regarding COVID-19 vaccinations, boosters, and therapeutic options, see www.cdc.gov/coronavirus/2019-nCoV/index.html.

## Tuberculosis

Establishing the tuberculosis status of immunocompromised travelers going to regions endemic for tuberculosis can be helpful in the evaluation of subsequent illness (see Sec. 5, Part 1, Ch. 23, . . . *perspectives*: Testing Travelers for *Mycobacterium tuberculosis* Infection). Depending on the traveler's degree of immune suppression, the baseline tuberculosis status might be assessed by a tuberculin skin test, *Mycobacterium tuberculosis* antigen–specific interferon-γ assay (i.e., QuantiFERON-TB Gold or T-SPOT TB, both generally more sensitive in immunocompromised patients than skin testing), or chest radiograph. The need for posttravel testing (often 3 months after travel) depends on exposure risk during the trip, medical conditions, and other factors.

People with HIV and transplant recipients might require primary or secondary prophylaxis for opportunistic infections (e.g., *Mycobacterium*, *Pneumocystis*, and *Toxoplasma* spp.). Adherence to all indicated prophylactic regimens should be confirmed before travel.

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# TRAVELERS WITH DISABILITIES

Jasmine Owens, Eric Cahill

The Americans with Disabilities Act (www.dol.gov/general/topic/disability/ada) defines an individual with a disability as a person who has a physical or mental impairment that substantially limits ≥1 major life activity, has a record of such an impairment, or is regarded as having such an impairment.

According to the World Health Organization, an activity limitation can include difficulty seeing, hearing, walking, or problem-solving. With proper preparation, many travelers with disabilities can travel internationally. The following guidelines can help support safe, accessible travel for people with various disabilities:

**Assess**. Assess each international itinerary individually, in consultation with travel agencies or tour operators that provide services to people with disabilities.

**Review**. Review (and refer travelers to) online resources for additional information (Table 3-05).

**Suggest**. Suggest that travelers ensure necessary accommodations are available throughout the entire trip.

**Recommend**. Recommend travelers enroll in the US Department of State's Smart Traveler Enrollment Program (https://step.state.gov/step) to receive security messages and to make it easier for the US embassy or consulate to assist in an emergency.

## HUMAN RIGHTS

Each country has its own standard of accessibility for people with disabilities. Unlike the United States, many countries do not legally require accommodations for people with disabilities. Several websites can help the traveler answer questions about accessibility for a specific destination or provide support if an emergency occurs. Travel agents, hotels, airlines, or cruise ship companies can also serve as sources for information about services available during the trip and at the destination, including for service animals. Table 3-06 includes resources for travelers with disabilities to help them gather information about accommodations and human rights frameworks at their destination.

## AIR TRAVEL REGULATIONS & STANDARDS

### Air Carrier Access Act

In 1986, Congress passed the Air Carrier Access Act (ACAA) to ensure that people with disabilities are treated without discrimination in a way

## Table 3-05 Online resources for travelers with disabilities or chronic illnesses[1]

| ORGANIZATION / SOURCE | RESOURCE | AVAILABLE FROM |
|---|---|---|
| American Council of the Blind | Travel Resources | https://acb.org/content/travel-resources |
| Autism Speaks | Traveling with Autism | www.autismspeaks.org/traveling-autism |
| Christopher & Dana Reeve Foundation | Traveling with your wheelchair | www.christopherreeve.org/living-with-paralysis/home-travel/traveling-with-your-wheelchair |
| Disabled World | Travel: Accessible Disability Travel Information | www.disabled-world.com/travel/ |
| Epilepsy Foundation | Air Travel and Epilepsy | www.epilepsy.com/sites/core/files/atoms/files/Air%20Travel%20Factsheet_0.pdf |
| Federal Aviation Administration | Acceptance Criteria for Portable Oxygen Concentrators | www.faa.gov/about/initiatives/cabin_safety/portable_oxygen |
| Federal Maritime Commission | Cruise Vacations: Know Before You Go | www.fmc.gov/wp-content/uploads/2018/09/PVO2014-508.pdf |
| International Civil Aviation Organization | Air Transport Accessibility | www.icao.int/safety/iStars/Pages/Air-Transport-Accessibility.aspx |
| National Association of the Deaf | Cruise Lines | www.nad.org/resources/transportation-and-travel/cruise-lines/ |
| | Transportation and Travel | www.nad.org/resources/transportation-and-travel/ |
| New Directions Travel | | www.newdirectionstravel.org/ |
| Society for Accessible Travel & Hospitality | | https://sath.org/ |
| USA.gov | Your Legal Disability Rights | www.usa.gov/disability-rights#item-213969 |
| US Department of Homeland Security, Transportation Security Administration | Disabilities and Medical Conditions | www.tsa.gov/travel/special-procedures |
| | Disability Notification Card | www.tsa.gov/sites/default/files/disability_notification_card_508.pdf |
| | Request for TSA Cares Assistance | www.tsa.gov/contact-center/form/cares |
| | What Can I Bring? | www.tsa.gov/travel/security-screening/whatcanibring/medical |

## Table 3-05 Online resources for travelers with disabilities or chronic illnesses (continued)

| ORGANIZATION / SOURCE | RESOURCE | AVAILABLE FROM |
|---|---|---|
| US Department of State | Travelers with Disabilities | https://travel.state.gov/content/travel/en/international-travel/before-you-go/travelers-with-special-considerations/traveling-with-disabilties.html |
| US Department of Transportation | Guide: Air Travelers with Developmental Disabilities | www.transportation.gov/sites/dot.gov/files/docs/Developmental_Disabilities_Guide.pdf |
| | Service Animals (Including Emotional Support Animals) | www.transportation.gov/individuals/aviation-consumer-protection/service-animals-including-emotional-support-animals |
| | Traveling with a Disability | www.transportation.gov/individuals/aviation-consumer-protection/traveling-disability |
| | What Airline Employees, Airline Contractors, and Air Travelers with Disabilities Need to Know About Access to Air Travel for Persons with Disabilities – July 15, 2005 | www.transportation.gov/individuals/aviation-consumer-protection/what-airline-employees-airline-contractors-and-air |
| | Wheelchairs and Other Assistive Devices | www.transportation.gov/individuals/aviation-consumer-protection/wheelchairs-and-other-assistive-devices |
| WheelchairTravel.org | Wheelchair Users' Guide to Air Travel | https://wheelchairtravel.org/air-travel/ |

[1]Some travelers with disabilities or chronic illnesses might need additional attention and adaptation of transportation services. This table is not intended to be an exhaustive list of resources.

consistent with the safe carriage of all air passengers. These regulations were established by the US Department of Transportation (DOT) and apply to all flights provided by US airlines and flights to or from the United States by foreign carriers.

ACAA ensures carriers cannot refuse transportation based on a disability. The ACAA has a few exceptions, however; for example, the carrier can refuse transportation if the person with a disability would endanger the health or safety of other passengers or if transporting the person would be a violation of Federal Aviation Administration safety rules. Travelers and their clinicians can learn more about exceptions and other aspects of the ACAA by reviewing What Airline Employees, Airline Contractors, and Air Travelers with Disabilities Need to Know about Access to Air Travel for Persons with Disabilities (see Table 3-05 for link).

Air carriers are also obliged to accept a declaration by travelers with disabilities that they are self-reliant. A medical certificate (a written statement from the traveler's health care provider saying that the traveler can complete the flight safely without requiring extraordinary medical care or endangering other travelers) might be required in specific situations. Examples of specific situations include a person intending to travel with a possible communicable disease, a person requiring a stretcher or oxygen, or a person whose medical condition can be reasonably expected to affect the operation of the flight.