CDC

CENTERS FOR DISEASE CONTROL
AND PREVENTION

Health Information for International Travel, 1999–2000

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service

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Health Information for International Travel 1999–2000

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Center for Infectious Diseases
Division of Quarantine
Atlanta, Georgia 30333

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Preface

One of the important responsibilities of the Centers for Disease Control and Prevention is to provide up-to-date and comprehensive information on immunization requirements and recommendations for international travelers. Readers are invited to send comments and suggestions regarding this book to:

CENTERS FOR DISEASE CONTROL AND PREVENTION
National Center for Infectious Diseases
Division of Quarantine (E-03)
Attention: Travelers' Health Section
Atlanta, Georgia 30333

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The Travelers' Health Section gratefully acknowledges the considerable contributions and assistance of the staff of the National Center for HIV, STD and TB Prevention, the National Center for Infectious Diseases, the National Immunization Program, the National Center for Injury Prevention and Control, and the National Center for Environmental Health.

Changes Since 1996–97 Edition

New formatting is intended to facilitate the use of this book for the reader. We hope you will find that the changes have made the text more user-friendly.

Vaccination Certificate Requirements and Malaria Risk and Prophylaxis

The chapter "Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, by Country," has been updated to be current as of April 1999.

- The list of countries that require an international certificate of vaccination has been updated.
- Information on malaria risk and areas with chloroquine-resistant *Plasmodium falciparum* malaria has been updated, and specific prophylaxis regimens by country have been revised.
- Countries for which CDC recommends yellow fever vaccination, even though vaccination may not be required, have been identified in this section.

The need for continuous cross-referencing with the biweekly "Summary of Health Information for International Travel" (also known as the Blue Sheet) is emphasized throughout the text.

U.S. Public Health Service Recommendations

Text has been modified and a new table has been added.

Specific Recommendations for Vaccination and Prophylaxis

All text in this section has been updated.

AIDS — The section on recommendations for HIV-infected travelers has been moved to "Advising the Traveler with Special Needs."

New text has been added for the following diseases: Hepatitis C, Influenza, Leptospirosis, Lyme Disease, Rotavirus, and Varicella.

Rabies — Tables have been updated.

Health Hints for the International Traveler

New text for bovine spongiform encephalitis. Information expanded for portable water filters and environmental effects.

Geographic Distribution of Potential Health Hazards

Text updated for disease risks.

Advising the Traveler with Special Needs

New chapter has been added.

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INTRODUCTION

This book is published by the Division of Quarantine (DQ), National Center for Infectious Diseases, Centers for Disease Control and Prevention (CDC), as a reference for those who advise international travelers of health risks. It is written primarily for health-care providers, although others who advise travelers, such as travel agencies, airlines, cruise lines, missionary organizations, and academic institutions, may find the information useful. Additional information, as well as an on-line version of this text, can be found on the CDC Internet web site at <http://www.cdc.gov/travel/index.htm>. Regional and disease-specific documents may be requested from the CDC Fax Information Service at (888) 232-3299; the directory of international travel documents is available by request from the same number. Users who are not medical professionals may find these sources to be more user friendly. All these resources specify the vaccinations required by different countries and include information on preventive measures that travelers should take to protect their health.

A biennial publication such as this cannot remain absolutely current, given the speed of global travel and disease transmission. Therefore, this text should be used in conjunction with the electronic sources mentioned above. Notices about changes in vaccine requirements, disease outbreaks, drug availability, or emerging infections will be posted promptly on these services. We suggest that any changes be penciled into or filed in the corresponding sections of this book to keep the information up to date.

This edition has been extensively reorganized to facilitate its use. This text cannot cover all the topics pertinent to the growing field of travel medicine. It focuses on the prevention of infectious diseases, which are only part of travelers' health risks. For example, long-term travelers and those with chronic medical conditions often need special considerations that this text cannot encompass. Topics such as air pollution, bioterrorism, crime, quality of overseas medical facilities, and psychosocial and cross-cultural issues are not covered. Therefore, this text must be viewed as just one reference of the many needed by those who counsel travelers.

Other sources of travel medicine information are the web sites of two professional medical organizations: the International Society of Travel Medicine, at <http://www.istm.org/>, and the American Society of Tropical Medicine and Hygiene, at <http://www.astmh.org/>. Both these web sites include directories of travel clinics throughout the United States. For travelers visiting other countries in the Western Hemisphere, the Pan American Health Organization (PAHO), a regional office of the World Health Organization (WHO), has a web site at <http://www.paho.org> that includes country-specific information about many health issues. The WHO web address at <http://www.who.org> provides disease surveillance data worldwide. Another valuable resource for country information is the Central Intelligence Agency's web site: <http://www.odci.gov/cia/publications/pubs.html>. (Select "World Factbook.")

CDC's recommendations for international travelers apply primarily to vaccinations and prophylactic measures for U.S. travelers planning to visit areas of the world where diseases such as measles, poliomyelitis, typhoid fever, yellow fever, viral hepatitis, and malaria occur. The purpose of the International Health Regulations (IHR) adopted by WHO is to ensure maximum security against the international spread of diseases, with minimum interference with world commerce. As a result of these regulations, some countries require an International

Certificate of Vaccination against yellow fever as a condition for entry. Because some countries require vaccination against yellow fever only if a traveler arrives from a country infected with this disease, current information must be taken into consideration in determining whether vaccinations are required. DQ publishes a biweekly "Summary of Health Information for International Travel" ("the Blue Sheet") to show where cholera and yellow fever are being reported. The "Blue Sheet" is available by fax by calling (888) 232-3299 and requesting document 220022. Official changes in the vaccines required by individual countries and reported by WHO are published in the Blue Sheet. These changes should be entered in the Vaccination Certificate Requirements section of this book (p. 11) to keep information current. This book, when kept up to date with changes in vaccination requirements and used in conjunction with the Blue Sheet, provides accurate information on vaccinations required for international travel.

The extent to which advisory statements can be made specific for each country and each disease is limited by both space and the lack of reliable data. Although WHO regularly publishes data on the occurrence of many of these diseases, these figures represent only a small percentage of the actual number of cases. Communicable diseases are not reported consistently by practicing physicians, and many cases may never come to medical attention. For these reasons, any recommendations must be interpreted with care.

In general, the risk of acquiring illness when engaging in international travel depends on the areas of the world to be visited. Travelers to developing countries are at greater risk than those who travel to developed areas. In most developed countries (e.g., Canada, Australia, New Zealand, Japan, and Western Europe), the risk to the general health of the traveler is no greater than that incurred throughout the United States. Living conditions and standards of sanitation and hygiene vary considerably throughout the world, and immunization coverage levels may be low; thus the risk of acquiring disease can vary greatly in these locations. Travelers visiting primarily tourist areas, on itineraries that do not include visits to rural areas, have lower risk of exposure to food or water of questionable quality.

Travelers who visit small cities off the usual tourist routes, who spend extended periods of time in small villages or rural areas, or who expect to have prolonged contact with children are at greater risk of acquiring infectious diseases, because of exposure to water and food of uncertain quality and close contact with local residents who may harbor the organisms that cause such diseases. Consequently, the added protection of booster or additional doses of certain vaccines and other prophylaxis is recommended for these persons. International travelers are advised to contact their physicians, local health departments, or private or public agencies that advise international travelers at least 6 weeks prior to departure to obtain current health information on the countries they plan to visit. See the "Specific Recommendations for Vaccination and Prophylaxis" section for more detailed comments.

In addition to geographic-specific risk factors, host susceptibility factors may play a significant role in determining the risk of acquiring illness during international travel. Persons at the extremes of age (young children and the elderly), pregnant women, or immunocompromised (e.g., HIV-infected) persons may be particularly vulnerable to certain infectious diseases. It is strongly advised that these persons contact physicians with special expertise in travel medicine at least 6 weeks before departure, especially if the itinerary includes high-risk destinations.

List of Countries by Region

To facilitate the use of this book, the following list of countries and other areas by region is provided. These regions correspond with those used in CDC's Fax Information Service for international travel. For region-specific vaccine recommendations and requirements, request a directory of International Travel documents by calling the fax service at (888) 232-3299.

AFRICA

North Africa

Algeria
Canary Islands
Egypt
Libyan Arab Jamahiriya
Morocco
Tunisia

Southern Africa

Botswana
Lesotho
Namibia
South Africa
St. Helena
Swaziland
Zimbabwe

Central Africa

Angola
Cameroon
Central African Republic
Chad
Congo
Democratic Republic of Congo
Equatorial Guinea
Gabon
Sudan
Zambia

East Africa

Burundi
Comoros
Djibouti
Eritrea
Ethiopia
Kenya
Madagascar
Malawi
Mauritius
Mayotte
Mozambique
Réunion
Rwanda
Seychelles
Somalia
Tanzania
Uganda

West Africa

Benin
Burkina Faso
Cape Verde Islands
Côte d'Ivoire
Gambia
Ghana
Guinea
Guinea-Bissau
Liberia
Mali
Mauritania
Niger
Nigeria
São Tomé & Principe
Senegal
Sierra Leone
Togo

THE AMERICAS

Mexico & Central America

Belize
Costa Rica
El Salvador
Guatemala
Honduras
Mexico
Nicaragua
Panama

Tropical South America

Bolivia
Brazil
Colombia
Ecuador
French Guiana
Guyana
Paraguay
Peru
Suriname
Venezuela

Temperate South America

Argentina
Chile
Falkland Islands (U.K.)
Uruguay

THE CARIBBEAN

Antigua & Barbuda
Bahamas
Barbados
Bermuda (U.K.)
Cayman Islands (U.K.)
Cuba
Dominica
Dominican Republic
Grenada
Guadeloupe
Haiti
Jamaica
Martinique (Fr.)
Montserrat (U.K.)
Netherlands Antilles:
Aruba, Bonaire, Curaçao, Saba, Saint Eustatius
Sint Maarten
Puerto Rico (U.S.)
Saint Lucia
Saint Christopher (St. Kitts) & Nevis (U.K.)
St. Vincent & the Grenadines
Trinidad and Tobago
Virgin Islands, U.S.
Virgin Islands, U.K.

ASIA

East Asia

China
Hong Kong
Japan
Macao
Mongolia
North Korea
South Korea
Taiwan

Southeast Asia

Brunei Darussalam
Cambodia
Indonesia
Laos
Malaysia
Myanmar (Burma)
Philippines
Singapore
Thailand
Vietnam

Indian Subcontinent

Afghanistan
Bangladesh
Bhutan
India
Maldives
Nepal
Pakistan
Sri Lanka

Middle East

Bahrain
Cyprus
Iran
Iraq
Israel
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
Syrian Arab Republic
Turkey
United Arab Emirates
Yemen

EUROPE and the NEWLY INDEPENDENT STATES (N.I.S.)

Eastern Europe & N.I.S.*

Albania
Armenia*
Azerbaijan*
Belarus*
Bosnia/Herzegovina
Bulgaria
Croatia
Czech Republic
Estonia*
Former Yugoslav Republic of Macedonia
Georgia*
Hungary
Kazakhstan*
Kyrgyz Republic*
Latvia*
Lithuania*
Moldova, Republic of*
Poland
Romania
Russia
Serbia/Montenegro
Slovak Republic
Slovenia
Tajikistan*
Turkmenistan*
Ukraine*
Uzbekistan*

Western Europe

Andorra
Austria
Azores
Belgium
Denmark
Faroe Island
Finland
France
Germany
Gibraltar
Greece
Greenland
Iceland
Ireland
Italy
Liechtenstein
Luxembourg
Madeira
Malta
Monaco
Netherlands
Norway
Portugal
San Marino
Spain
Sweden
Switzerland
United Kingdom

Australia/Oceania

American Samoa
Christmas Island
Cook Island
Fiji
Guam
Kiribati
Micronesia
(Fed. States of)
Nauru
New Caledonia
New Zealand
Niue
Northern Mariana Islands
Palau
Papua New Guinea
Pitcairn
Samoa
Solomon Islands
Tahiti
Tonga
Tokelau
Tuvalu
U.S. Trust Territories
Vanuatu
Wake Island
Wallis and Futuna

Vaccination Information

Vaccination Information

How To Use This Resource To Determine Vaccinations Required Or Recommended

The following steps are suggested to determine vaccinations required:

1. List the traveler's itinerary in the sequence in which the countries will be visited. Consider the length of stay in each country. For the purpose of the International Health Regulations, the incubation periods of the quarantinable diseases are—

   Cholera — 5 days Plague — 6 days Yellow Fever — 6 days

2. Because some countries require vaccination only if a traveler arrives from an infected area, check the current biweekly Blue Sheet to determine if any country on the itinerary is currently infected with yellow fever. The Blue Sheet is available both from the CDC website at <http://www.cdc.gov/travel/index.htm> and from the CDC Fax Information Service by dialing 1-888-CDC-FAXX (232-3299) and requesting document number 220022.

3. Use the Vaccine Requirements section of this book (yellow pages) to determine the requirements for each country. **Infected countries and infected areas** are reported in the biweekly "Summary of Health Information for International Travel" (Blue Sheet). Read both these resources carefully, as they are interdependent.

Some immunizations are not required under the International Health Regulations but are recommended to protect the health of the traveler. For some diseases no vaccines are available, so specific preventive behaviors or medications are a necessity. Along with the summary below, use the Specific Recommendations section of this book (pp. 69–158) to determine immunizations that are recommended for the specific itinerary.

The following is an outline of vaccine recommendations for most adult travelers. Exceptions to this guide may be pregnant women, infants, children, the elderly and immunocompromised patients, or patients with unusual itineraries. For these patients, read the corresponding text. This page is meant only as a guide and should be read along with the full text sections of this book. Use the table of contents to find the text for each disease. As recommendations may change because of outbreaks or other events such as natural disasters, it is necessary to also check either the Fax Information service (telephone number above; request document number 000005) or consult the Internet pages as described above.

Tetanus/Diphtheria — After completion of a primary series, a booster should be administered once every 10 years for life.

Polio — After completion of a primary series, CDC recommends an additional dose ONCE in adult life if traveling to a country where the

	disease occurs. See Geographic Distribution Section to find countries with polio.
Measles	CDC recommends a dose of measles vaccine for persons born in or after 1957 who have not had two doses on or after the first birthday. Exceptions: pregnant women and other persons for whom it is contraindicated (e.g., those who are severely immunocompromised) should not get measles vaccine. Vaccination is not necessary for persons with documentation of physician-diagnosed measles or serologic evidence of measles immunity.
Hepatitis B	Consider for long-term travelers (staying > 6 months) going to intermediate- or high-prevalence areas (see hepatitis B map) and ANY short-term travelers who may have contact with blood or body fluids (e.g., health-care workers) if they have not had the vaccine previously.
Varicella	Discuss with a physician. See page 149.

Travel Vaccines

Cholera	Almost never recommended; see text pages for rare exceptions.
Hepatitis A	Consider for all travelers except those traveling to developed countries in Europe, Japan, Australia, New Zealand, or Canada (see hepatitis A map and text, page 94).
Japanese encephalitis	Should generally be considered for travelers who will be visiting 30 days or longer, risk areas in all of Asia, the Indian Subcontinent and Western Pacific (for areas and seasons of risk, see specific text and accompanying tables).
Meningococcal meningitis	Consider if traveling during December–June to the Meningitis Belt (see map, page 125). May be required for travelers to Saudi Arabia during the Hajj and Umra.
Plague	Rarely recommended; see text for exceptions.
Rabies	Consider for travelers who might be exposed to wild or domestic animals through work or recreation, except in countries listed as "rabies-free" in Table 17.
Tickborne encephalitis	Not available in the United States; see text at "Encephalitis, tickborne" for discussion. Use insect repellent to minimize risk.
Typhoid fever	Consider for travelers staying in areas of questionable sanitation. See Typhoid text for vaccine options.

Yellow Fever — Follow steps 1, 2, and 3 on page 9 to determine if **required** by country of destination. CDC **recommendations** for this vaccine are listed by country in the yellow pages of text.

Malaria Prophylaxis **(No vaccine available)**

Malaria — Important to consider if traveling to Mexico, Central and South America, Dominican Republic, Haiti, Africa, parts of the Middle East, Asia, and a few countries within Eastern Europe. See country-specific risk information in yellow pages and comprehensive discussion of prophylactic medication in "Specific Recommendations" chapter of this book.

Vaccination Certificate Requirements

Under the International Health Regulations adopted by the World Health Organization, a country under certain conditions may require an International Certificate of Vaccination against Yellow Fever from international travelers. *Smallpox was deleted from the diseases subject to the Regulations effective January 1, 1982. Smallpox vaccination should not be given (see p. 143).* No country requires a certificate of cholera immunization. Vaccination against cholera cannot prevent the introduction into a country. The World Health Assembly therefore amended the International Health Regulations in 1973 so that cholera vaccination should no longer be required of any traveler. Information on vaccination requirements included in this book has been provided by the countries to WHO.

Table 1. Summary of vaccinations that may be required by International Health Regulations (WHO)

Type	Doses	Comments
Cholera		No longer required
Yellow Fever	1	Certificate valid for 10 years beginning 10 days after primary vaccination or on the date of revaccination, if within 10 years of first injection.

Model of a Correctly Completed Certificate

An International Certificate of Vaccination must be complete in every detail; if incomplete or inaccurate, it is not valid. Revisions of this certificate dated 9-66, 9-69, 9-71, 1-74, 9-77, 1-82, or 11-91 are acceptable.

INTERNATIONAL CERTIFICATE OF VACCINATION
AS APPROVED BY
THE WORLD HEALTH ORGANIZATION

CERTIFICAT INTERNATIONAL DE VACCINATION
APPROUVÉ PAR
L'ORGANISATION MONDIALE DE LA SANTÉ

John Doe
TRAVELER'S NAME–NOM DU VOYAGEUR

0000 Clairmont Road
ADDRESS–ADRESSE (Number–Numéro) (Street–Rue)

Atlanta, Georgia 30029
(City–Ville)

(County–Département) (State–État)

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE

PHS-731 (REV. 11-91)

John Doe
1 May 1956
12 May 1964
DeKalb County Board of Health
Comanche
Lot #: 3012 MW
OFFICIAL VACCINATION GEORGIA 10 889 10380 U. S. A.

The International Certificate of Vaccination, PHS-731 may be purchased for $1.00 each (or $15.00 per 100) from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, telephone: (202) 512-1800. The stock number is 017-001-00483-9.

Vaccination Certificate Requirements for Direct Travel from the United States to Other Countries

For direct travel from the United States, only the following countries require an International Certificate of Vaccination against yellow fever:

Benin
Burkina Faso
Cameroon
Central African Republic
Congo
Côte d'Ivoire
Democratic Republic of Congo
French Guiana
Gabon
Ghana
Liberia
Mali
Mauritania (for stay of > 2 weeks)
Niger
Rwanda
São Tomé and Principe
Togo

For travel to and between other countries, check the individual country requirements.

No vaccinations are required to return to the United States.

Exemption From Vaccination

Age: Some countries do not require an International Certificate of Vaccination for infants under 6 months or 1 year of age. Check the individual country requirements for age.

Medical grounds: If a physician thinks that a particular vaccination should not be administered for medical reasons, the traveler should be given a signed, dated statement of the reasons on the physician's letterhead stationery.

There are no other acceptable reasons for exemption from vaccination.

Unvaccinated Persons

Travelers who do not have the required vaccinations upon entering a country may be subject to vaccination, medical follow-up, and/or isolation. In a few countries, unvaccinated travelers are denied entry.

Travel On Military Orders

Since military requirements may exceed the requirements indicated in this book, any person who plans to travel on military orders (civilians and military personnel) should contact the nearest military medical facility to determine the requirements for the trip.

Persons Authorized to Vaccinate and to Validate the International Certificate of Vaccination

Yellow fever vaccinations must be given at official Yellow Fever Vaccination Centers as designated by respective State health departments, and the certificate must be validated by the center that administers the vaccine. Other vaccinations may be given under the supervision of any licensed physician. Validation of the certificate can be obtained at most city, county, and state health departments, or from vaccinating physicians who possess a "Uniform Stamp." State health departments are responsible for designating non-Federal Yellow Fever Vaccination Centers and issuing Uniform Stamps to be used to validate the International Certificate of Vaccination. Information about the location and hours of Yellow Fever Vaccination Centers may be obtained by contacting local or state health departments. Physicians administering vaccine to travelers should emphasize that an International Certificate of Vaccination must be validated to be acceptable to quarantine authorities. Failure to secure validation may cause a traveler to be revaccinated, quarantined, or denied entry.

Persons Authorized To Sign The Certificate

The International Certificate of Vaccination must be signed by a licensed physician or by a person designated by the physician. A signature stamp is not acceptable.

U.S. PUBLIC HEALTH SERVICE RECOMMENDATIONS

U.S. Public Health Service Recommendations

General Recommendations on Vaccination and Prophylaxis

The Advisory Committee on Immunization Practices (ACIP) meets periodically and makes immunization recommendations to the Public Health Service. Benefits and risks are associated with the use of all immunobiologics—no vaccine is completely effective or completely safe. The recommendations are based on scientific evidence of benefits and risks to achieve optimal levels of protection against vaccine-preventable diseases. The recommendations include information on general immunization issues and on the use of specific vaccines. When these recommendations are revised, they are published in the *Morbidity and Mortality Weekly Report*.

Vaccinations against diphtheria, tetanus, pertussis, measles, mumps, rubella, varicella, poliomyelitis, hepatitis B, rotavirus, and *Haemophilus influenzae* type b invasive disease are routinely administered in the United States, usually in childhood. If persons do not have a history of adequate protection against these diseases, immunizations appropriate to their age and previous immunization status should be obtained, whether or not international travel is planned. The text and Tables 2–21 present recommendations for use, the number of doses, dose intervals, boosters, adverse reactions, precautions, and contraindications of vaccines and toxoids that may be indicated for travelers. For specific vaccines and toxoids, additional details on background, adverse reactions, precautions, and contraindications are available in the appropriate ACIP statements.

Spacing of Immunobiologics

Multiple Doses of the Same Antigen

Some vaccines require more than one dose for adequate protection. The use of multiple reduced doses or the use of doses given at less than minimum intervals may lessen the antibody response and is not endorsed or recommended; such doses should not be counted as part of the vaccination series. The minimum interval between subsequent doses of vaccine is shown in Table 6. **Except for oral typhoid vaccine, it is unnecessary to restart an interrupted series of a vaccine or toxoid or to add extra doses.** However, some products (i.e., tetanus and diphtheria toxoids) require periodic booster doses to maintain protection.

Simultaneous Administration

All commonly used vaccines can safely and effectively be given simultaneously (i.e., on the same day) without impairing antibody responses or increasing rates of adverse reactions. This is particularly helpful for international travelers for whom exposure to several infectious diseases may be imminent.

In general, inactivated vaccines can be administered simultaneously at separate sites. However, when vaccines commonly associated with local or systemic reactions (e.g., cholera and plague) are given simultaneously, reactions may be accentuated. It is preferable to administer these vaccines on separate occasions.

Simultaneous administration of DTaP (or DTP), IPV (or OPV), Hib vaccine, MMR, varicella, rotavirus, and hepatitis B vaccine is encouraged for children who are the recommended age to receive these vaccines and for whom no contraindications exist at the time.

Yellow fever vaccine may be administered simultaneously with all other vaccines except cholera vaccine. The antibody response of yellow fever and cholera vaccines is decreased if they are administered simultaneously or within a short time of each other. If possible, yellow fever and cholera vaccinations should be separated by at least 3 weeks. If there are time constraints and both vaccines are necessary, the injections can be administered simultaneously or within a 3-week period with the understanding that antibody response may not be optimal.

Limited data suggest that the immunogenicity and safety of Japanese encephalitis (JE) vaccine are not compromised by simultaneous administration with DTaP/DTP vaccine. No data exist on the effect of concurrent administration of other vaccines, drugs (e.g., chloroquine, mefloquine), or biologicals on the safety and immunogenicity of JE vaccine.

Inactivated vaccines generally do not interfere with the immune response to other inactivated or live-virus vaccines. In general, an inactivated vaccine can be given either simultaneously or at any time before or after a different inactivated vaccine or a live-virus vaccine. An exception, as noted above, is the recommendation that yellow fever and cholera vaccines should be separated by at least 3 weeks, if possible.

Theoretically, the immune response to an injected live-virus vaccine (e.g., MMR, varicella, yellow fever) might be impaired if administered within 28 days of another live-virus vaccine; however, no evidence exists for currently available vaccines to support this concern. Whenever possible, injected live-virus vaccines administered on different days should be administered at least 28 days apart. However, OPV and rotavirus vaccine can be administered at any time before, with, or after each other, if indicated. OPV and rotavirus vaccines can be administered any time before or after an injected live-virus vaccine.

Live-virus vaccines can interfere with an individual's response to tuberculin testing. Tuberculin testing, if otherwise indicated, can be done on the day that live-virus vaccines are administered or 4–6 weeks later.

Vaccination of Persons with Acute Illnesses

It is important to take every opportunity to provide appropriate vaccinations. The decision to delay vaccination because of a current or recent acute illness depends on the severity of the symptoms and their etiology. Although a moderate or severe acute illness is sufficient reason to postpone vaccination, minor illnesses, such as diarrhea, mild upper-respiratory infection with or without low-grade fever, or other low-grade febrile illness are not contraindications to vaccination. Antimicrobial therapy is not a contraindication to vaccination, except in some circumstances with oral typhoid vaccine (TY21a). Persons with moderate or severe acute illness with or without fever should be vaccinated as soon as their condition has improved. This precaution is to avoid superimposing adverse effects from the vaccine on underlying illness or mistakenly attributing a manifestation of underlying illness to the vaccine.

Routine physical examinations or temperature measurements are not prerequisites for vaccinating infants and other persons who appear to be in good health. Asking if the person is ill,

postponing vaccination for those with moderate or severe acute illnesses, and vaccinating those without contraindications are appropriate procedures in immunization programs.

Immune Globulin (IG) preparations

When MMR and varicella vaccines are given with immune globulin (IG, formerly called immune serum globulin and immunoglobulin) preparations, antibody response can be diminished. IG preparations do not interfere with the immune response to OPV, rotavirus, or yellow fever vaccines. The duration of inhibition of MMR and varicella vaccines is related to the dose of IG. Administration of MMR, its components, and varicella vaccines should be delayed for 3–11 months after IG administration, depending on the type and quantity administered. Recommended intervals are shown in Table 2.

Because of imminent exposure to disease, immune globulin administration may become necessary after MMR, its individual components, or varicella vaccines have been given, and interference can occur. Vaccine virus replication and stimulation of immunity usually occur within 2–3 weeks after vaccination. If the interval between administration of these vaccines and the subsequent administration of an immune globulin preparation is ≥ 14 days, vaccine need not be readministered. If the interval is < 14 days, the vaccine should be readministered after the interval shown in Table 2, unless serologic testing indicates that antibodies have been produced. If administration of immune globulin becomes necessary because of imminent exposure to disease, MMR, its components, or varicella vaccine can be administered simultaneously with IG, with the recognition that vaccine-induced immunity may be compromised. The vaccine should be administered in a site remote from that chosen for the IG injection. Vaccination should be repeated after the interval noted in Table 7 unless serologic testing indicates antibodies have been produced.

When IG is given with the first dose of hepatitis A vaccine, the proportion of persons who develop protective levels of antibody is not affected, but antibody concentrations are lower. Because the final concentrations of anti-HAV are many times higher than that considered protective, this reduced immunogenicity is not expected to be clinically important. IG preparations interact minimally with other inactivated vaccines and toxoids. Therefore, other inactivated vaccines can be given simultaneously or at any time interval after or before an antibody-containing blood product is used. However, vaccines should be administered at sites different than the antibody.

Hypersensitivity to Vaccine Components

Vaccine components can cause allergic reactions in some recipients. These reactions can be local or systemic and can include anaphylaxis or anaphylactic-like responses. The vaccine components responsible can include the vaccine antigen, animal proteins, antibiotics, preservatives, or stabilizers. The most common animal protein allergen is egg protein in vaccines prepared by using embryonated chicken eggs (i.e., influenza and yellow fever vaccines). Generally, persons who are able to eat eggs or egg products safely may receive these vaccines, while persons with histories of anaphylactic allergy (e.g., hives, swelling of the mouth and throat, difficulty breathing, hypotension, or shock) to eggs or egg proteins of ordinarily should not. Screening persons by asking whether they can eat eggs without adverse effects is a reasonable way to identify those who might be at risk from receiving yellow fever and

Table 2. Suggested intervals between administration of immune globulin preparations for various indications and vaccines containing live measles virus*

Indication	Dose (including mg of IgG/kg)	Suggested Interval before Measles Vaccination
RSV monoclonal antibody (Synagis™)†	15 mg/kg IM	None
Tetanus (TIG)	250 units (10 mg IgG/kg) IM	3 months
Hepatitis A (IG)		
Contact prophylaxis	0.02 mL/kg (3.3 mg IgG/kg) IM	3 months
International travel	0.06 mL/kg (10 mg IgG/kg) IM	3 months
Hepatitis B prophylaxis (HBIG)	0.06 mL/kg (10 mg IgG/kg) IM	3 months
Rabies prophylaxis (HRIG)	20 IU/kg (22 mg IgG/kg) IM	4 months
Varicella prophylaxis (VZIG)	125 units/10kg (20-40 mg IgG/kg) IM (maximum 625 units)	5 months
Measles prophylaxis (IG)		
Normal contact	0.25 mL/kg (40 mg IgG/kg) IM	5 months
Immunocompromised contact§	0.50 mL/kg (80 mg IgG/kg) IM	6 months
Blood transfusion		
Red blood cells (RBCs), washed	10 mL/kg negligible IgG/kg) IV	None
RBCs, adenine-saline added	10 mL/kg (10 mg IgG/kg) IV	3 months
Packed RBCs (Hct 65%)¶	10 mL/kg (60 mg IgG/kg) IV	6 months
Whole blood (Hct 35-50%)¶	10 mL/kg (80-100 mg IgG/kg) IV	6 months
Plasma/platelet products	10 mL/kg (160 mg IgG/kg) IV	7 months
Cytomegalovirus prophylaxis (CMV IGIV)	150 mg/kg (maximum)	6 months
Respiratory syncytial virus prophylaxis (RSV IGIV)	750 mg/kg	9 months
Intravenous Immune Globulin (IGIV)		
IGIV, Replacement therapy	300-400 mg/kg IV¶	8 months
IGIV, ITP**	400 mg/kg IV	8 months
IGIV, ITP**	1000 mg/kg IV	10 months
IGIV, Kawasaki disease	2 grams/kg IV	11 months

*This table is not intended to be used for determining the correct indications and dosage for the use of IG preparations. Unvaccinated persons may not be fully protected against measles during the entire suggested interval, and additional doses of IG and/or measles vaccine may be indicated following measles exposure. The concentration of measles antibody in a particular IG preparation can vary by lot. The rate of antibody clearance following receipt of an IG preparation can also vary. The recommended intervals are extrapolated from an estimated half-life of 30 days for passively acquired antibody and an observed interference with the immune response to measles vaccine for 5 months following a dose of 80 mg IgG/kg.

†Contains only antibody to respiratory syncytial virus (RSV)

§Measles vaccination is recommended for children with HIV infection but is contraindicated in patients with congenital disorders of the immune system.

¶Assumes a serum IgG concentration of 16 mg/mL.

**Immune (formerly, idiopathic) thrombocytopenic purpura.

influenza vaccines. Protocols have been developed for testing and vaccinating persons with anaphylactic reactions to egg ingestion.

Some vaccines contain preservatives (e.g., thimerosal, a mercury compound) or trace amounts of antibiotics to which patients may be allergic. Persons administering vaccines should carefully review the information provided in the package insert before deciding if the rare patient with such allergy should receive the vaccine(s). No currently recommended vaccine contains penicillin or penicillin derivatives. Some vaccines (e.g., MMR and its individual component vaccines) contain trace amounts of neomycin. This amount is less than would usually be used for the skin test to determine hypersensitivity. However, persons who have experienced anaphylactic reactions to neomycin should not receive these vaccines. Most often, neomycin allergy is a contact dermatitis—a manifestation of a delayed-type (cell-mediated) immune response—rather than anaphylaxis. A history of delayed-type reactions to neomycin is not a contraindication to receiving these vaccines.

Certain bacterial vaccines, such as cholera and plague, are frequently associated with local or systemic adverse effects. These reactions appear to be of a toxic rather than a hypersensitivity nature and are difficult to link with a specific sensitivity to vaccine components.

Reporting Adverse Events Following Immunization

Modern vaccines are extremely safe and effective. However, adverse events following immunization have been reported with all vaccines. These range from frequent, minor, local reactions to extremely rare, severe, systemic illness such as paralysis associated with OPV. Information on side effects and adverse events following specific vaccines and toxoids are discussed in detail in each ACIP statement. Health-care providers are required by law to report selected adverse events occurring after vaccination with DTP, DT, Td, MMR, MR, measles, OPV, and IPV. Reportable events are listed in MMWR 1988;37:197–200 and, in general, are events usually requiring the recipient to seek medical attention. These events and all temporally associated events following receipt of all other vaccines severe enough to require the recipient to seek medical attention should be reported to the Vaccine Adverse Event Reporting System (VAERS) (telephone: 1-800-822-7967) maintained by CDC and the Food and Drug Administration.

Vaccine Recommendations for Children

Vaccine Recommendations for Children

Age at Which Immunobiologics Are Administered

Factors that influence recommendations concerning the age at which a vaccine is administered include the age-specific risks of the disease and its complications, the ability of individuals of a given age to respond to the vaccine(s), and the potential interference with the immune response by passively transferred maternal antibody. Vaccines are recommended for the youngest age group at risk of developing the disease whose members are known to develop an adequate antibody response to vaccination.

The routine immunization recommendations and schedules for infants and children in the United States (Tables 3 and 4) do not provide specific guidelines for infants and young children who will travel internationally before the age when specific vaccines and toxoids are routinely recommended. The section titled "Immunization Schedule Modifications for International Travel for Infants and Inadequately Immunized Young Children < 2 Years of Age" (page 25) provides revised recommendations and schedules for active and passive immunization of such infants and children.

Immunization Schedule Modifications for International Travel for Infants and Inadequately Immunized Young Children < 2 Years of Age

Routine Childhood Vaccine-Preventable Diseases (diphtheria, tetanus, pertussis, measles, mumps, rubella, varicella, rotavirus, polio, *Haemophilus influenzae* type b, and hepatitis B)

Diphtheria and Tetanus Toxoid and Pertussis Vaccine

Diphtheria is an endemic disease in many developing countries and is currently found throughout the New Independent States of the former Soviet Union. Tetanus occurs worldwide. Pertussis is common in developing countries and in other areas where pertussis immunization levels are low. Children leaving the United States should be as well immunized as possible. Optimum protection against diphtheria, tetanus, and pertussis in the first year of life is achieved with three doses of diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP), the first administered at 6–8 weeks of age and the next two at 4- to 8-week intervals. A fourth dose of DTaP should be administered 6–12 months after the third dose at 12–15 months of age. Two doses of DTaP received at intervals of at least 4 weeks may provide some protection, particularly against diphtheria and tetanus, while a single dose is of little protective benefit. Parents should be informed that children who have not received at least three doses of DTaP may not be fully protected from pertussis. Children < 7 years of age who at the time of travel have received fewer than three doses of DTaP should complete their remaining doses at 4-week intervals. A minimum of 6 months should separate the third and fourth doses of the DTaP schedule.

Measles Vaccine

Measles is an endemic disease in many developing countries and in other countries where measles immunization levels are low. Because the risk of contracting measles in many countries is greater than in the United States, children should be as well protected as possible before leaving the United States. Measles vaccine, preferably in combination with rubella and mumps vaccines (i.e., MMR vaccine) should be administered to all children ≥ 12 months of age. A second dose is currently recommended for all children and is usually given at school entry (Table 3).

The age at vaccination may be lowered for infants traveling to areas where the risk of measles is high. Infants 6–11 months of age who will be traveling to areas where measles is endemic or epidemic may receive a dose of single measles antigen vaccine before departure, although MMR may be used if single-antigen measles vaccine is not available. Children vaccinated prior to their first birthday must be revaccinated with two doses of MMR vaccine at least 4 weeks apart, on or after their first birthday. The optimal age for the first revaccination is 12–15 months. The second revaccination dose should normally be given at school entry. Since virtually all infants < 6 months of age will be protected by maternally derived antibodies, no additional means to provide protection against measles is generally necessary in this age group.

Mumps and Rubella Vaccine(s)

Because the risk of serious disease from infection with either mumps or rubella in infants is low, mumps and rubella vaccines generally should not be administered to children younger than 12 months, unless measles vaccine is indicated and single-antigen measles vaccine is not available. However, parents of children < 12 months of age should be immune to mumps and rubella so they will not expose the infant or become infected if the infant develops illness.

Varicella Vaccine

Varicella (chickenpox) is an endemic disease throughout the world. A single dose of varicella vaccine should be administered to all susceptible children without contraindications ≥ 12 months of age. Children who have a reliable history of having had chickenpox do not need to be vaccinated. Children < 12 months of age will generally be protected from varicella because of passive maternal antibody.

Rotavirus Vaccine

Rotavirus causes potentially severe diarrheal illness in infants and young children. Rotavirus is endemic throughout the world. Three doses of oral rotavirus vaccine should be administered, beginning at 6–8 weeks of age. The second and third doses should be separated from the preceding dose by 3–8 weeks. The first dose of rotavirus vaccine should be administered by 6 months of age, and all three doses should be administered before 12 months of age. The vaccine is not licensed or recommended for children ≥ 12 months of age.

Polio Vaccine

Two types of polio vaccine are available in the United States: live attenuated oral polio vaccine (OPV) and inactivated polio vaccine (IPV). For routine childhood vaccination, including children who will travel outside the United States, the Advisory Committee on Immunization Practices (ACIP) recommends a sequential IPV-OPV schedule, with IPV given at 2 and 4 months of age, followed by OPV at 12–18 months and 4–6 years of age. If an accelerated polio vaccination schedule is required, a previously unvaccinated child ≥ 6 weeks of age

should receive two doses of IPV separated by a minimum of 4 weeks, followed by OPV a minimum of 4 weeks after the second dose of IPV. The fourth polio dose (second OPV dose) is routinely administered at 4–6 years of age, but may be given as early as 4 weeks after the third dose. If travel to a polio-endemic area is imminent (in less than 4 weeks), an unvaccinated child ≥ 6 weeks of age should receive a single dose of OPV, with the remaining doses in the series administered after arrival in the foreign country.

A polio vaccination series that includes OPV as the first two doses of the series is acceptable only for special circumstances (e.g., vaccination of children whose parents do not accept the recommended sequential schedule, late initiation of vaccination that would require an unacceptable number of injections, imminent travel [<4 weeks] of an unvaccinated person to polio-endemic areas). For a schedule that includes only OPV, vaccination should begin at 6 weeks of age, with second and third doses given a minimum of 4 weeks after the preceding dose. The fourth dose of OPV is routinely administered at 4–6 years of age, but may be administered as early as 4 weeks after the third dose.

OPV is contraindicated if the child or a household contact of the child is immunosuppressed (e.g., chemotherapy, malignancy, HIV infection, etc). In this situation, only IPV should be administered. A schedule that includes only IPV may begin as early as 6 weeks of age, with the second and third doses given a minimum of 4 weeks after the preceding dose. The fourth dose of IPV is routinely administered at 4–6 years of age, but may be given as early as 4 weeks after the third dose.

Haemophilus influenzae type b Conjugate Vaccine

Haemophilus influenzae type b (Hib) is an endemic disease worldwide. Risk of acquiring disease may be higher in developing countries than in the United States. In the United States, four types of *Haemophilus influenzae* type b conjugate vaccines are available, three of which may be used in infants beginning at 6 weeks of age. Two Hib conjugates vaccines for infants are also available as combined whole-cell DTP-Hib vaccines. Routine Hib vaccination is recommended beginning at 2 months of age for all U.S. children. The first dose may be given as early as 6 weeks of age. A primary series consists of two or three doses (depending on the type of vaccine used) separated by 4–8 weeks. A booster dose is recommended at 12–15 months of age (see *Haemophilus influenzae* type b section, p. 91, for additional details).

If vaccination is started at ≥ 7 months of age, fewer doses may be required. If different brands of vaccine are administered, a total of three doses of Hib conjugate vaccine completes the primary series. After completion of the primary infant vaccination series, any of the licensed Hib conjugate vaccines may be used for the booster dose at 12–15 months.

Infants and children should have optimal protection prior to travel. If previously unvaccinated, children < 15 months of age should ideally receive at least two vaccine doses prior to travel. An interval as short as 4 weeks between these two doses is acceptable.

Unvaccinated children 15–59 months of age should receive a single dose of Hib vaccine.

Hepatitis B Vaccine

Hepatitis B vaccine is recommended for all infants beginning either at birth or by 2 months of age. Infants and young children who have not previously been vaccinated and who are

traveling to areas with intermediate and high hepatitis B virus (HBV) endemicity may be at risk if they are directly exposed to blood from the local population. Circumstances in which HBV transmission could occur include receipt of blood transfusions not screened for HBsAg, exposure to unsterilized needles (or other medical/dental equipment) in local health facilities, or continuous close contact with local children who have open skin lesions (impetigo, scabies, scratched insect bites). Such exposures are most likely to occur if the child is living for long periods in smaller cities or rural areas and in close contact with the local population. Children who will live in an area of intermediate or high HBV endemicity for ≥ 6 months and who are expected to have the above exposures should receive the three doses of hepatitis B vaccine. The interval between doses 1 and 2 should be 1–2 months. Between doses 2 and 3, the interval should be a minimum of 2 months; however, 4–12 months is preferred. (See Table 3, p. 30, for the suggested schedule and Table 13, p. 102, for vaccine-specific doses.)

Other Vaccines and Immune Globulin

Cholera Vaccine

One cholera vaccine, administered parenterally with a two-dose primary series, is currently licensed in the United States. The risk of cholera to U.S. travelers of any age who avoid high-risk food and drinks is so low that it is questionable whether vaccination is of benefit. No data are available concerning the efficacy or side effects of cholera vaccine in children < 6 months of age. Cholera vaccine is not recommended for children < 6 months of age. Breast-feeding is protective against cholera; careful preparation of formula and food from safe water and foodstuffs should protect nonbreast-fed infants.

Typhoid Vaccine

Typhoid vaccination is not required for international travel. No data are available concerning the efficacy of typhoid vaccine in infants. Breast-feeding is likely to be protective against typhoid; careful preparation of formula and food from safe water and foodstuffs should protect nonbreast-fed infants. Typhoid vaccine is recommended for older children traveling to areas where there is a recognized risk of exposure to *Salmonella typhi,* particularly if they are visiting friends and/or family in highly endemic areas (see Typhoid fever for information on dosage and route of administration of the vaccines, p. 145).

Yellow Fever Vaccine

Because infants are at high risk of developing encephalitis from yellow fever vaccine, the recommendations for vaccinating infants should be considered on an individual basis. Although the incidence of these adverse events has not been clearly defined, 14 of 18 reported cases of post-vaccination encephalitis were in infants < 4 months of age. One fatal case confirmed by viral isolation was in a 4-year-old child. The ACIP and the World Health Organization recommend that yellow fever vaccine should never be given to infants < 4 months of age. Yellow fever vaccine can be given to children ≥ 9 months of age if they are traveling to or living in areas of South America and Africa where yellow fever infection is officially reported (see "Summary of Health Information for International Travel," also known as the Blue Sheet) or to countries that require yellow fever immunization (see "Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, by Country," pp. 35–68). Children ≥ 9 months of age also should be immunized if they travel outside urban areas within the yellow fever endemic zone (see pages 35–68 and maps on pages 156 and 157). Infants 6–9 months of age should be vaccinated only if they travel to areas of ongoing epidemic yellow fever and a high level of protection against mosquito bites is not possible.

Immunization of children 4–6 months of age should be considered only under unusual circumstances (consult CDC), and in *no* instance should infants < 4 months of age receive yellow fever vaccine.

Hepatitis A Vaccine or Immune Globulin for Hepatitis A

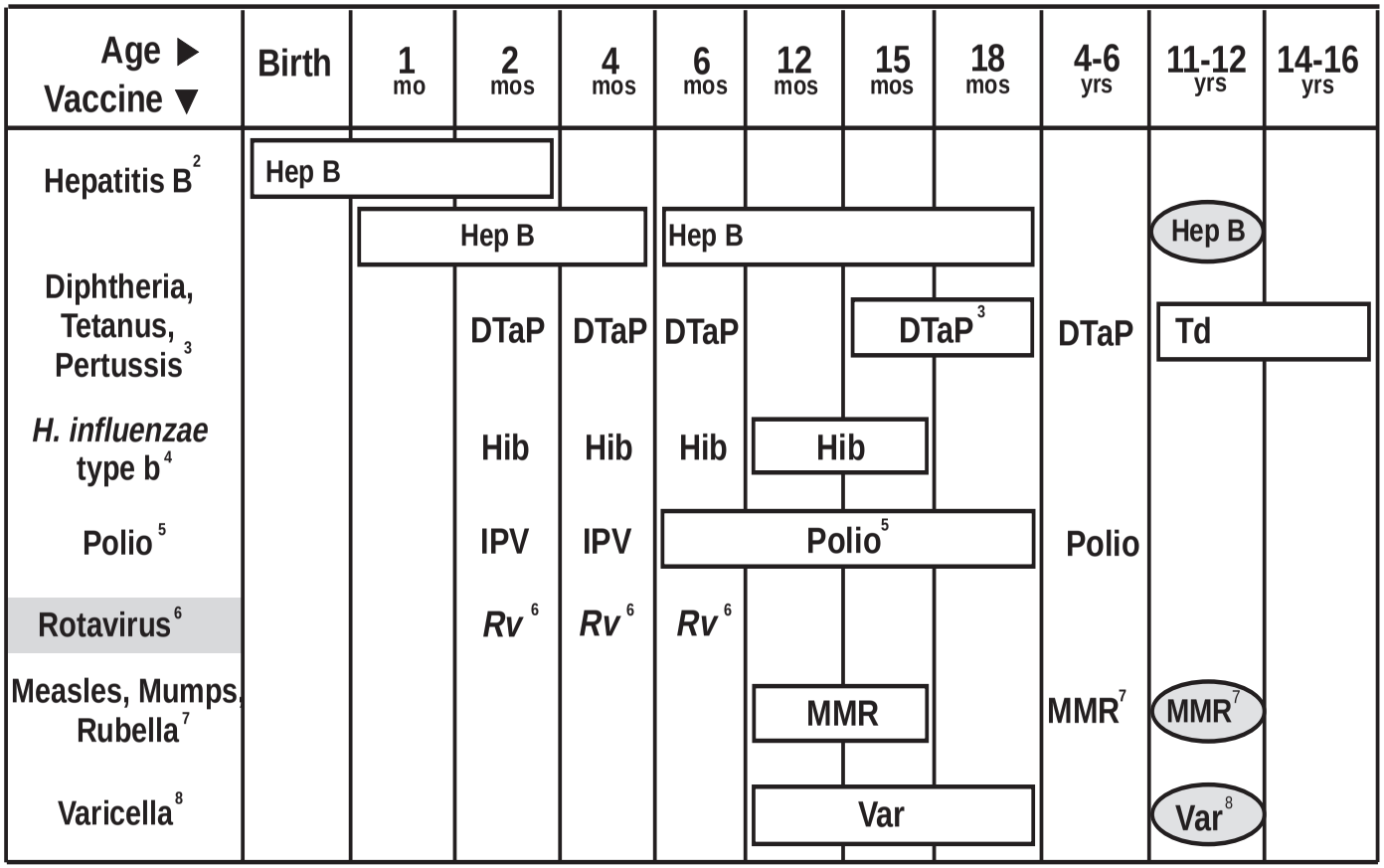
Infants and children traveling to developing countries are at increased risk of acquiring hepatitis A virus infection, especially if their travel is outside usual tourist routes, if they will be eating food or drinking water in settings of questionable sanitation, or if they will be in contact with local young children in settings of poor sanitation (see p. 93). Although hepatitis A is rarely severe in children < 5 years of age, infected children efficiently transmit infection to older children and adults. Immune globulin (IG) should be given to children < 2 years old in the same schedule as recommended for adults (Table 11, IG doses, p. 97). Children ≥ 2 years of age should receive the pediatric formulation of hepatitis A vaccine (Tables 12 and 12a, p. 97) or IG (Table 11, Immune Globulin for Protection Against Viral Hepatitis A, p. 97).

Other Diseases

See pages 120 and 170, respectively, for discussion of malaria and diarrhea in infants.

Table 3. Recommended Childhood Immunization Schedule United States, January - December 1999

Vaccines[1] are listed under routinely recommended ages. Bars indicate range of recommended ages for immunization. Any dose not given at th recommended age should be given as a "catch-up" immunization at any subsequent visit when indicated and feasible. Ovals indicate vaccines to given if previously recommended doses were missed or given earlier than the recommended minimum age.



Approved by the Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP).

[1]This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines. Combination vaccines may be used whenever any components of the combination are indicated and its other components are not contraindicated. Providers should consult the manufacturers' package inserts for detailed recommendations.

[2]Infants born to HBsAg-negative mothers should receive the 2nd dose of hepatitis B (Hep B) vaccine at least one month after the 1st dose. The 3rd dose should be administered at least 4 months after the 1st dose and at least 2 months after the 2nd dose, but not before 6 months of age for infants.
Infants born to HBsAg-positive mothers should receive hepatitis B vaccine and 0.5 mL hepatitis B immune globulin (HBIG) at separate sites, within 12 hours of birth. The 2nd dose is recommended at 1–2 months of age and the 3rd dose at 6 months of age.
Infants born to mothers whose HBsAg status is unknown should receive hepatitis B vaccine within 12 hours of birth. Maternal blood should be drawn at the time of delivery to determine the mother's HBsAg status; if the HBsAg test is positive, the infant should receive HBIG as soon as possible (no later than 1 week of age).
All children and adolescents (through 18 years of age) who have not been immunized against hepatitis B may begin the series during any visit. Special efforts should be made to immunize children who were born in or whose parents were born in areas of the world with moderate or high endemicity of hepatitis B virus infection.

[3]DTaP (diphtheria and tetanus toxoids and acellular pertussis vaccine) is the preferred vaccine for all doses in the immunization series, including completion of the series in children who have received 1 or more doses of whole-cell DTP vaccine. Whole-cell DTP is an acceptable alternative to DTaP. The 4th dose (DTP or DTaP) may be administered as early as 12 months of age, provided 6 months have elapsed since the 3rd dose and if the child is unlikely to return at age 15–18 months. Td (tetanus and diphtheria toxoids) is recommended at 11-12 years of age if at least 5 years have elapsed since the last dose of DTP, DTaP or DT. Subsequent routine Td boosters are recommended every 10 years.

[4]Three *Haemophilus influenzae* type b (Hib) conjugate vaccines are licensed for infant use. If PRP-OMP (PedvaxHIB® or ComVax® [Merck]) is administered at 2 and 4 months of age, a dose at 6 months is not required. Because clinical studies in infants have demonstrated that using some combination products may induce a lower immune response to the Hib vaccine component, DTaP/Hib combination products should not be used for primary immunization in infants at 2, 4 or 6 months of age, unless FDA-approved for these ages.

[5]Two poliovirus vaccines currently are licensed in the United States: inactivated poliovirus (IPV) vaccine and oral poliovirus (OPV) vaccine.
The ACIP, AAP, and AAFP now recommend that the first two doses of poliovirus vaccine should be IPV. The ACIP continues to recommend a sequential schedule of two doses of IPV administered at ages 2 and 4 months, followed by two doses of OPV at 12–18 months and 4–6 years. Use of IPV for all doses also is acceptable and is recommended for immunocompromised persons and their household contacts.
OPV is no longer recommended for the first two doses of the schedule and is acceptable only for special circumstances, such as children of parents who do not accept the recommended number of injections, late initiation of immunization, which would require an unacceptable number of injections, and imminent travel to polio-endemic areas. OPV remains the vaccine of choice for mass immunization campaigns to control outbreaks due to wild poliovirus.

[6]Rotavirus (Rv) vaccine is shaded and italicized to indicate: 1) health-care providers may require time and resources to incorporate this new vaccine into practice and 2) the AAFP feels that the decision to use rotavirus vaccine should be made by the parent or guardian in consultation with their physician or other health-care provider. The first dose of Rv vaccine should not be administered before 6 weeks of age, and the minimum interval between doses is 3 weeks. The Rv vaccine series should not be initiated at ≥ 7 months of age, and all doses should be completed by the first birthday.

[7]The 2nd dose of measles, mumps, and rubella (MMR) vaccine is recommended routinely at 4–6 years of age but may be administered during any visit, provided at least 4 weeks have elapsed since receipt of the 1st dose and that both doses are administered beginning at or after 12 months of age. Those who have not previously received the second dose should complete the schedule by the visit at 11–12 years of age.

[8]Varicella (Var) vaccine is recommended at any visit on or after the first birthday for susceptible children, i.e., those who lack a reliable history of chickenpox (as judged by a health-care provider) and who have not been immunized. Susceptible persons 13 years of age or older should receive two doses, given at least 4 weeks apart.

Table 4. Recommended Accelerated Immunization Schedule for Infants and Children <7 Years of Age Who Start the Series Late* or Who Are >1 Month Behind in the Immunization Schedule† (i.e., Children for Whom Compliance With Scheduled Return Visits Cannot Be Assured)

Timing	Vaccine(s)	Comments
First visit (≥ 4 months of age)	DTaP,§ IPV,¶ Hib,** Hepatitis B, MMR, varicella	Must be ≥ 12 months of age to receive MMR and varicella. If ≥ 5 years of age, Hib is not normally indicated.
Second visit (1 month†† after first visit)	DTaP,§ IPV,¶ Hib,** Hepatitis B	
Third visit (1 month after second visit)	DTaP,§ OPV,¶ Hib**	
Fourth visit (≥ 6 months after third visit)	DTaP,§Hib,** Hepatitis B	
4–6 years of age	DTaP,§ OPV, MMR	Preferably at or before school entry. DTaP is not necessary if fourth dose given on or after the fourth birthday. OPV not necessary if third dose given on or after fourth birthday.
11–12 years of age	Varicella, MMR, and/or Hepatitis B (if not already received). Td if >5 years since last dose.	Repeat Td every 10 years throughout life.

*If initiated in the first year of life, administer DTaP doses 1, 2, and 3 and polio doses 1, 2, and 3 according to this schedule; administer MMR and varicella when the child reaches 12–15 months of age. All vaccines should be administered simultaneously at the appropriate visit.

†See individual ACIP recommendations for detailed information on specific vaccines.

§Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP) is preferred for all doses of the series. A vaccine containing whole-cell pertussis vaccine is an acceptable alternative.

¶OPV is no longer recommended for the first two doses of the schedule and is acceptable only for special circumstances, e.g., children of parents who do not accept the recommended number of injections, late initiation of immunization, which would require an unacceptable number of injections, or imminent travel to polio-endemic areas.

**Recommended Hib schedule varies by vaccine manufacturer and age of the child when vaccination series is started. If series is begun at < 6 months of age, four doses are needed. (Only three doses are needed if all doses are PRP-OMP [PedvaxHIB®, Merck].) The fourth dose must be at least 2 months after the third dose and on or after the first birthday. If series started at age 7–11 months, three doses are needed, with the third dose 2 months after the second dose and on or after the first birthday. If series started at age 12–14 months, two doses are needed, 2 months apart. If series started at age ≥15 months, one dose of any licensed conjugate Hib vaccine is recommended.

††An interval of 28 or more days.

Based on *General Recommendations on Immunization* (1994), with modifications from subsequent ACIP statements.

Table 5. Recommended Immunization Schedule for Persons ≥ 7 Years of Age Not Vaccinated at the Recommended Time in Early Infancy*

Timing	Vaccine(s)	Comments
First visit	Td,† IPV,§, MMR,¶, Varicella,** and Hepatitis B††	Primary poliovirus vaccination is not routinely recommended for persons ≥ 18 years of age, unless traveling to infected areas.
Second visit (4–8 weeks after first visit)	Td, IPV, MMR,§§ Varicella,** Hepatitis B††	
Third visit (4-8 weeks after second visit	OPV§	
Fourth visit (5 months after third visit)	Td, OPV,§ Hepatitis B**	
Additional visits	Td	Repeat every 10 years throughout life.

*See individual ACIP recommendations for details.

†The DTP and DTaP doses administered to children < 7 years of age who remain incompletely vaccinated at age ≥ 7 years should be counted as prior exposure to tetanus and diphtheria toxoids (e.g., a child who previously received two doses of DTP needs only one dose of Td to complete a primary series for tetanus and diphtheria).

§A sequential schedule of IPV followed OPV is recommended for routine vaccination of children 2 months to 18 years of age. A total of four doses (two doses of IPV followed by two doses of OPV) is recommended. Schedules that include only OPV or only IPV are acceptable or preferred in some situations, and may require only three doses, depending on the age at vaccination. IPV is preferred for primary polio vaccination of persons ≥ 18 years of age. See text or the 1997 polio vaccine ACIP statement for details.

¶Persons born before 1957 can generally be considered immune to measles, mumps, and rubella. Birth before 1957 should not be accepted as evidence of rubella immunity for women who may become pregnant. See text for details.

**Varicella vaccine is recommended for all susceptible persons without contraindications ≥ 12 months of age. Children 12 months to 12 years of age should receive one dose. Persons ≥ 13 years of age should receive two doses separated by 4–8 weeks.

††Hepatitis B vaccine, recombinant. Selected high-risk groups for whom vaccination is recommended include persons with occupational risk, such as health-care and public-safety workers who have occupational exposure to blood, clients and staff of institutions for the developmentally disabled, hemodialysis patients, recipients of certain blood products (e.g., clotting factor concentrates), household contacts and sex partners of hepatitis B virus carriers, injecting drug users, sexually active homosexual and bisexual men, certain sexually active heterosexual men and women, inmates of long-term correctional facilities, certain international travelers, and families of HBsAg-positive adoptees from countries where HBV infection is endemic. Because risk factors are often not identified directly among adolescents, universal hepatitis B vaccination of teenagers should be implemented in communities where injecting drug use, pregnancy among teenagers, and/or sexually transmitted diseases are common.

§§The ACIP recommends a second dose of measles-containing vaccine (as MMR) for certain groups. Unvaccinated children should receive two doses of live measles-containing vaccine at least 4 weeks apart. In addition, the following persons born in 1957 or later should have two doses of MMR or other evidence of measles immunity: a) those entering post-high school educational settings, b) those beginning employment in health-care settings who will have direct patient contact, and c) international travelers.

Table 6. Minimum age for initial vaccination and minimum interval between vaccine doses, by type of vaccine

Vaccine	Minimum *age* for first dose*	Minimum *interval* from dose 1 to 2*	Minimum *interval* from dose 2 to 3*	Minimum *interval* from dose 3 to 4*
DTP/DTaP (DT)[†]	6 weeks	4 weeks	4 weeks	6 months
Combined DTP-Hib	6 weeks	1 month	1 month	6 months
Hib (primary series)				
HbOC	6 weeks	1 month	1 month	[§]
PRP-T	6 weeks	1 month	1 month	[§]
PRP-OMP	6 weeks	1 month	[§]	
Polio[¶]	6 weeks	4 weeks	4 weeks	4 weeks[††]
MMR	12 months[§§]	1 month		
Hepatitis B	birth	1 month	2 months[¶¶]	
Varicella	12 months	4 weeks		
Rotavirus***	6 weeks	3 weeks	3 weeks	

*These minimum acceptable ages and intervals may not correspond with the *optimal* recommended ages and intervals for vaccination. See tables 3–5 in the ACIP's *General Recommendations on Immunization* and the most current childhood immunization schedule (published each January in the *Morbidity and Mortality Weekly Report*) for the current recommended routine and accelerated vaccination schedules.

[†] Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP) is preferred for all doses of the series. A vaccine containing whole-cell pertussis vaccine is an acceptable alternative.

[§]The booster dose of Hib vaccine recommended following the primary vaccination series should be administered no earlier than 12 months of age **and** at least 2 months after the previous dose of Hib vaccine (Tables 3 and 4 of ACIP's *General Recommendations on Immunization*).

[¶]Sequential IPV/OPV, all OPV, or all IPV.

[††]It is preferable to administer the fourth dose of the polio series 3–4 years after the third dose.

[§§]Although the age for measles vaccination may be as young as 6 months in outbreak areas where cases are occurring in children <1 year of age, children initially vaccinated before the first birthday should be revaccinated at 12–15 months of age and an additional dose of vaccine should be administered at the time of school entry or according to local policy. Doses of MMR or other measles-containing vaccines should be separated by at least 1 month.

[¶¶]This final dose is recommended at least 4 months after the first dose and no earlier than 6 months of age.

*** The series should not be started if the child is older than 6 months of age. The vaccine should not be given to a child who is older than 12 months of age.

NOTE: This table contains some information that has not yet been published in the ACIP's recommendations.

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, by Country

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Afghanistan	If traveling from an **infected area** (see the Blue Sheet)	All	Confirmed	Mefloquine
Albania	If traveling from an **infected area** (see the Blue Sheet) and >1 year of age	None		
Algeria	If traveling from an **infected area** (see the Blue Sheet) and >1 year of age	Very limited in Sahara Region	None	None
Andorra	Not required	None		
Angola	If traveling from an **infected area** (see the Blue Sheet) and >1 year of age. However, CDC recommends for all travelers (from any country) >9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Antigua and Barbuda	If traveling from an **infected area** (see the Blue Sheet) and >1 year of age.	None		
Argentina	Not required. Risk in northeastern forest areas only. However, CDC recommends for all travelers (from any country) >9 months of age who go outside urban areas.	Rural areas near Bolivian border (i.e., Salta and Jujuy Provinces) and along border with Paraguay (i.e., Misiones and Corrientes Provinces)	None	Chloroquine
Armenia	Not required	Risk limited to western border areas: Masis, Ararat, and Artashat regions in Ararat District	None	Chloroquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Australia **Note:** Australia is not bound by the International Health Regulations (see page 9)	If traveling within 6 days of having stayed overnight or longer in a country any part of which is infected (see the Blue Sheet) and if >1 year of age	None		
Austria	Not required	None		
Azerbaijan	Not required	Southern border areas and northern Khachmas region. Sporadic cases have been reported from the Baku suburbs.	None	Chloroquine
Azores (Portugal)	If traveling from an **infected area** (see the Blue Sheet) and >1 year of age. **Exception:** Not required if in transit at Santa Maria	None		
Bahamas	If traveling from an an **infected area** (see the Blue Sheet) and >1 year of age.	None		
Bahrain	Not required	None		
Bangladesh	If traveling from a country any part of which is infected (see the Blue Sheet) Required also for travelers arriving from or transiting— **AFRICA:** Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo (formerly Zaire), Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mauritania, Niger, Nigeria, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, Somalia, Sudan (south of 15° N), Tanzania (United Republic of), Togo, Uganda, Zambia *(Continued on next page)*	All, except no risk in city of Dhaka	Widespread along northern and eastern borders with India and Myanmar and in the southeastern part of the country.	Mefloquine

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Bangladesh (Cont'd)	**Americas:** Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Guyana, Honduras, Nicaragua, Panama, Peru, Suriname, Venezuela **Caribbean:** Trinidad and Tobago Any person (including infants) arriving by air or sea without a certificate within 6 days of departure from or transit through an infected area will be isolated up to 6 days.			Mefloquine
Barbados	If traveling from an infected area (see the Blue Sheet) and >1 year of age	None		
Belarus	Not required	None		
Belgium	Not required	None		
Belize	If traveling from an infected area (see the Blue Sheet)	Rural, including forest preserves, and offshore islands, including the resort areas **Exception:** no risk in the central coastal district	None	Chloroquine
Benin	Required upon arrival from all countries if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Bermuda (U.K.)	Not required	None		
Bhutan	If traveling from an **infected area** (see the Blue Sheet)	Rural, in districts bordering India	Confirmed	Mefloquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Bolivia	If traveling from an **infected area** (see the Blue Sheet) Bolivia recommends vaccination for travelers who are destined for risk areas, such as the Departments of Beni, Cochabamba, Santa Cruz, and the subtropical part of La Paz Department. However, CDC recommends vaccination for all travelers (from any country) > 9 months of age who go outside urban areas	Rural only, except no risk in highland areas: Oruro Department Province of Ingavi Los Andes Omasuyos Pacajes (La Paz Department) Southern and central Potosi Department	Confirmed	Mefloquine
Bosnia/Herzegovina	Not required	None		
Botswana	Not required	Northern part of country (north of 21° latitude south)	Confirmed	Mefloquine
Brazil	If traveling from an **infected area** (see the Blue Sheet) and > 9 months of age, unless the traveler has a waiver stating that immunization is contraindicated on medical grounds. However, CDC recommends for all travelers (from any country) > 9 months of age who travel outside urban areas. Also required for travelers arriving from— **Africa:** Angola, Cameroon, Democratic Republic of Congo (formerly Zaire), Gabon, Gambia, Ghana, Guinea, Liberia, Nigeria, Sierra Leone, Sudan **Americas:** Bolivia, Ecuador, Colombia, Peru. Brazil recommends vaccination for travel to rural areas in— Acre, Amapá, Amazonas, Goiás, Maranhaõ, Mato Grosso, Mato Grosso do Sul, Pará, Rondônia, Roraima and Tocantins, as well as certain areas of Minas Gerais, Paraná, and São Paulo.	**Areas of Risk:** Acre and Rondônia States; Territories of Amapá and Roraima; parts of rural areas of the following states: Amazonas, Maranhaõ, Mato Grosso, Pará, and Tocantins. Also in the outskirts of urban areas in Amazonia, including Manaus and Porto Velho **Note:** Travelers who will visit only the coastal states from the horn to the Uruguay border and Iguassu Falls are not at risk and need no prophylaxis.	Confirmed	Mefloquine

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Brunei Darussalam	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age **Note:** Required also for travelers coming from or transiting endemic zones within the preceding 6 days (see pages 156–157)	None		
Bulgaria	Not required	None		
Burkina Faso	Required upon arrival from **all countries** if traveler is > 1 year of age	All	Confirmed	Mefloquine
Burundi	If traveling from an infected area (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Cambodia	If traveling from an infected area (see the Blue Sheet)	All, except no risk in Phnom Penh	Confirmed	Mefloquine. In western provinces, doxycycline.
Cameroon	Required upon arrival from **all countries** if traveler is > 1 year of age	All	Confirmed	Mefloquine
Canada	Not required	None		
Canary Islands (Spain)	Not required	None		
Cape Verde	If traveling from a country **any part of which is infected** (see the Blue Sheet) and > 1 year of age. Required **also** if coming from countries having reported cases in the last 6 years.	**Area of risk:** Limited risk on the island of Saõ Tiago only	None	None
Cayman Islands (U.K.)	Not required	None		

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Central African Republic	Required upon arrival from all countries if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Chad	Not required; however, Chad recommends vaccination for all travelers > 1 year of age. CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Chile	Not required	None		
China	If traveling from an **infected area** (see the Blue Sheet)	Rural only, except no risk in northern provinces bordering Mongolia and in the western provinces of Heilungkiang, Kirin, Ningsia Hui Tibet, and Tsinghai. North of latitude 33° N, transmission occurs July– November; from latitude 33° N to 25° N, it occurs May–December; south of latitude 25° N, it occurs year-round. **Note:** Travelers visiting cities and popular rural sites on usual tourist routes are generally not at risk, and chemoprophy- laxis is therefore not recommended. Travelers on special scientific, educa- tional, or recreational visits should check whether their *(Continued on next page)*	Confirmed in southern China, Hainan Island, and provinces bordering Myanmar, Lao People's Democratic Republic, and Vietnam	Chloroquine. Mefloquine for travelers in areas of chloroquine resistance.

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
China (Cont'd)		itineraries include evening or nighttime exposure in areas of risk or in areas of chloroquine resistance.		
Christmas Island (Australia) **Note:** Christmas Island is not bound by the International Health Regulations (see p. 9).	If traveling within 6 days of having stayed overnight or longer in a country **any part of which is infected** (see the Blue Sheet) and if > 1 year of age.	None		
Colombia	Not required; however, Colombia recommends vaccination for travelers to middle valley of the Magdalena River; eastern and western foothills of the Cordillera Oriental from the border with Ecuador to that with Venezuela; Urabá; foothills of the Sierra Nevada; eastern plains (Orinoquia); and Amazonia. CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	Rural areas only of Alto Vaupes (Vaupes Comisaria), Amazonas, Ariari (Meta Dept.), Bajo Cauca- Nechi (Cauca and Antioquia Dept.), Caqueta (Caqueta Intendencia), Catatumbo (Norte de Santander Dept.), Guainia (Comisarias), Magdalena Medio, Pacífico Central and Sur, Putumayo (Putumayo Intendencia), Sarare (Aruca Intendencia), and Urabá (Antioquia Dept.) **Exception:** No risk in Bogotá and vicinity.	Confirmed	Mefloquine
Comoros	Not required	All	Confirmed	Mefloquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Congo	Required upon arrival from **all countries** if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Cook Islands (New Zealand)	Not required	None		
Costa Rica	Not required	Rural areas only (including tourist areas), except no risk in central highlands (i.e., Cartago and San José Provinces)	None	Chloroquine
Côte d'Ivoire (formerly Ivory Coast)	Required upon arrival from **all countries** if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Croatia	Not required	None		
Cuba	Not required	None		
Cyprus	Not required	None		
Czech Republic	Not required	None		
Democratic Republic of Congo (formerly Zaire)	Required upon arrival from **all countries** if traveler is > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Denmark	Not required	None		
Djibouti	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	All	Confirmed	Mefloquine

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Dominica	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Dominican Republic	Not required	Rural, except no risk in tourist resorts. Highest risk in provinces bordering Haiti.	None	Chloroquine
Ecuador	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas. Travelers to the Galápagos who make intermediate stops in rural areas may be at higher risk and should obtain YF immunization.	All provinces along eastern border and Pacific coast: Cañar Cotopasi, El Oro, Esmeraldas, Guayas (including Guayaquil), Los Rios, Manabi, Morona-Santiago, Napo, Pastaza, Pinchincha, Sucumbios, Zamora-Chinchipe **Note:** Travelers who will visit only Quito and vicinity and the central highland tourist areas, or travel directly to the Galápagos Islands are not at risk and need no prophylaxis.	Confirmed	Mefloquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Egypt	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. Also required if arriving from or transiting— **Africa:** Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Niger, Nigeria, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, Somalia, Sudan (south of lat. 15° N), Tanzania (United Republic of), Togo, Uganda, and Zambia **Americas:** Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guyana, Panama, Peru, Suriname, and Venezuela **Caribbean:** Trinidad and Tobago Air passengers in transit but coming from these countries or areas without a certificate will be detained in the precincts of the airport until they resume their journey. All travelers arriving from Sudan are required to possess a vaccination or a location certificate issued by a Sudanese official center stating that they have not been in Sudan south of latitude 15° N within the preceding 6 days.	Very limited risk in El Faiyum area. **Note:** Travelers visiting main tourist areas, including cruises, are not at risk and need no prophylaxis.	None	None
El Salvador	If traveling from an **infected area** (see the Blue Sheet) and > 6 months of age.	Rural only	None	Chloroquine
Equatorial Guinea	If traveling from an **infected area** (see the Blue Sheet). However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Eritrea	If traveling from an **infected area** (see the Blue Sheet). However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All, except no risk at altitudes higher than 2,000 meters. No risk in Asmara.	Confirmed	Mefloquine
Estonia	Not required	None		
Ethiopia	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All, except no risk in Addis Ababa and at altitudes higher than 2,000 meters.	Confirmed	Mefloquine
Falkland Islands (U.K.)	Not required	None		
Faroe Islands (Denmark)	Not required	None		
Fiji	If traveling from an infected area (see the Blue Sheet) and > 1 year of age, within 10 days of having stayed overnight or longer in an infected area.	None		
Finland	Not required	None		
France	Not required	None		
French Guiana	Required upon arrival from **all countries** if traveler is > 1 year of age.	All	Confirmed	Mefloquine
French Polynesia (Tahiti)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Gabon	Required upon arrival from **all countries** if traveler is >1 year of age.	All	Confirmed	Mefloquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Gambia	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. Required **also** for travelers arriving from countries in the endemic zones (pp. 156–157) CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Georgia	Not required	None		
Germany	Not required	None		
Ghana	Required upon arrival from all countries.	All	Confirmed	Mefloquine
Gibraltar (U.K.)	Not required	None		
Greece	If traveling from an **infected area** (see the Blue Sheet) and > 6 months of age.	None		
Greenland (Denmark)	Not required	None		
Grenada	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Guadeloupe (France)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Guam (U.S.)	Not required	None		
Guatemala	If traveling from a country **any part of which is infected** (see the Blue Sheet) and > 1 year of age	Rural only, except no risk in central highlands	None	Chloroquine

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Guinea	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Guinea-Bissau	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas. Required also for travelers arriving from— **Africa:** Angola, Benin, Burkina Faso, Burundi, Cape Verde, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, Somalia, Tanzania (United Republic of), Togo, Uganda, Zambia **Americas:** Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Peru, Suriname, Venezuela	All	Confirmed	Mefloquine
Guyana	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas. Required also for travelers arriving from— **Africa:** Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Niger, Nigeria, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, Somalia, Tanzania (United Republic of), Togo, and Uganda **Americas:** Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Honduras, Nicaragua, Panama, Peru, Suriname, and Venezuela	Rural, in all interior regions, including Rupununi and North-West Regions and areas along the Pomeroon River. Sporadic cases have also been reported in the coastal region.	Confirmed	Mefloquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Haiti	If traveling from an **infected area** (see the Blue Sheet)	All	None	Chloroquine
Honduras	If traveling from an **infected area** (see the Blue Sheet)	Rural only, including Roatán and other Bay Islands	None	Chloroquine
Hong Kong (Special Administration of China)	Not required	None		
Hungary	Not required	None		
Iceland	Not required	None		
India	If traveling from a country **any part of which is infected** (see the Blue Sheet)**.** Required also for travelers arriving from or transiting— **Africa:** Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Niger, Nigeria, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, Somalia, Sudan, Tanzania (United Republic of), Togo, Uganda, and Zambia **Americas:** Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Peru, Suriname, and Venezuela **Caribbean:** Trinidad and Tobago Any person (except infants up to the age of 6 months) arriving without a certificate within 6 days of departure from or transit through an infected area will be isolated up to 6 days.	All, including the cities of Delhi and Bombay, except no risk in parts of the states of Himachal Pradesh, Jammu, Kashmir, and Sikkim	Confirmed	Mefloquine

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Indonesia	If traveling from an **infected area** (see the Blue Sheet) Required also for travelers arriving from countries in the endemic zones (see pp. 156–157)	Rural only, except high risk in all areas of Irian Jaya (western half of island of New Guinea). No risk in cities of Java and Sumatra and no risk for the main resort areas of Java and Bali. **Note:** Transmission in Indonesia (except for Irian Jaya) is largely confined to rural areas not visited by most travelers; most travel to rural areas of Indonesia is during daytime hours when the risk of exposure is minimal.	Confirmed	Mefloquine
Iran (Islamic Republic of)	If traveling from an **infected area** (see the Blue Sheet)	Rural only in the provinces of Sistan-Baluchestan, the tropical part of Kerman, Hormozgan, parts of Bushehr, Fars, Ilam, Kohgiluyeh-Boyar, Lorestan, Chahar Mahal-Bakhtiari, and the north of Khuzestan	Confirmed	Mefloquine
Iraq	If traveling from an **infected area** (see the Blue Sheet)	All of northern region; Duhok, Erbil, Ninawa, Sulaimaniya, Támim, and Basrah provinces	None	Chloroquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Ireland	Not required	None		
Israel	Not required	None		
Italy	Not required	None		
Jamaica	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Japan	Not required	None		
Jordan	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Kazakhstan	If traveling from an infected area (see the Blue Sheet)	None		
Kenya	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All (including game parks), except no risk in Nairobi and at altitudes higher than 2,500 meters.	Confirmed	Mefloquine
Kiribati (formerly Gilbert Islands)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Korea, Democratic People's Republic of (North)	Not required	None		
Korea, Republic of (South)	Not required	Limited to Demilitarized Zone and northern area of Kyunggi Do Province along the Demilitarized Zone	None	None
Kuwait	Not required	None		

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Kyrgyzstan	Not required	None		
Lao People's Democratic Republic	If traveling from an **infected area** (see the Blue Sheet)	All, except no risk in city of Vientiane	Confirmed	Mefloquine
Latvia	Not required	None		
Lebanon	If traveling from an **infected area** (see the Blue Sheet)	None		
Lesotho	If traveling from an **infected area** (see the Blue Sheet)	None		
Liberia	Required upon arrival from **all countries** if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Libyan Arab Jamahiriya	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	Very limited risk in two small foci in southwest of country	None	None
Liechtenstein	Not required	None		
Lithuania	Not required	None		
Luxembourg	Not required	None		
Macao (Portugal)	Not required	None		
Madagascar	If traveling from an **infected area** (see the Blue Sheet); includes travelers in transit	All (highest risk in coastal areas)	Confirmed	Mefloquine
Madeira (Portugal)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. **Exception:** Not required for travelers in transit at Funchal and Porto Santo	None		
Malawi	If traveling from an **infected area** (see the Blue Sheet)	All	Confirmed	Mefloquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Malaysia	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. Required also for travelers arriving from countries in the endemic zones (see pp. 156–157).	Peninsular Malaysia and Sarawak (NW Borneo): malaria limited to remote areas. Urban and coastal areas: malaria-free. Sabah (NE Borneo): malaria throughout. **Note:** Malaria transmission in Malaysia (except Sabah) is largely confined to rural areas not visited by most travelers; most travel to rural areas is during daytime hours when the risk of exposure is minimal.	Confirmed	Mefloquine Chemoprophylaxis is recommended only for travelers who will have outdoor exposure during evening and nighttime hours in rural areas.
Maldives	If traveling from an **infected area** (see the Blue Sheet)	None		
Mali	Required upon arrival from **all countries** if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Malta	If traveling from an infected area (see the Blue Sheet) and > 9 months of age. Children < 9 months of age arriving from an **infected area** may be subject to isolation or surveillance.	None		
Marshall Islands	Not required	None		
Martinique (France)	If traveling from an infected area (see the Blue Sheet) and > 1 year of age.	None		

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Mauritania	Required upon arrival from **all countries** if traveler is > 1 year of age. **Exception:** Not required for travelers from a noninfected area who stay < 2 weeks.	All, except no risk in the northern areas of Dakhlet-Nouadhibou and Tiris-Zemour	Probable	Mefloquine
Mauritius	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. Required also for travelers arriving from countries in the endemic zones (see pp. 156–157)	Rural only, except no risk on Rodrigues Island	None	Chloroquine
Mayotte (French territorial collectivity)	Not required	All	Confirmed	Mefloquine
Mexico	If traveling from an infected area (see the Blue Sheet) and > 6 months of age. Also required for travelers arriving from— **Africa:** Angola, Benin, Cameroon, Democratic Republic of Congo, Gabon, Gambia, Guinea, Liberia, Nigeria, Sierra Leone, Sudan **America:** Bolivia, Brazil, Colombia, Ecuador, Peru	Rural areas, including resorts in rural areas, of the following states: Campeche, Chiapas, Guerrero, Michoacan, Nayarit, Oaxaca, Quintana Roo, Sinaloa, Tabasco	None	Chloroquine **Note:** Although chemoprophylaxis is not recommended for travel to the major resort areas on the Pacific and Gulf Coasts, travelers should use insect repellents and other measures for personal protection (See pp. 12)
Micronesia (Federated States of)	Not required	None		
Monaco	Not required	None		
Mongolia	Not required	None		
Montserrat (U.K.)	Not required	None		
Morocco	Not required	Very limited risk in rural areas of Al Hoceima, Chefchaouen, Khouribga, and Taounate provinces	None	None

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Mozambique	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	All	Confirmed	Mefloquine
Myanmar	If traveling from an **infected area** (see the Blue Sheet) Required **also** for nationals and residents of Myanmar departing for an infected area.	Rural only. **Note**: Travelers who visit the cities of Yangon (formerly Rangoon) and Mandalay are not at risk and need no prophylaxis.	Confirmed	Mefloquine Note: Chemoprophylaxis is recommended only for travelers who will have outdoor exposure during evening and nighttime hours in rural areas.
Namibia	If traveling from a country **any part of which is infected** (see the Blue Sheet) and >1 year of age. Required also for travelers arriving from countries in the endemic zones (see pp. 156–157) and for travelers on unscheduled flights who have transited an infected area. Children <1 year of age may be subject to surveillance.	All Ovamboland and Caprivi Strip	Confirmed	Mefloquine
Nauru	If traveling from an **infected area** (see the Blue Sheet) and >1 year of age.	None		
Nepal	If traveling from an **infected area** (see the Blue Sheet)	Rural in Terai and Hill Districts below 1,200 meters. No risk in Kathmandu.	Confirmed	Mefloquine
Netherlands	Not required	None		
Netherlands Antilles	If traveling from an **infected area** (see the Blue Sheet) and >6 months of age	None		

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
New Caledonia and Dependencies (France)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. **Note:** Cholera—not required; however, travelers from infected areas are required to complete a form for the Health Service.	None		
New Zealand	Not required	None		
Nicaragua	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	Rural only; however, risk exists in outskirts of Bluefields, Bonanza, Chinandega, León, Puerto Cabeza, Rosita, Siuna	None	Chloroquine
Niger	Required upon arrival from all countries if traveler is > 1 year of age. Niger **also** recommends vaccination for travelers leaving the country.	All	Confirmed	Mefloquine
Nigeria	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Niue (New Zealand)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Northern Mariana Islands (U.S.)	Not required	None		
Norway	Not required	None		
Oman	If traveling from an **infected area** (see the Blue Sheet)	All	Confirmed	Mefloquine
Pacific Islands, U.S. Trust Territory	Not required	None		

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Pakistan	If traveling from a country any part of which is infected (see the Blue Sheet) Required **also** for travelers arriving from countries in the endemic zones (see pp. 156–157). Not required of infants < 6 months of age if the mother's certificate shows she was vaccinated before the child's birth.	In all areas below 2,000 meters, including the cities	Confirmed	Mefloquine
Panama	Not required, but Panama recommends for travelers who are destined for the province of Darien. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	Rural, in the eastern provinces (Darien and San Blas), northwestern provinces (Boca del Toro and Veraguas), Lake Boyana area, and Lake Gatun **Exception:** No risk in the Canal Zone or Panama City and vicinity.	Confirmed in areas east of the Canal Zone, including the San Blas Islands	Chloroquine for travelers to rural areas west of the Canal Zone. Mefloquine for travelers to areas east of the Canal Zone (including the San Blas Islands)
Papua New Guinea	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	All	Confirmed	Mefloquine
Paraguay	If traveling from an **infected area** (see the Blue Sheet). However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas. Required also for travelers going to or coming from endemic zones (see pp. 156–157).	Rural, bordering Brazil	None	Chloroquine

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Peru	If traveling from an **infected area** (see the Blue Sheet) and > 6 months of age. Peru recommends for those who intend to visit any rural areas of the country. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas	Rural areas of departments of—Amazonas, Cajamarca (except Hualgayoc Province), La Libertad (except Otuzco, Santiago de Chuco Provinces), Lambayeque, Loreto, Piura (except Talara Province), San Martin and Tumbes, Provinces of Santa (Ancash Dept.), parts of La Convención (Cuzco Dept.), Tayacaja (Huancavelica Dept.), and Satipo (Junin Dept). **Note:** Travelers who will visit only Lima and vicinity, coastal areas south of Lima, or the highland tourist areas (Cuzco, Machu Picchu, Lake Titicaca) are not at risk and need no prophylaxis.	Confirmed in provinces bordering Brazil and Ecuador. Suspected in Piura and Tumbes departments.	Chloroquine. Mefloquine for travelers to the provinces bordering Brazil and Ecuador who will have rural exposure during evening and nighttime hours.
Philippines	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	Rural only, except no risk in provinces of Bohol, Catanduanes, Cebu, and metropolitan Manila. **Note:** Malaria transmission in the Philippines is largely confined to rural areas not visited by most travelers; most travel to rural areas in the Philippines is during daytime hours when the risk of exposure is minimal.	Confirmed in islands of Basilian, Luzon, Mindanao, Mindoro, Palawan, and Sulu Archipelago	Chloroquine. Mefloquine for travelers to areas of confirmed chloroquine resistance. **Note:** Chemoprophylaxis is recommended only for travelers who will have outdoor exposure during evening and nighttime hours in rural areas.

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Pitcairn (U.K.)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Poland	Not required	None		
Portugal	Required **only** for travelers > 1 year of age arriving from **infected areas** who are destined for the Azores and Madeira. However, no certificate is required for passengers in transit at Funchal, Porto Santo, and Santa Maria.	None		
Puerto Rico (U.S.)	Not required	None		
Qatar	Not required	None		
Republic of Moldova	Not required	None		
Rééunion (France)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Romania	Not required	None		
Russian Federation	Not required	None		
Rwanda	Required upon arrival from all countries if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Saint Christopher (Saint Kitts) and Nevis (U.K.)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Saint Helena (U.K.)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Saint Lucia	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Saint Pierre & Miquelon (France)	Not required	None		

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Saint Vincent and the Grenadines	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Samoa (formerly Western Samoa)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Samoa, American (U.S.)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
San Marino	Not required	None		
São Tomé and Principe	Required upon arrival from **all countries** if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Saudi Arabia	If traveling from a country **any part of which is infected** (see the Blue Sheet)	All of western provinces, except no risk in the high-altitude areas of Asir Province (Yemen border) and the urban areas of Jeddah, Mecca, Medina, and Taif.	Confirmed	Mefloquine
Senegal	Required upon arrival from an infected area (see the Blue Sheet). Required also for travelers arriving from countries in the endemic zones (see pp. 156–157). However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Serbia/Montenegro	Not required	None		

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Seychelles	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. A certificate is also required from travelers who have, within the preceding 6 days, transited an endemic area (see pp. 156–157)	None		
Sierra Leone	If traveling from an **infected area** (see the Blue Sheet) However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Singapore	If traveling from a country **any part of which is infected** (see the Blue Sheet) and > 1 year of age. Required **also** for travelers arriving from or transiting countries in the endemic zones (see pp. 156–157).	None		
Slovak Republic	Not required	None		
Slovenia	Not required	None		
Solomon Islands	**If traveling from an infected area** (see the Blue Sheet)	All	Confirmed	Mefloquine
Somalia	**If traveling from an infected area** (see the Blue Sheet)	All	Confirmed	Mefloquine
South Africa	If traveling from a country **any part of which is infected** (see the Blue Sheet) and > 1 year of age. Required also for travelers arriving from countries in the endemic zones (see pp. 156–157).	Rural (including game parks) in the northern, eastern, and western low-altitude areas of Transvaal and in the Natal coastal areas north of 28° S.	Confirmed	Mefloquine

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Spain	Not required	None		
Sri Lanka	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	Risk in all rural areas. No risk in the districts of Colombo, Kalutara, and Nuwara Eliya.	Confirmed	Mefloquine
Sudan	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. Required also for travelers arriving from countries in the endemic zones (see pp. 156–157). However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas. May be required for travelers leaving Sudan.	All	Confirmed	Mefloquine
Suriname	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	Rural only, except no risk in Paramaribo District and coastal areas north of 5^{o} N.	Confirmed	Mefloquine
Swaziland	If traveling from an **infected area** (see the Blue Sheet)	All lowlands	Confirmed	Mefloquine
Sweden	Not required	None		
Switzerland	Not required	None		
Syrian Arab Republic	If traveling from an **infected area** (see the Blue Sheet)	Rural only, except no risk in southern and western districts of Deir-es-zor and Sweida	None	Chloroquine
Taiwan	If traveling from an **infected area** (see the Blue Sheet)	None		
Tajikistan	Not required	Southern border; some central (Dushanbe), western (GornoBadakh-shan), and northern (Leninabad) areas	Suspected	Cloroquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Tanzania (United Republic of)	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. Required also for travelers arriving from countries in the endemic zones (see pp. 156–157). Risk in northwestern forest areas only. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Thailand	**If traveling from an infected area** (see the Blue Sheet) and > 1 year of age. Required also for travelers arriving from countries in the endemic zones (see pp. 156–157).	Limited risk. No risk in cities and major tourist resorts (e.g., Bangkok, Chiang Mai, Phuket). **Note:** Transmission largely confined to forested rural areas, principally along the borders with Cambodia and Myanmar, not visited by most travelers; most travel to rural areas in Thailand is during daytime hours when the risk of exposure is minimal.	Confirmed	Doxycycline is the drug of choice for travelers who stay overnight in the few areas with risk of malaria.
Togo	Required upon arrival from **all countries** if traveler is > 1 year of age.	All	Confirmed	Mefloquine
Tokelau (New Zealand)	Not required	None		
Tonga	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Trinidad and Tobago	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	None		
Tunisia	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age.	None		
Turkey	Not required	Southeast part of the country; Cukurova/ Amikova areas, except no risk in the Incerlik U.S. Air Force base.	None	Chloroquine
Turkmenistan	Not required	None		
Tuvalu	Not required	None		
Uganda	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age. Required also from travelers arriving from countries in the endemic zones (see pp. 156–157). However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Ukraine	Not required	None		
(Former) **Union of Soviet Socialist Republics**	Not required except for Kazhakstan (see above)	See individual countries		
United Arab Emirates	Not required	Northern emirates, except no risk in Abu Dhabi or in cities of Ajman, Dubai, Sharjah, Umm al Qaiwan	Confirmed	Mefloquine

Yellow Fever Vaccine Requirements and Information on Malaria Risk and Prophylaxis, By Country

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
United Kingdom (with Channel Islands and the Isle of Man)	Not required	None		
United States of America	Not required	None		
Uruguay	Not required	None		
Uzbekistan	Not required	None		
Vanuatu (formerly New Hebrides)	Not required	All	Confirmed	Mefloquine
Venezuela	Not required However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	Rural, in all border states and territories and the states of Barinas, Mérida, Portuguesa	Confirmed	Mefloquine
Vietnam	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age	Rural only, except no risk in the Red River Delta and the coastal plain north of Nha Trang	Confirmed	Mefloquine
Virgin Islands, British	Not required	None		
Virgin Islands, U.S.	Not required	None		
Wake Island, U.S.	Not required	None		

Country	Yellow Fever Vaccination	Malaria		
		Area of Risk	Chloroquine Resistance	Prophylaxis (see pp. 110–121)
Yemen	If traveling from an **infected area** (see the Blue Sheet) and > 1 year of age	All, except no risk in Aden and airport perimeter and in Sana'a	Confirmed	Mefloquine
The Former Yugoslav Republic of Macedonia	Not required	None		
Zaire (See Democratic Republic of Congo)				
Zambia	Not required Risk in northwestern forest areas only. However, CDC recommends for all travelers (from any country) > 9 months of age who go outside urban areas.	All	Confirmed	Mefloquine
Zimbabwe	If traveling from an **infected area** (see the Blue Sheet)	All, except no risk in cities of Harare and Bulawayo	Confirmed	Mefloquine

SPECIFIC RECOMMENDATIONS FOR VACCINATION AND DISEASE PREVENTION

Acquired Immunodeficiency Syndrome (AIDS)

Description

AIDS is a serious disease, first recognized as a distinct syndrome in 1981. This syndrome represents the late clinical state of infection with the human immunodeficiency virus (HIV), resulting in progressive damage to the immune system and in life-threatening infectious and noninfectious complications.

Occurrence

AIDS and HIV infection occur worldwide. Comprehensive surveillance systems are lacking in many countries, so that the true number of cases is likely to be far greater than the numbers officially reported from some, particularly the nonindustrialized, nations. The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimates that 33.4 million persons are HIV-infected worldwide. Because HIV infection and AIDS are globally distributed, the risk to international travelers is determined less by their geographic destination than by their sexual and drug-using behaviors.

Risk for Travelers

The risk of HIV infection for international travelers is generally low. Factors to consider when assessing risk include the extent of direct contact with blood or secretions and of sexual contact with potentially infected persons. In addition, the blood supply in developing countries may not be adequately screened.

Vaccine

No vaccine is available to prevent infection with HIV.

Safety of Vaccines for HIV-Infected Persons. Scientists have reviewed the safety and efficacy of vaccines (such as for measles, yellow fever, influenza, pneumococcal pneumonia, and other infections) in persons with HIV infection or AIDS. No increased incidence of adverse reactions to inactivated vaccines has been noted in these persons. However, administration of live organism vaccines may carry increased risks of adverse reactions (see especially the sections on measles [p. 121], poliomyelitis [p. 130], and yellow fever [p. 152]). In addition, the likelihood of successful immune response is reduced in some HIV-infected persons (depending on the degree of immunodeficiency). On the other hand, because of their immunodeficiency, many HIV-infected persons are at increased risk for complications of vaccine-preventable diseases. Thus, the risk-benefit balance usually favors administration of vaccine to HIV-infected persons, especially for inactivated vaccines. Administration of vaccines should be backed up by behaviors to prevent infections (e.g., avoid mosquito bites in yellow fever areas; avoid exposure to measles or chickenpox patients). For more information on HIV-infected persons and vaccines, see “Vaccine Recommendations for Travelers with Altered Immunocompetence, Including HIV” on p. 203.

Preventive Measures

The global epidemic of HIV infection and AIDS has raised several issues regarding HIV infection and international travel. The first is the need for information for international travelers regarding HIV transmission and how HIV infection can be prevented.

HIV infection is preventable. HIV is transmitted through sexual intercourse, needle- or syringe-sharing, by medical use of blood, blood components, or organ or tissue transplantation, and perinatally from an infected woman to her infant. HIV is not transmitted through casual contact; air, food, or water routes; contact with inanimate objects; or through mosquitoes or other arthropod vectors. The use of any public conveyance (e.g., airplane, automobile, boat, bus, train) by persons with AIDS or HIV infection does not pose a risk of infection for the crew or other passengers.

Travelers are at risk if they—

- have sexual intercourse (heterosexual or homosexual) with an infected person;
- use or allow the use of contaminated, unsterilized syringes or needles for any injections or other skin-piercing procedures including acupuncture, use of illicit drugs, steroid or vitamin injections, medical/dental procedures, ear or body piercing, or tattooing;
- use infected blood, blood components, or clotting factor concentrates. HIV infection by this route is rare in those countries or cities where donated blood/plasma is screened for HIV antibody.

Travelers should avoid sexual encounters with persons who are infected with HIV or whose HIV infection status is unknown. This includes avoiding sexual activity with intravenous drug users and persons with multiple sexual partners, such as male or female prostitutes. Condoms, when used consistently and correctly, prevent transmission of HIV. Persons who engage in vaginal, anal, or oral-genital intercourse with anyone who is infected with HIV or whose infection status is unknown should use a latex condom. For those who are sensitive to latex, polyurethane or other plastic condoms are available. (Look for the words “for the prevention of disease” on the condom packaging.)

In many countries, needle-sharing by IV drug users is a major source of HIV transmission and other infections, such as hepatitis B and C. Do not use drugs intravenously or share needles for any purpose.

In the United States, Australia, New Zealand, Canada, Japan, and western European countries, the risk of infection of transfusion-associated HIV infection has been virtually eliminated through required testing of all donated blood for antibodies to HIV. In the United States, donations of blood and plasma must be screened for HIV-1 and HIV-2 antibodies and HIV-1 p24 antigen.

If produced in the United States according to FDA-approved procedures, immune globulin preparations (such as those used for the prevention of hepatitis A and B) and hepatitis B virus vaccine undergo processes that are known to inactivate HIV; therefore, these products should be used as indicated. Less-developed nations may not have a formal program for testing blood or biological products for antibody to HIV. In these countries, use of unscreened blood-clotting factor concentrates or those of uncertain purity should be avoided (when medically prudent). If transfusion is necessary, the blood should be tested, if at all possible, for HIV antibodies

by appropriately trained laboratory technicians using a reliable test. For WHO blood transfusion guidelines for international travelers, see p. 179.

Needles used to draw blood or administer injections should be sterile, preferably of the single-use disposable type, and prepackaged in a sealed container. Insulin-dependent diabetics, hemophiliacs, and other persons who require routine or frequent injections should carry a supply of syringes, needles, and disinfectant swabs (e.g., alcohol wipes) sufficient to last their entire stay abroad.

International travelers should be aware that some countries serologically screen incoming travelers (primarily those with extended visits, such as for work or study) and deny entry to persons with AIDS and those whose test results indicate infection with HIV. Persons who are intending to visit a country for a substantial period or to work or study abroad should be informed of the policies and requirements of the particular country. This information is usually available from consular officials of individual nations. An unofficial list that has been compiled by the U.S. State Department can be found at the following Internet address: <http://travel.state.gov/HIVtestingreqs.html>.

Further information is available from (800) 342-AIDS, toll free from the United States or its territories. (For Spanish-speaking callers, [800] 344-SIDA, or for hearing-impaired callers with teletype equipment, [800] AIDS-TTY).

African Sleeping Sickness (African Trypanosomiasis)

Description

Trypanosomiasis is a systemic disease caused by the parasite *Trypanosoma brucei*. It is transmitted by the bite of the tsetse fly, a gray-brown insect about the size of a honeybee. Signs and symptoms are initially nonspecific (fever, skin lesions, rash, edema, or lymphadenopathy); however, the infection progresses to meningoencephalitis. Symptoms generally appear within 1–4 weeks of infection. East African trypanosomiasis (caused by *T. b. rhodesiense*) is more acute clinically than the West African form of the disease (caused by *T. b. gambiense*), and central nervous system involvement occurs earlier.

Occurrence

African trypanosomiasis is confined to tropical Africa between 15 degrees North and 20 degrees South latitude.

Risk for Travelers

Tsetse flies inhabit rural areas only, living in the woodland and thickets of the savannah and the dense vegetation along streams. Although infection of international travelers is rare, cases have occurred and persons visiting game parks and remote areas should take precautions. Travelers to urban areas are not at risk.

Vaccine
No vaccine is available

Preventive Measures
Tsetse flies are attracted to moving vehicles and dark, contrasting colors. They are not affected by insect repellents and can bite through lightweight clothing. Areas of heavy infestation tend to be sporadically distributed and are usually well known to local inhabitants. Avoidance of such areas is the best means of protection. Travelers at risk should wear clothing of wrist and ankle length that is made of medium-weight fabric in neutral colors that blend with the background environment.

Amebiasis

Description
Amebiasis is caused by the protozoan parasite *Entamoeba histolytica*. Infection is acquired by the fecal-oral route, either by person-to-person contact or indirectly by eating or drinking fecally contaminated food or water. The clinical spectrum of intestinal amebiasis ranges from asymptomatic infection to fulminant colitis. A newly recognized species, *Entamoeba dispar*, cannot be distinguished from *E. histolytica* by routine diagnostic methods. This organism appears to be responsible for asymptomatic infections. In infected persons who are symptomatic, the most common symptom is diarrhea. The diarrhea may evolve to painful, bloody bowel movements, with or without fever (amebic dysentery). Occasionally, amebiasis causes disease outside the intestines, most notably in the liver (amebic liver abscess).

Occurrence
Amebiasis occurs worldwide, especially in regions with poor sanitation.

Risk for Travelers
For travelers to developing countries, risk of infection is highest for those who live in or visit rural areas, trek in backcountry areas, or eat or drink in settings of poor sanitation.

Vaccine
No vaccine is available.

Preventive Measures
Travelers to developing countries are advised to follow the precautions included under “Risks From Food and Drink” (p. 162).

American Trypanosomiasis (Chagas Disease)

Description

Chagas disease is caused by the protozoan parasite *Trypanosoma cruzi*. Acute infection may be asymptomatic or accompanied by a febrile illness with meningoencephalitis and/or myocarditis. Manifestations of chronic infection include cardiomyopathy and intestinal "mega" syndromes, e.g., megaesophagus and megacolon. Chagas disease is usually transmitted by contact with feces of an infected reduviid ("cone nose" or "kissing") bug; transmission may also occur through blood transfusion or via transplacental infection.

Occurrence

Chagas disease occurs throughout much of the Western hemisphere, from Mexico to Argentina.

Risk for Travelers

Reduviid bugs typically infest buildings constructed of mud, adobe brick, or palm thatch, particularly those with cracks or crevices in the walls and roof. Avoidance of overnight stays in dwellings infested by the reduviid bug vector greatly reduces the risk of acquiring the infection. In some regions, travelers should be aware that blood for transfusion may not be routinely tested or treated for *T. cruzi*.

Vaccine

No vaccine is available.

Preventive Measures

Alternate preventive measures include insecticide spraying of infested houses and the use of bed netting. The latter is recommended if camping or sleeping out of doors in highly endemic areas. Although anti-trypanosomal treatment exists for acute disease, currently there is no accepted anti-parasitic treatment for chronic infection. Persons with chronic cardiac or mega-syndromes may, however, benefit from symptomatic therapy.

Cholera

Description

Cholera is an acute intestinal infection caused by toxigenic *Vibrio cholerae* O-group 1 or O-group 139. The infection is often mild and self-limited or subclinical. Persons with severe cases respond dramatically to simple fluid-and electrolyte-replacement therapy. Infection is acquired primarily by ingesting contaminated water or food; person-to-person transmission is rare.

Occurrence

Since 1961, *V. cholerae* has spread from Indonesia through most of Asia into eastern Europe and Africa, and from North Africa to the Iberian Peninsula. In 1991, an extensive epidemic began in Peru and spread to neighboring countries in the Western Hemisphere. In 1997, nearly 150,000 cases from 65 countries were reported to the World Health Organization.

Risk for Travelers

Persons following usual tourist itineraries who observe food safety recommendations while in countries reporting cholera have virtually no risk.

Vaccine

One cholera vaccine, administered parenterally with a two-dose primary series, is currently licensed in the United States. This vaccine provides only about 50% effectiveness in reducing clinical illness from *Vibrio cholerae* O1 infection for 3 6 months after vaccination, with the greatest protection for the first 2 months. This vaccine probably provides no protection against illness caused by *V. cholerae* O-group 139. The risk of cholera to U.S. travelers is so low that vaccination is of questionable benefit. Oral cholera vaccines that provide greater protection are available in several countries but have not been licensed in the United States.

Currently no country or territory requires vaccination as a condition for entry. Local authorities, however, may continue to require documentation of vaccination against cholera; in such cases, a single dose of vaccine is sufficient to satisfy local requirements. The complete two-dose primary series is suggested only for special high-risk groups that work and live in highly endemic areas under less than adequate sanitary conditions. The primary series need never be repeated for the booster doses to be effective. Table 7 (p. 77) summarizes the recommended doses for primary and booster vaccinations. Cholera vaccine is not recommended for infants under 6 months of age. See p. 28 for discussion of cholera immunization schedule for infants who will be traveling. See Simultaneous Administration of Other Vaccine and Drugs for information about the timing of yellow fever and cholera vaccines (p. 17).

Precautions and Contraindications

Reactions

Vaccination often results in 1–2 days of pain, erythema, and induration at the site of injection. The local reaction may be accompanied by fever, malaise, and headache. Serious reactions to vaccination are extremely rare. If a person has experienced a serious reaction to the vaccine, revaccination is not advisable.

Pregnancy

Specific information is not available on the safety of cholera vaccine during pregnancy. Therefore, it is prudent on theoretical grounds to avoid vaccinating pregnant women.

Table 7. Cholera vaccine

Doses	Intradermal route*	Subcutaneous or intramuscular route			Comments
	≥5 years of age	6 months–4 years of age	5–10 years of age	>10 years of age	
Primary series: 1 & 2	0.2 mL	0.2 mL	0.3 mL	0.5 mL	Give 1 week to >1 month apart
Booster	0.2 mL	0.2 mL	0.3 mL	0.5 mL	1 dose every 6 months

*Higher levels of protection (antibody) may be achieved in children < 5 years of age if vaccine is administered by the subcutaneous or intramuscular routes.

Preventive Measures

Travelers to cholera-affected areas are advised to avoid eating high-risk food, especially fish and shellfish. Food that is cooked and served hot, fruits or vegetables peeled by the traveler himself, and beverages and ice that are made from boiled or chlorinated water or are carbonated are usually safe.

Cryptosporidiosis

Description

Cryptosporidiosis is a parasitic infection transmitted after ingestion of fecally contaminated food or water, including water swallowed while swimming, from exposure to fecally contaminated environmental surfaces, and from person to person (e.g., changing diapers or caring for an infected person) by the fecal-oral route, particularly through sexual behavior. Symptoms include watery diarrhea, abdominal cramps and a slight fever that normally last 3–7 days in immunocompetent individuals. In persons with severely weakened immune systems, cryptosporidiosis is not self-limited and can be fatal.

Occurrence

Cryptosporidiosis occurs worldwide.

Risk for Travelers

For travelers to developing countries, risk of infection is highest for those who live in or visit rural areas, trek in backcountry areas, or frequently eat or drink in settings of poor sanitation.

Vaccine

No vaccine is available.

Preventive Measures
There is no known chemoprophylaxis for cryptosporidiosis and no anti-parasitic drug has yet been found that can shorten the duration of infection. To avoid contracting cryptosporidiosis, travelers should follow the precautions described in "Risks From Food and Drink," page 162.

Cyclosporiasis

Description
Cyclospora cayetanensis, previously known as cyanobacterium-like, coccidia-like, and Cyclospora-like body, is a protozoan parasite that causes gastrointestinal infection. Infection is acquired by ingestion of water or food contaminated with the parasite. Infection can be asymptomatic or be manifested by such symptoms as watery diarrhea, loss of appetite, weight loss, bloating, increased gas, stomach cramps, nausea, vomiting, fatigue, muscle aches, and low-grade fever. Some persons first notice flu-like symptoms. If untreated, the illness can last for weeks to months.

Occurrence
Infection can be acquired worldwide.

Risk for Travelers
Travelers to developing countries may be at increased risk for this infection, and the risk may vary with season.

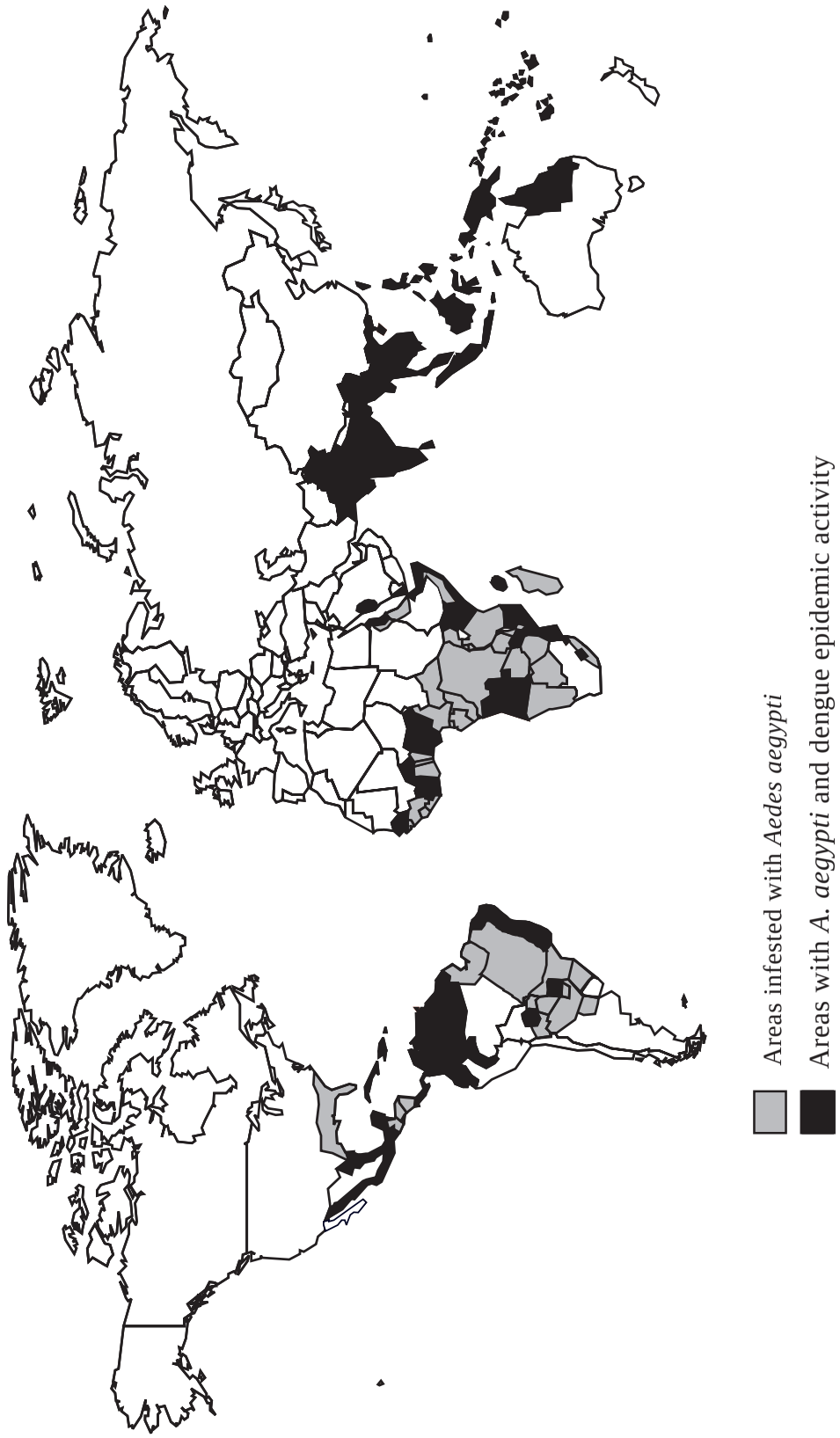
Vaccine
No vaccine is available.

Preventive Measures
Travelers to developing countries are advised to follow the precautions included under "Risks From Food and Drink" (p. 162). Direct person-to-person transmission is unlikely.

Dengue Fever

Description
Dengue fever/dengue hemorrhagic fever is a viral disease transmitted by urban *Aedes* mosquitoes, usually *Aedes aegypti*. The four dengue viruses are immunologically related, but do not provide cross-protective immunity. Dengue fever is characterized by sudden onset, high fever, severe frontal headache, joint and muscle pain. Many patients have nausea, vomiting, and rash. The rash appears 3–5 days after onset of fever and may spread from torso to arms, legs, and face. The disease is usually benign and self-limited, although convalescence may be prolonged. Many cases of nonspecific or even subclinical infection occur, but dengue may also present as a severe, fatal hemorrhagic disease called dengue hemorrhagic fever (DHF). There is no specific treatment for dengue infection.

World Distribution of Dengue—1998



Occurrence

Dengue fever, which is a rapidly expanding disease in most tropical areas of the world, has become the most important arboviral disease of humans. There are now over 2.5 billion persons living in areas at risk of infection and an estimated 100 million cases of dengue fever occur each year, 500,000 of which are DHF, with 25,000 fatalities. Epidemics caused by all four virus serotypes have become progressively more frequent and larger in the past 20 years. As of 1998, dengue viruses have become endemic in most tropical countries of the South Pacific, Asia, the Caribbean Basin, Mexico, Central and South America, and Africa (see map, p. 79). It is not possible to accurately predict future dengue incidence, but increased dengue transmission is anticipated in all tropical areas of the world for the indefinite future. The incidence of the severe disease, DHF, has increased dramatically in Southeast Asia in the past 20 years, with major epidemics occurring in most countries every 3–4 years. Dengue hemorrhagic fever is an emerging disease in the Americas. The first major epidemic occurred in Cuba in 1981 and a second major epidemic of DHF occurred in Venezuela in 1989–90. Since then, smaller outbreaks and/or sporadic cases of confirmed DHF have occurred in 24 tropical American countries. After an absence of 35 years, autochthonous cases of dengue fever have occurred in the United States (Texas) four times in the past 18 years, all of them associated with imported cases.

Risk for Travelers

There is a risk of dengue infection for the international traveler, especially if an epidemic is in progress. Cases of dengue are confirmed every year in travelers returning to the United States from visits to tropical areas. Travelers to endemic and epidemic areas, therefore, should take precautions to avoid mosquito bites. The principal vector mosquito, *Aedes aegypti*, prefers to feed on humans during the daytime and most frequently is found in or near human habitations. There are two peaks of biting activity, in the morning for several hours after daybreak and in the late afternoon for several hours before dark. The mosquito may feed at any time during the day, however, especially indoors, in shady areas, or when it is overcast. Mosquito breeding sites include artificial water containers such as discarded tires, barrels, buckets, flower vases/pots, cans, and cisterns.

Although not completely understood, current data suggest that virus strain, together with immune status, age, and genetic background of the human host, are the most important risk factors for developing DHF. In Asia, children < 15 years of age who are experiencing a second dengue infection appear to have the highest risk, although adults can also develop DHF. This suggests that most international travelers from nonendemic areas such as the United States are at low risk for severe dengue infection. There is little information in the medical literature about the risk of dengue infection in pregnant women. In spite of many epidemics, no increase in congenital malformations has been noted after epidemics. A small number of recently reported cases suggests that if the mother is ill with dengue around the time of delivery, the child may be born with dengue or may acquire dengue through the delivery process itself.

Dengue should be considered by physicians in the differential diagnosis of all patients who present with fever and a history of travel to a tropical area within three weeks of onset of symptoms. Acetaminophen products are recommended for managing fever; acetylsalicylic acid and nonsteroidal anti-inflammatory agents (i.e., aspirin and ibuprofen) should be avoided because of their anticoagulant properties. For diagnosis, acute- and convalescent-phase serum

samples should be obtained and sent through state or territorial health department laboratories to CDC's Dengue Branch, Division of Vector-Borne Infectious Diseases, National Center for Infectious Diseases, 2 Calle Casia, San Juan, PR 00921-3200; telephone (787) 766-5181; fax (787) 766-6596; e-mail, his1@cdc.gov. Serum samples should be accompanied by clinical and epidemiologic information, including date of disease onset, date of collection of sample, and detailed recent travel history.

Vaccine
No vaccine is available.

Preventive Measures
Travelers can reduce their risk of acquiring dengue by remaining in well-screened or air-conditioned areas when possible, by wearing clothing that adequately covers the arms and legs, and by applying insect repellent to both skin and clothing. The most effective repellents are those containing N,N-diethyl-metatoluamide (DEET) at a concentration of <35%. High concentration (> 30% DEET) products for the skin, particularly in children, should be avoided.

Diphtheria, Tetanus, and Pertussis

Description
Diphtheria is an acute bacterial disease involving primarily the tonsils, pharynx, larynx, nose, and occasionally other mucous membranes or skin. The characteristic lesion is marked by a patch or patches of an adherent grayish membrane with a surrounding inflammation.

Tetanus is an acute disease induced by an exotoxin of the tetanus bacillus, which grows anaerobically at the site of an injury. The disease is characterized by painful muscular contractions, primarily of the masseter and other large muscles.

Pertussis is an acute bacterial disease involving the respiratory tract, characterized by paroxysmal coughing.

Occurrence
Diphtheria remains a serious disease throughout much of the world. In particular, large outbreaks of diphtheria are currently occurring throughout the Newly Independent States of the former Soviet Union. Most cases occur in unimmunized or inadequately immunized persons.

Tetanus is a global health problem. The disease occurs almost exclusively in persons who are unimmunized or inadequately immunized. In developing countries most reported illness occurs in infants and young children.

Pertussis primarily occurs in children and is common in countries where immunization is not generally provided. It is highly communicable, often associated with complications, and has a relatively high case-fatality ratio in infants.

Risk for Travelers

Diphtheria and pertussis are more common in parts of the world where immunization levels are low. Tetanus may occur in an unvaccinated person almost anywhere in the world.

Vaccine

Immunizations for Persons < 7 Years of Age

Simultaneous immunization against diphtheria, tetanus, and pertussis during infancy (see Tables 3 and 4) is recommended. Neither whole cell nor acellular pertussis vaccine is licensed for persons ≥ 7 years of age. Pertussis vaccination is not recommended after the seventh birthday.

Combination vaccines containing either whole cell or acellular pertussis vaccine are available in the United States. Acellular pertussis vaccine (DTaP) is the preferred vaccine for all doses of the diphtheria, tetanus, and pertussis vaccination series. Whole-cell pertussis vaccine (DTP) may be used if DTaP is not readily available. As of February 1999, four brands of DTaP are licensed in the United States, all of which contain different numbers and concentrations of pertussis antigen. There is no documented evidence that one brand of DTaP is more efficacious or safer than the other brands. Neither ACIP nor the American Academy of Pediatrics prefers one brand over another.

Primary immunization for children up to the seventh birthday consists of four doses of DTaP vaccine. The first dose is typically given at 2 months of age. The first three doses should be given at 4- to 8-week intervals, with the fourth dose given at 15–18 months of age. A fifth (booster) dose is recommended at 4–6 years of age. The fifth dose is not necessary if the fourth dose in the primary series was given after the fourth birthday.

At least three, and preferably four, doses of DTaP are necessary for protection against pertussis. Efforts should be made to complete as many doses as possible of the primary series before traveling to an area with increased risk of pertussis. If an accelerated schedule is required to complete the series, the schedule may be started as early as 6 weeks of age, with the second and third doses 4 weeks after the preceding dose (see Table 4, p. 32). The fourth dose should not be given before 12 months of age and should be separated from the third dose by at least 6 months. The fifth (booster) dose should not be given before 4 years of age.

Interruption of the recommended schedule or a delay in doses does not lead to a reduction in the level of immunity reached on completion of the primary series. There is no need to restart a series regardless of the time that has elapsed between doses.

DTaP vaccines are as efficacious as whole cell pertussis vaccines when administered to infants as the primary series. In addition, local reactions, fever, and other systemic adverse events occur substantially less often after DTaP administration than after administration of whole cell DTP. As a result, DTaP vaccines are recommended for all five doses of the vaccination schedule. For children who have started the vaccination series with whole cell DTP, DTaP may be substituted for any doses of the pertussis series. A pertussis vaccination series begun with whole cell DTP may be completed with DTaP.

There are no data regarding the safety, immunogenicity, and efficacy of using DTaP vaccines from different manufacturers for successive doses of the primary or booster vaccination series ("mix and match"). Whenever possible, the same brand of DTaP vaccine should be used for all doses of the vaccination series. However, the type of vaccine previously administered may not be known, or the type of vaccine used for earlier doses may not be available to a vaccine provider. In these circumstances, any licensed DTaP vaccine may be used to continue or complete the vaccination series. Vaccination should NOT be deferred because the type of DTaP used for earlier doses is not available.

Reducing the dose of whole-cell DTP or DTaP vaccine or giving the full dose in multiple smaller doses may result in an altered immune response and inadequate protection. Furthermore, there is no evidence that the frequency of significant vaccine reactions is likely to be reduced by this practice. The use of multiple reduced doses that together equal a full immunizing dose or the use of smaller divided doses is not endorsed or recommended. Any vaccination using less than the standard dose or a nonstandard route or site of administration should not be counted, and the person should be revaccinated according to age.

Children inadequately immunized for their age should be brought up to date prior to travel. For children < 7 years of age with a contraindication to the pertussis component of DTaP, DT should be used.

Immunizations for Persons ≥ 7 Years of Age

Unvaccinated persons ≥ 7 years of age should receive three doses of the adult formulation of tetanus-diphtheria toxoid (Td). The use of Td is recommended whenever either tetanus or diphtheria toxoid is indicated. The first two doses are given 4–8 weeks apart and the third dose 6–12 months after the second. Two doses of Td received at intervals of at least 4 weeks may provide some protection, while a single dose is of little benefit. Persons who cannot provide written documentation of having received a complete series of tetanus and diphtheria toxoids should be given a three-dose series.

The first booster dose of Td should be given at 11–12 years of age if at least 5 years have elapsed since the last dose of DTaP, DTP, or pediatric DT. A booster dose of Td should be given every 10 years thereafter.

Adverse Reactions

Local reactions (generally erythema and induration with or without tenderness) are common after the administration of vaccines containing diphtheria, tetanus, and pertussis antigens. Mild systemic reactions such as fever, drowsiness, fretfulness, and low-grade fever may occur after vaccination with either whole-cell DTP or DTaP. However, mild reactions following the first four doses are less common among children who receive DTaP. For instance, fever of $> 101^{o}$ F is reported in 3%–5% of DTaP recipients, compared with 16% of whole-cell DTP recipients. These reactions are self-limited and can be managed with symptomatic treatment with acetaminophen or ibuprofen. Moderate to severe systemic events (e.g., fever $\geq 105^{o}$ F, febrile seizures, persistent crying lasting ≥ 3 hours, and hypotonic hyporesponsive episodes) have been reported rarely after administration of DTaP, and they occur less frequently among children administered DTaP than among children administered whole cell DTP.

Rarely, anaphylactic reactions have been reported after receipt of a preparation containing diphtheria, tetanus and/or pertussis. Arthus-type hypersensitivity reactions, characterized by severe local reactions, may follow receipt of tetanus and diphtheria toxoids, particularly in adults who have received frequent (e.g., annual) boosters of tetanus and/or diphtheria toxoid. The rates of local reactions, fever, and other common systemic symptoms following receipt of DTaP are lower than those following whole-cell DTP vaccination.

Precautions and Contraindications

A severe allergic reaction to a prior dose of vaccine or vaccine component is a contraindication to further vaccination with DTaP, DTP, DT, or adult Td. Encephalopathy within 7 days of vaccination not due to another identifiable cause is a contraindication to further vaccination with a pertussis-containing vaccine.

Moderate or severe acute illness may be a contraindication to vaccination. Persons with mild illnesses, such as otitis media or upper respiratory infection, should be vaccinated. Persons for whom vaccination is deferred because of moderate or severe acute illness should be vaccinated when their conditions improve.

Certain infrequent adverse events following pertussis vaccination will generally contraindicate subsequent doses of pertussis vaccine. These adverse events include temperature ≥ 40.5° C (105°F) not resulting from another identifiable cause, collapse or shock-like state (hypotonic-hyporesponsive episode) or persistent, inconsolable crying lasting ≥ 3 hours occurring within 48 hours, and convulsions with or without fever occurring within 3 days. There may be circumstances (e.g., during a community-wide outbreak of pertussis) in which the benefit of vaccination outweighs the risk, even if one of the four precautionary adverse events occurred following a previous dose. Under these circumstances, one or more additional doses of pertussis vaccine may be considered. DTaP should be used in these circumstances.

Acellular pertussis vaccine should NOT be substituted in children who have a valid contraindication to whole cell pertussis vaccine. If a valid contraindication or precaution exists, DT should be used for the remaining doses in the schedule.

Neurologic conditions characterized by changing developmental findings are considered contraindications to receipt of pertussis vaccine. Such disorders include uncontrolled epilepsy, infantile spasms, and progressive encephalopathy. Children who because of perinatal complications or other conditions are felt to be at an increased risk of latent onset of central nervous system disorders should have immunization with DTaP or DT delayed until further observation and study have clarified the child's neurologic status. The decision whether to commence immunization with DTaP or with DT should be made no later than the child's first birthday. Infants and children with stable neurologic conditions such as cerebral palsy or well-controlled seizures **should** be vaccinated. The occurrence of a single seizure (not temporally associated with DTaP) does not contraindicate DTaP vaccination, particularly if the seizures can be satisfactorily explained. Parents of infants and children with personal or family histories of convulsion should be informed of the increased risk of simple febrile seizures following immunization. Acetaminophen, 15 mg/kg, every 4 hours for 24 hours, should be given to children with such histories to reduce the possibility of postvaccination fever. Infants and children who have received more than one dose of DTaP and who experience a neurologic disorder (e.g., a seizure) not temporally associated with the vaccination, but before the next

scheduled dose, should have their neurologic status evaluated and clarified before a subsequent dose of DTaP is given.

Encephalitis, Japanese

Description

Japanese encephalitis (JE) is a common mosquito-borne viral encephalitis in Asia. Most infections are asymptomatic, but among patients who develop a clinical illness, the case-fatality rate may be as high as 30%. Neuropsychiatric sequelae are reported in 50% of survivors. In endemic areas, children are at greatest risk of infection; however, multiple factors such as occupation, recreational exposure, gender (possibly reflecting exposure), previous vaccination, and naturally acquired immunity, alter the potential for infection and illness. A higher case-fatality rate is reported in the elderly, but serious sequelae are more frequent in the very young, possibly because they are more likely to survive a severe infection.

JE virus is transmitted chiefly by the bites of mosquitoes in the *Culex vishnui* complex: the individual vector species in specific geographic areas differ. In China and many endemic areas in Asia, *Culex tritaeniorhyncus* is the principal vector. This species feeds outdoors beginning at dusk and during evening hours until dawn; it has a wide host range including domestic animals, birds, and man. Larvae are found in flooded rice fields, marshes, and small stable collections of water around cultivated fields. In temperate zones the vectors are present in greatest numbers from June through September and are inactive during winter months. Swine and certain species of wild birds function as viremic amplifying hosts in the transmission cycle. Habitats supporting the transmission cycle of JE virus are principally in rural, agricultural locations. In many areas of Asia, however, the appropriate ecologic conditions for virus transmission occur near or occasionally within urban centers.

Occurrence

Transmission is seasonal and occurs in the summer and autumn in the temperate regions of China, Japan, Korea, and eastern areas of Russia. Elsewhere, seasonal patterns of disease are more extended or vary with the rainy season and irrigation practices. Risk of JE varies by season and geographic area (Table 8).

Risk for Travelers

The risk to short-term travelers and persons who confine their travel to urban centers is very low. Expatriates and travelers living for prolonged periods in rural areas where JE is endemic or epidemic are at greatest risk. Travelers with extensive unprotected outdoor, evening and night-time exposure in rural areas, such as bicycling, camping, or engaging in certain occupational activities, may be at high risk even if their trip is brief.

Table 8. Risk of Japanese encephalitis, by country, region, and season

Country	Affected areas/ jurisdictions	Transmission season	Comments
Australia	Islands of Torres Strait	Probably year-round transmission risk	Localized outbreak in Torres Strait in 1995 and sporadic cases in 1998 in Torres Strait and on mainland Australia at Cape York Peninsula
Bangladesh	Few data, but probably widespread	Possibly July–December, as in northern India	Outbreak reported from Tangail district, Dacca division; sporadic cases in Rajshahi division.
Bhutan	No data	No data	Not applicable
Brunei	Presumed to be sporadic-endemic as in Malaysia	Presumed year-round transmission	
Cambodia	Presumed to be endemic-hyperendemic countrywide	Presumed to be May–October	Cases reported from refugee camps on Thai border
Hong Kong	Rare cases in new territories	April–October	Vaccine not routinely recommended
India	Reported cases from all states except Arunachal, Dadra, Daman, Diu, Gujarat, Himachal, Jammu, Kashmir, Lakshadweep, Meghalaya, Nagar Haveli, Orissa, Punjab, Rajasthan, Sikkim	*South India:* May–October in Goa; October–January in Tamil Nadu; August–December in Karnataka. Second peak, April–June in Mandya district. *Andrha Pradesh:* September–December *North India:* July–December	Outbreaks in West Bengal, Bihar, Karnataka, Tamil Nadu, Andrha Pradesh, Assam, Uttar Pradesh, Manipur, and Goa Urban cases reported (e.g., Lucknow)
Indonesia	Kalimantan, Bali, Nusa Tenggara, Sulawesi, Mollucas, and West Irian Java, Lombok	Probably year-round risk; varies by island; peak risks associated with rainfall, rice cultivation, and presence of pigs. Peak periods of risk: November–March; June–July in some years	Human cases recognized on Bali and Java and possibly in Lombok
Japan*	Rare-sporadic cases on all islands except Hokkaido	June–September except Ryuku Islands (Okinawa) April–October	Vaccine not routinely recommended for travel to Tokyo and other major cities. Enzootic transmission without human cases observed on Hokkaido
Korea	North Korea: no data South Korea: sporadic-endemic with occasional outbreaks	July–October	Last major outbreaks in 1982–1983. Sporadic cases reported in 1994 and 1998.
Laos	Presumed to be endemic–hyperendemic country-wide	Presumed to be May–October	No data available

Malaysia	Sporadic-endemic in all states of Peninsula, Sarawak, and probably Sabah	No seasonal pattern; year-round transmission	Most cases from Penang, Perak, Salangor, Johore, and Sarawak
Myanmar (Burma)	Presumed to be endemic-hyperendemic countrywide	Presumed to be May–October	Repeated outbreaks in Shan State in Chiang Mai Valley
Nepal	Hyperendemic in southern lowlands (Terai)	July–December	Vaccine not recommended for travelers visiting high-altitude areas only
Pakistan	May be transmitted in central deltas	Presumed to be June–January	Cases reported near Karachi. Endemic areas overlap those for West Nile virus. Lower Indus Valley may be an endemic transmission area.
Papua New Guinea	Normanby Islands and Western Province	Probably year-round risk	Localized sporadic cases
People's Republic of China	Cases in all provinces except Xizang (Tibet), Xinjiang, Qinghai. Hyperendemic in southern China; endemic-periodically epidemic in temperate areas	*Northern China:* May–September *Southern China:* April–October (Guangshi, Yunnan, Gwangdong, and Southern Fugian, Szechuan, Guizhou, Hunan, Jiangsi provinces)	Vaccine not routinely recommended for travelers to urban areas only
Philippines	Presumed to be endemic on all islands	Uncertain. Speculations based on locations and agroecosystems: West Luzon, Mindoro, Negro Palowan: April–November. Elsewhere: year-round, with greatest risk April–January	Outbreaks described in Nueva Ecija, Luzon, and Manila
Russia	Far eastern maritime areas south of Khabarousk	Peak period July–September	First human cases in 30 years recently reported
Singapore	Rare cases	Year-round transmission, with April peak	Vaccine not routinely recommended
Sri Lanka	Endemic in all but mountainous areas; periodically epidemic in northern and central provinces	October–January; secondary peak of enzootic transmission May–June	Recent outbreaks in central (Anuradhapura) and northwestern provinces
Taiwan*	Endemic, sporadic cases; island-wide	April–October, with a June peak	Cases reported in and around Taipei and the Kao-hsiung-Pingtung river basins
Thailand	Hyperendemic in north; sporadic-endemic in south	May–October	Annual outbreaks in Chiang Mai Valley; sporadic cases in Bangkok suburbs
Vietnam	Endemic-hyperendemic in all provinces	May–October	Highest rates in and near Hanoi
Western Pacific	Two epidemics reported in Guam & Saipan since 1947.	Uncertain; possibly September–January	Enzootic cycle may not be sustainable; epidemics may follow introductions of virus.

*Local JE incidence rates may not accurately reflect risks to nonimmune visitors because of high immunization rates in local populations. Humans are incidental to the transmission cycle. High levels of viral transmission may occur in the absence of human disease.

NOTE: Assessments are based on publications, surveillance reports, and personal correspondence. Extrapolations have been made from available data. Transmission patterns may change.

Tsai TF, Yu Yx, Japanese encephalitis vaccines. In: Plotkin SA & Mortimer EA. Vaccines. 2nd ed., WB Saunders, Philadelphia 1994:671–713.

Table 9. Japanese encephalitis vaccine

Doses	Subcutaneous route		Comments
	1–2 years of age	≥ 3 years of age	^
Primary series 1, 2, and 3	0.5 mL	1.0 mL	Days 0, 7, 30
Booster*	1.0 mL	1.0 mL	1 dose at ≥ 36 months

*In vaccinees who have completed a three-dose primary series, the full duration of protection is unknown; therefore, definitive recommendations cannot be given.

Vaccine

JE vaccine licensed in the United States is manufactured by Biken, Osaka, Japan, and distributed by Connaught Laboratories, Inc. Other JE vaccines are made by several companies in Asia, but are not licensed in the United States. Vaccination should only be considered for persons who plan to live in areas where JE is endemic or epidemic and for travelers whose activities include trips into rural, farming areas. Short-term travelers (< 30 days), especially those whose visits are restricted to major urban areas, are at a lower risk for acquiring JE and generally should not receive the vaccine. Evaluation of an individual traveler's risk should take into account their itinerary and activities and the current level of JE activity in the country (see Table 8, p. 86).

Schedule

The recommended primary immunization series is three doses of 1.0 mL each, administered subcutaneously on days 0, 7, and 30. An abbreviated schedule of days 0, 7, and 14 can be used when the longer schedule is impractical because of time constraints. Two doses given a week apart may be used in unusual circumstances, but will confer short-term immunity in only 80% of vaccinees. The last dose should be administered at least 10 days before the commencement of travel to ensure an adequate immune response and access to medical care in the event of delayed adverse reactions.

Use in Children

Immunization route and schedules for children 1–3 years of age is identical except that doses of 0.5 mL should be administered. No data are available on vaccine efficacy and safety in children < 1 year of age. The full duration of protection is unknown; however, preliminary data indicate that neutralizing antibodies persist for at least 3 years after primary immunization. In children whose primary immunization series included doses of 0.5 mL, a booster dose of 1.0 mL may be administered 3 years after the primary series.

Adverse Reactions

JE vaccine is associated with local reactions and mild systemic side effects (fever, headache, myalgias, malaise) in about 20% of vaccinees. More serious allergic reactions including generalized urticaria, angioedema, respiratory distress, and anaphylaxis have occurred within

minutes to as long as one week after immunization. Such hypersensitivity reactions occur in approximately 0.6% of vaccinees. Reactions have been responsive to therapy with epinephrine, antihistamines and/or steroids. Vaccinees should be observed for 30 minutes after immunization and warned about the possibility of delayed allergic reactions. The full course of immunization should be completed ≥ 10 days before departure, and vaccinees should be advised to remain in areas with access to medical care. Persons with a past history of urticaria appear to have a greater risk for developing more serious allergic reactions, and this must be considered when weighing the risks and benefits of the vaccine. A history of allergy to JE or other mouse-derived vaccines is a contraindication to further immunization.

Contraindications

Persons with known hypersensitivity to the vaccine should not be vaccinated. Persons with multiple allergies, especially a history of allergic urticaria or angioedema, are at higher risk for allergic complications from JE vaccine.

Pregnancy

Vaccination during pregnancy should be avoided unless the risk of acquiring Japanese encephalitis outweighs the theoretical risk of vaccination.

Preventive Measures

Travelers are advised to stay in screened or air-conditioned rooms, to use bed nets when such quarters are unavailable, to use insecticidal space sprays as necessary, and to use insect repellents and protective clothing to avoid mosquito bites.

Encephalitis, Tickborne

Description

Tickborne encephalitis (TBE), also known as spring-summer encephalitis, is a viral infection of the central nervous system transmitted by bites of certain vector ticks. Human infections follow bites of infected *Ixodes ricinus* ticks, usually in persons who visit or work in forests, fields or pastures. Infection also may be acquired by consuming unpasteurized dairy products from infected cows, goats, or sheep.

Occurrence

The disease occurs in Scandinavia, Western and Central Europe and countries that made up the former Soviet Union. Risk of acquiring the disease is greatest from April through August, when *Ixodes ricinus*, the principal tick vector, is most active. TBE is common in Austria, the Czech Republic, Slovakia, Germany, Hungary, Poland, Switzerland, Russia, Ukraine, Belarus, and northern Yugoslavia. It occurs at a lower frequency in Bulgaria, Romania, Denmark, France, the Aland Islands and neighboring Finnish coastline, and along the coastline of southern Sweden, from Uppsala to Karlshamn. Serologic evidence for TBE infection, as well as sporadic cases, has been reported from Albania, Greece, Italy, Norway, and Turkey. A closely related disease, Russian spring-summer encephalitis, transmitted by *Ix. persulcatus* ticks, occurs in China, Korea, Japan, and eastern areas of Russia. The severity of disease, incidence of sequelae, and case-fatality rates are higher in the Far East and eastern regions of Russia than in western and central Europe.

Risk to Travelers
The risk to travelers who do not visit forested areas or consume unpasteurized dairy products is low.

Vaccine
Although effective vaccines may be obtained in Europe from Immuno (Vienna, Austria, and Behring, Germany) available data do not support recommending its use in travelers.

Preventive Measures
Travelers should be advised to avoid tick-infested areas and to protect themselves from tick bites by dressing appropriately and using repellents. Repellents containing N,N-diethyl-meta-toluamide (DEET) can be applied directly on the skin. Compounds containing permethrin have an acaricidal and repellent effect and should be used on clothing and camping gear. Consumption of unpasteurized dairy products should be avoided.

Filariasis, Lymphatic

Description
Disease is thought to be caused primarily by the adult worms (filariae), which live in the lymphatic vessels; the female worms release microfilariae, which circulate in the peripheral blood and are ingested by mosquitoes; thus, infected mosquitoes transmit the infection from person to person. The two major species of filariae that cause lymphatic disease in humans are *Wuchereria bancrofti* and *Brugia malayi*. Clinical manifestations include asymptomatic infection, acute inflammation of the lymph nodes ("filarial fever"), tropical pulmonary eosinophilia, lymphedema that may progress to elephantiasis, and testicular hydrocele.

Occurrence
Lymphatic filariasis affects an estimated 120 million persons in tropical areas of the world including sub-Saharan Africa, Egypt, southern Asia, the western Pacific Islands, the northeastern coast of South and Central America, and the Caribbean.

Risk to Travelers
Short-term travelers to endemic areas are at low risk for this infection. Persons who visit endemic areas for extended periods of time and who are intensively exposed to infected mosquitoes may become infected.

Vaccine
No vaccine is available.

Preventive Measures
Effectiveness of chemoprophylaxis has not been well documented. Protective measures include avoidance of mosquito bites through the use of personal protection measures such as those outlined on page 161.

Giardiasis

Description

Symptoms include diarrhea, abdominal cramps, bloating, fatigue, weight loss, flatulence, anorexia, or nausea, in various combinations, and usually lasting > 5 days. Fever and vomiting are uncommon. Transmission occurs after ingestion of fecally contaminated water or food, from exposure to fecally contaminated environmental surfaces, and from person to person by the fecal-oral route.

Occurrence

Giardiasis occurs worldwide.

Risk for Travelers

Risk of infection increases with duration of travel and is highest for those who live in or visit rural areas, trek in backcountry areas, or frequently eat or drink in settings of poor sanitation.

Vaccine

No vaccine is available.

Preventive Measures

There is no known chemoprophylaxis. To prevent infection, travelers to disease-endemic areas should follow the precautions included under “Health Hints for the Traveler” (p. 161).

Haemophilus influenzae Type b Meningitis and Invasive Disease

Description

Haemophilus influenzae type b (Hib) causes meningitis and other severe bacterial infections (e.g., pneumonia, septic arthritis, epiglottitis, and sepsis), primarily among children < 5 years of age. The highest rate of reported invasive Hib disease is among children < 12 months of age. The incidence among children 1–4 years of age is much lower than among infants. The disease is rarely reported in persons > 4 years of age. Most cases occur in children who are unvaccinated or incompletely vaccinated.

Occurrence

In the early 1980s (before licensure of conjugate Hib vaccines), it was estimated that about 20,000 cases of invasive Hib disease occurred annually in the United States, primarily among children < 5 years of age. As a result of widespread use of conjugate Hib vaccines, the disease is now uncommon in the United States, with < 300 cases reported annually.

Risk to Travelers

Invasive Hib disease occurs throughout the world. Few countries routinely use Hib vaccine, so invasive Hib disease remains common in many countries of the world.

Vaccine

Three different conjugate Hib vaccines are licensed for use in infants: HbOC (HibTITER, Wyeth-Lederle), PRP-OMP (PedvaxHIB, Merck and Company), and PRP-T (ActHIB [Pasteur Merieux Connaught] and OmniHIB [SmithKline Beecham]). A fourth Hib conjugate vaccine (PRP-D [ProHIBIT, Pasteur Merieux Connaught]) is licensed only for children 12–59 months of age and should not be used for the primary series. HbOC and PRP-T are also available combined with whole-cell pertussis vaccine (Tetramune and ActHIB/DTP, respectively). PRP-T (ActHIB) is also available combined with acellular pertussis vaccine (labeled as TriHIBit). However, as of February 1999, TriHIBit is licensed only for use as the fourth dose of the Hib and DTaP series. It should not be given for the first, second, or third doses of the Hib series. PRP-OMP vaccine is available combined with hepatitis B vaccine (COMVAX).

All infants, including those born prematurely, should receive a primary series of conjugate Hib vaccine (separate or as a combination vaccine), beginning at 2 months of age. The number of doses in the primary series depends on the type of vaccine used. A primary series of PRP-OMP (PedvaxHIB) vaccine is two doses; HbOC (HibTiTER) and PRP-T (ActHIB, OmniHIB) require a three-dose primary series (see Table 10, p. 93). A booster is recommended at 12–15 months, regardless of which vaccine is used for the primary series.

The optimal interval between doses is 2 months, with a minimum interval of 1 month. At least 2 months should separate the booster dose from the previous (second or third) dose. Hib vaccines may be given simultaneously with all other vaccines.

Recent data suggest that if Hib conjugate vaccines are given before 6 weeks of age, they may induce immunologic tolerance to additional doses of Hib vaccine. A dose given before 6 weeks of age may make the child incapable of responding to subsequent doses. Therefore, Hib vaccines, including combination vaccines that contain Hib conjugate, should never be given to a child < 6 weeks of age.

All three conjugate Hib vaccines licensed for use in infants are interchangeable. A series that includes vaccine of more than one type will induce a protective antibody level. If it is necessary to change vaccine type, three doses of any combination constitute the primary series. Any licensed conjugate vaccine may be used for the booster dose, regardless of what was received in the primary series.

Unvaccinated children ≥ 7 months of age may not require a full series of three or four doses. The number of doses a child needs to complete the series depends primarily on the child's current age and to a lesser degree on the number of prior doses of Hib vaccine the child has received. Previously unvaccinated children aged 15–59 months should receive a single dose of any conjugate Hib vaccine. In general, children > 59 months of age do not need Hib vaccination. Refer to the ACIP statement (MMWR 1991;40[RR-1]) or the American Academy of Pediatrics Red Book for additional information on late or lapsed Hib vaccination schedules.

Side Effects and Adverse Reactions

Adverse events following Hib conjugate vaccines are uncommon. Swelling, redness, and/or pain have been reported in 5%–30% of recipients and usually resolve within 12–24 hours. Systemic reactions such as fever and irritability are infrequent. Information on adverse events suggests that the risks for local and systemic events following Tetramune and ActHIB/DTP administration are similar to those following concurrent administration of its individual component vaccines and are probably due to the pertussis component of the DTP vaccine.

Precautions and Contraindications

Vaccination with Hib conjugate vaccine is contraindicated in persons known to have experienced anaphylaxis following a prior dose of that vaccine. Vaccination should be delayed in children with moderate or severe acute illnesses. Minor illnesses (e.g., mild upper-respiratory infection) are not contraindications to vaccination. Contraindications and precautions for the use of Tetramune, ActHIB/DTP, TriHIBit and COMVAX are the same as those for its individual component vaccines (i.e., DTP, DTaP, Hib, and hepatitis B).

Table 10. Recommended *Haemophilus influenzae* Type b (Hib) Routine Vaccination Schedule

Vaccine	2 months	4 months	6 months	12–15 months
HbOC/PRP-T	dose 1	dose 2	dose 3	booster
PRP-OMP	dose 1	dose 2		booster
PRP-D*				single dose*

*PRP-D is licensed for a booster dose following a primary series of another type of vaccine at 12 months of age and for a single dose in previously unvaccinated children at 15 months of age.

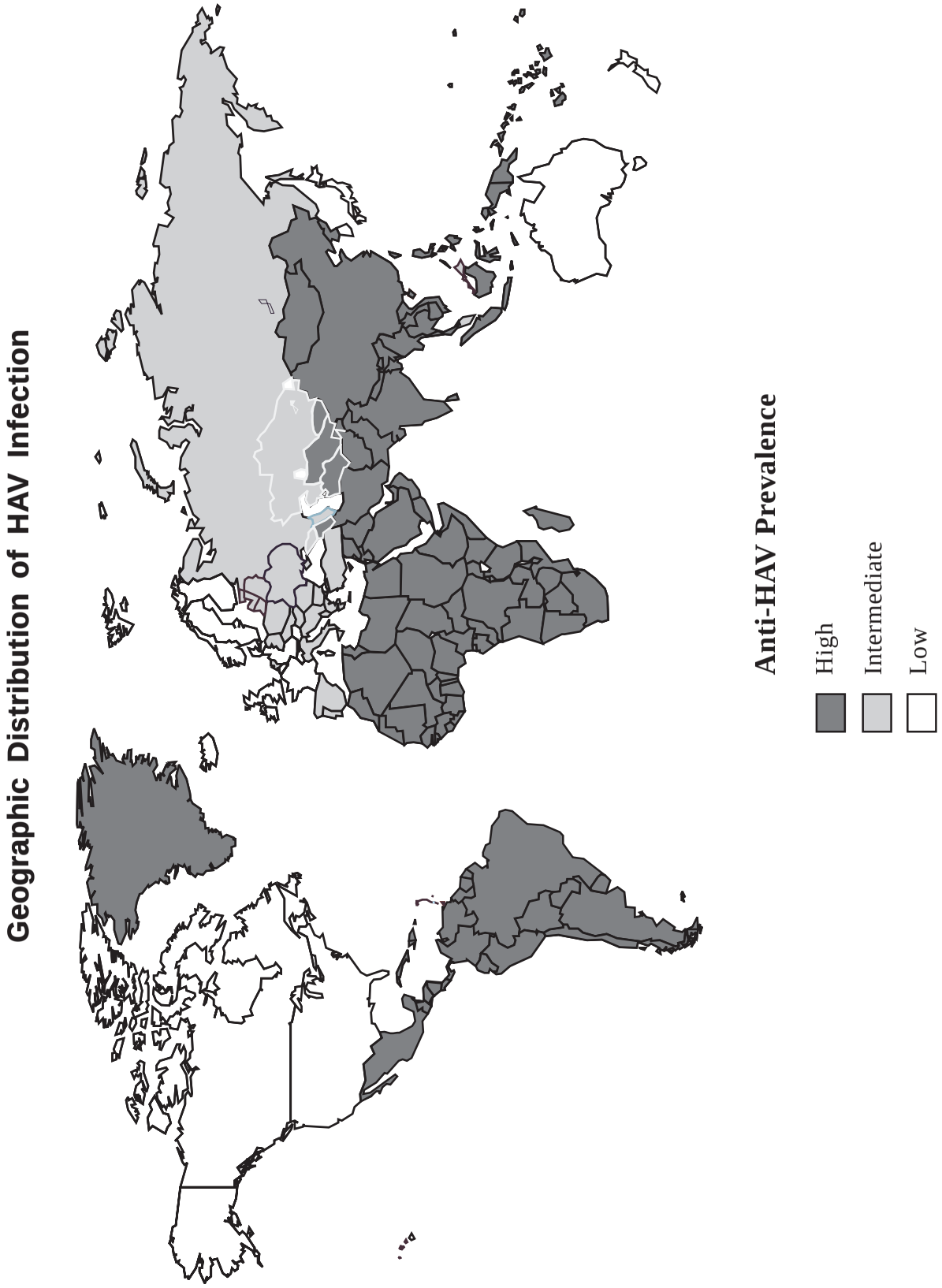
Hepatitis, Viral, Type A

Description

Hepatitis A is an enterically transmitted viral disease that causes fever, malaise, anorexia, nausea, and abdominal discomfort, followed within a few days by jaundice. The disease ranges in clinical severity from a mild illness lasting 1–2 weeks to a severely disabling disease lasting several months. In developing countries, hepatitis A virus (HAV) is usually acquired during childhood, most frequently as an asymptomatic or mild infection. Transmission may occur by direct person-to-person contact; or from contaminated water, ice, or shellfish harvested from sewage-contaminated water; or from fruits, vegetables, or other foods that are eaten uncooked, but which may become contaminated during handling.

Occurrence

Hepatitis A is highly endemic throughout the developing world but of low endemicity in developed countries such as the United States.


Geographic Distribution of HAV Infection
Anti-HAV Prevalence
High
Intermediate
Low

Risk for Travelers

The risk of acquiring HAV infection for U.S. citizens traveling abroad varies with living conditions, length of stay, and incidence of hepatitis A in the area visited. Travelers to North America except Mexico, and developed countries in Europe, Japan, Australia, and New Zealand are at no greater risk of infection than in the United States. For travelers to developing countries, risk of infection increases with duration of travel and is highest in those who live in or visit rural areas, trek in backcountry areas, or frequently eat or drink in settings of poor sanitation. Nevertheless, many cases of travel-related hepatitis A occur in travelers to developing countries with "standard" tourist itineraries, accommodations, and food consumption behaviors. Hepatitis A vaccine and/or immune globulin (IG) is recommended for all susceptible persons traveling to or working in countries with intermediate or high endemicity of infection (see map, p. 94).

Vaccine

Two hepatitis A vaccines are currently licensed in the United States: HAVRIX® (manufactured by SmithKline Beecham) and VAQTA® (manufactured by Merck & Co., Inc.). Both vaccines are made of inactivated virus adsorbed to aluminum hydroxide as an adjuvant. HAVRIX® is prepared with 2-phenoxyethanol as a preservative while VAQTA® is formulated without a preservative. The vaccine should be administered by intramuscular injection in the deltoid muscle.

Both HAVRIX® and VAQTA® are currently licensed in two formulations, and the formulation and number of doses vary according to the person's age. For HAVRIX,® the schedule for children and adolescents 2–18 years of age is two 720-EL.U. doses, with the second dose given 6–12 months after the first. For adults > 18 years of age, the schedule is two 1,440 EL.U. doses with the second dose given 6–12 months after the first (Table 12a, p. 97). For VAQTA® the schedule for children and adolescents 2–17 years of age is two 25-U doses given 6–18 months after the first, and for adults > 17 years of age, the schedule is two 50-U doses given 6 months apart (Table 12b, p. 97).

Vaccination of children ≥ 2 years of age, adolescents and adults with the age-appropriate dose (See Table 12a, p. 97: Recommended doses of HAVRIX® and Table 12b: Recommended doses of VAQTA®) is preferred for persons who plan to travel repeatedly or reside for long periods in high-risk areas. Data on the long-term persistence of antibody after hepatitis A vaccination are limited because the currently available vaccines have been under evaluation for only 5–7 years. Estimates of antibody persistence derived from kinetic models of antibody decline suggest that protective levels of anti-HAV could persist for at least 20 years. Protection can be assumed by 4 weeks after receiving the first vaccine dose, although a second dose is necessary for long-term protection. Because protection may not be complete until 4 weeks after vaccine administration, persons traveling to high-risk areas < 4 weeks after the initial dose should also be given IG (0.02 mL/kg) when available, but at a different injection site.

Travelers < 2 years of age should receive a single dose of IG (0.02 mL/kg) because neither vaccine is licensed for children in this age group. Travelers who are allergic to a vaccine component or otherwise elect not to receive vaccine should receive a single dose of IG (0.02 mL/kg), which provides effective protection against hepatitis A for up to 3 months. For adults and children traveling > 3 months, an IG dose of 0.06 mL/kg should be given and must be

repeated if the duration of travel is > 5 months. See Table 11, p. 97, for approximate IG dosages.

Although vaccination of an immune person is not contraindicated and does not increase the risk of adverse effects, screening for total antibodies to HAV (anti-HAV) before travel may be useful to determine susceptibility and eliminate unnecessary vaccination or IG prophylaxis of immune persons. Such serologic screening for susceptibility may be indicated for adult travelers who are likely to have had prior HAV infection if the cost of screening (laboratory and office visit) is less than the cost of vaccination or IG prophylaxis and if testing will not interfere with subsequent receipt of vaccine or IG. Such persons may include those > 40 years of age and persons born in parts of the world with intermediate or high endemicity (see map, p. 94). Postvaccination testing for serologic response is not indicated.

Safety

Among adults, the most frequently reported side effects occurring within 3 days following a dose of HAVRIX® were soreness at the injection site (56%), headache (14%), and malaise (7%). In clinical studies among children, the most frequently reported side effects were soreness at the injection site (15%), feeding problems (8%), headache (4%), and injection-site induration (4%).

Among adults, the most frequent side effects occurring within 5 days following vaccination with VAQTA® include tenderness (53%), pain (51%), warmth (17.3%) at the injection site (53%) and headache (16.1%). Among children, the most common side effects reported were pain (19%), tenderness (17%), and warmth (9%) at the injection site.

Postlicensure reports, without regard to causality, of serious adverse events received by the vaccine manufacturers have included (but may not be limited to) anaphylaxis, Guillain-Barré syndrome, brachial plexus neuropathy, transverse myelitis, multiple sclerosis, encephalopathy, and erythema multiforme. Most of these events have occurred among adults, and many have occurred among persons receiving other vaccines concurrently.

Neither vaccine should be administered to persons with a history of hypersensitivity to alum and HAVRIX® hepatitis A vaccine should not be administered to persons with a history of hypersensitivity reactions to the preservative 2-phenoxyethanol. Because the vaccine is inactivated, no special precautions need to be taken for vaccination of immunocompromised persons.

Any adverse event suspected to be associated with hepatitis A vaccination should be reported to the Vaccine Adverse Event Reporting System (VAERS). VAERS forms can be obtained by calling 1-800-822-7967.

Pregnancy

The safety of hepatitis A vaccine for pregnant women has not been determined. However, because hepatitis A vaccine is produced from inactivated HAV, the theoretical risk to either the pregnant woman or the developing fetus is thought to be very low. The risk of vaccination should be weighed against the risk of hepatitis A in women who may be at high risk for exposure to HAV.

Table 11. Immune globulin for protection against viral hepatitis A

Length of stay	Body weight		Dose volume*	Comments
	lb	kg†		
Short-term travel (< 3 mos)	< 50 50–100 >100	< 23 23–45 > 45	0.5 mL 1.0 mL 2.0 mL	Dose volume depends on body weight and length of stay
Long-term travel (3–5 months)	< 22 < 50 50–100 > 100	< 10 < 23 23–45 > 45	0.5 mL 1.0 mL 2.5 mL 5.0 mL	

*For intramuscular injection.

†kg = approximately 2.2 lbs.

Table 12a. Recommended doses of HAVRIX®*

Group	Age (years)	Dose (EL.U.)	Volume	No. of doses	Schedule (months)
Children and adolescents	2–18	720	0.5 mL	2	0, 6 12
Adults	>18	1,440	1.0 mL	2	0, 6 12

*Hepatitis A vaccine, inactivated, SmithKline Beecham.

†EL.U = ELISA units.

§0 months represents timing of the initial dose; subsequent numbers represent months after the initial dose.

¶An alternate formulation and schedule (three doses) are available for children and adolescents, consisting of 360 EL.U. per 0.5-mL dose at 0, 1, and 6–12 months of age.

Table 12b. Recommended doses of VAQTA®*

Group	Age (years)	Dose (U)	Volume	No. of doses	Schedule (months)
Children and adolescents	2 17	25 U	0.5 mL	2	0, 6 18
Adults	>17	50 U	1.0 mL	2	0, 6–12

*Hepatitis A vaccine, inactivated, Merck & Company, Inc.

†Units

§0 months represents timing of the initial dose; subsequent numbers represent months after the initial dose.

Immune globulin

Immune globulin for intramuscular administration prepared in the United States has few side effects (primarily soreness at the injection site) and has never been shown to transmit infectious agents (hepatitis B virus [HBV], hepatitis C virus [HCV] or human immunodeficiency virus [HIV]). Since December 1994, all IG products, commercially available in the United States must undergo a viral inactivation procedure or be negative for HCV RNA (ribonuleic acid) before release. Pregnancy is not a contraindication to using immune globulin.

Preventive Measures

HAV is inactivated by boiling or cooking to 85^{o} C for at least 1 minute. Cooked foods cannot serve as vehicles for disease unless contaminated after cooking. Adequate chlorination of water as recommended in the United States will inactivate HAV. In developing countries, travelers should minimize their risk of hepatitis A and other enteric diseases by avoiding potentially contaminated water or food. Drinking water (and beverages with ice) of unknown purity, uncooked shellfish, and uncooked fruits or vegetables that are not peeled or prepared by the traveler should be avoided.

Hepatitis, Viral, Type B

Description

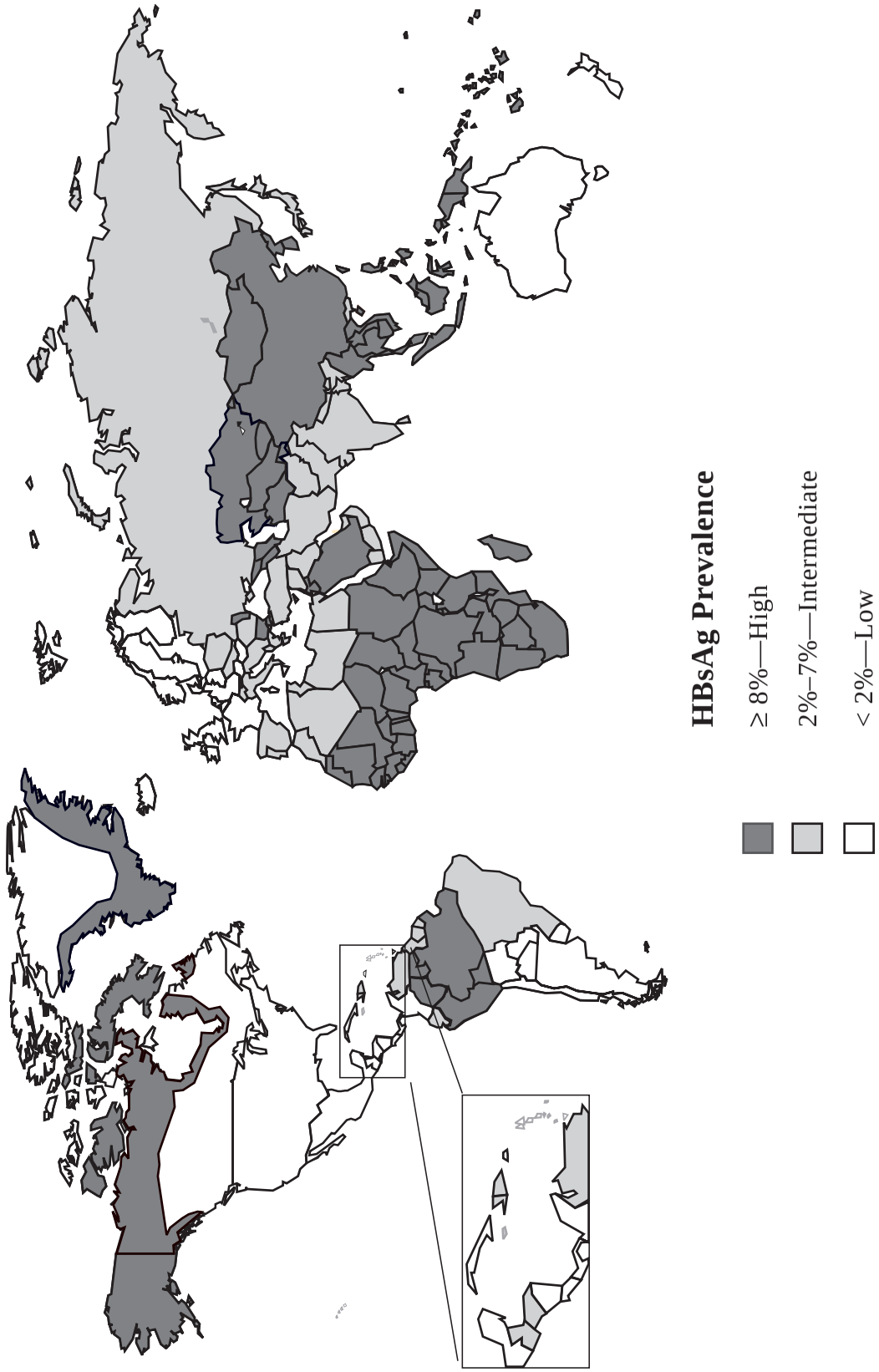
Hepatitis B is a viral infection with clinical manifestations including anorexia, abdominal discomfort, nausea and vomiting, often progressing to jaundice. Severity ranges from inapparent cases detectable only by liver function tests to fulminating, fatal cases of acute hepatic necrosis.

Hepatitis B virus (HBV) is primarily transmitted through activities that result in exchange of blood or blood-derived fluids, as well as through sexual activity, either heterosexual or homosexual, between an infected and a susceptible person. Principal activities that may result in blood exposure include work in health-care fields (medical, dental, laboratory or other) which entail direct exposure to human blood; receipt of blood transfusions that have not been screened for HBV; and having dental, medical, or other exposure to needles (e.g., acupuncture, tattooing, or injecting drug use) that have not been appropriately sterilized. In addition, in less developed areas, open skin lesions in children or adults, due to factors such as impetigo, scabies, and scratched insect bites, may play a role in disease transmission if direct exposure to wound exudates occurs.

Occurrence

The prevalence of chronic HBV infection is high (≥ 8%) in all socioeconomic groups in certain areas (see map, p. 99): all of Africa, Southeast Asia, including China, Korea, Indonesia, and the Philippines; the Middle East except Israel; South and Western Pacific Islands, interior Amazon Basin, and certain parts of the Caribbean, i.e., Haiti and the Dominican Republic. It is moderate (2%–7%) in South Central and Southwest Asia, Israel, Japan, Eastern and Southern Europe and Russia, and most of Central and South America. In Northern and Western

Geographic Distribution of Hepatitis B Prevalence



Europe, North America, Australia, and New Zealand, chronic HBV infection prevalence is low (< 2%) in the general population.

Risk for Travelers

The risk of HBV infection for international travelers is generally low, except for certain travelers in countries with high HBV endemicity. Factors to consider in assessing risk include 1) the prevalence of HBV carriers in the local population; 2) the extent of direct contact with blood, or secretions, or of intimate sexual contact with potentially infected persons; and 3) the duration of travel.

Vaccine

Hepatitis B vaccination is currently recommended for all persons who work in health-care fields (medical, dental, laboratory or other) which entail exposure to human blood. Previously unvaccinated persons who will work in health-care fields for any duration in high or moderate HBV endemicity areas are strongly advised to receive hepatitis B vaccine prior to such travel. Hepatitis B vaccination should also be considered for persons who plan to reside for ≥ 6 months in areas with intermediate to high levels of endemic HBV transmission and who will have any of the previously discussed types of contact with the local population. In particular, persons who anticipate sexual contact with the local population, who will live in rural areas and/or have daily physical contact with local populations; and persons who are likely to seek medical, dental or other treatment in local facilities during their stay should receive the vaccine. Vaccination should be considered for short-term travelers (< 6 months) who will have direct contact with blood, or sexual contact with residents of areas with moderate to high levels of endemic HBV transmission.

Two types of hepatitis B vaccines have been licensed in the United States. One, which was manufactured from plasma of HBV carriers, is no longer produced in the United States. The currently available vaccines are produced through recombinant DNA technology by common baker's yeast into which the gene for hepatitis B surface antigen (HBsAg) has been inserted. Hepatitis B vaccines have been shown to be very safe when given to adults and children. In the United States, it is estimated that more than 20 million adults and adolescents and 16 million infants or children have been vaccinated.

Primary vaccination consists of three intramuscular doses of vaccine. The recommended dose varies by product and the recipient's age (Table 13). When the vaccine is administered as a three-dose series, the second dose should be given 1 month after the first dose, and the third dose 6 months after the first dose. Alternatively, the vaccine produced by one manufacturer is licensed to be administered as a four-dose schedule at 0, 1, 2, and 12 months. Vaccination should ideally begin at least 6 months before travel to complete the full vaccine series prior to departure. Since some protection is provided by one or two doses, the vaccine series should be initiated, if indicated, even if it cannot be completed prior to departure. However, optimal protection is not conferred until after the final (third or fourth) vaccine dose. There is no evidence of interference between hepatitis B vaccine and other simultaneously administered vaccine(s) or with immunoglobulin.The optimum site of injection in adults is the deltoid muscle; vaccination in the buttocks results in poorer antibody response. Long-term studies of healthy adults and children indicate that immunologic memory remains intact for at least 12

years and confers protection against chronic HBV infection, even though hepatitis B surface antibody (anti-HBs) levels may become low or decline below detectable levels. For children and adults whose immune status is normal, booster doses of vaccine are not recommended, nor is serologic testing to assess antibody levels necessary. See p. 27 for discussion of hepatitis B immunization schedule for infants who will be traveling.

Adverse Events

Pain at the injection site (3%–29%) and temperature > 37.7^{o} C (1%–6%) are the most frequently reported side effects among adults and children receiving vaccine. In placebo-controlled studies, these side effects were reported no more frequently among persons receiving hepatitis B vaccine than among persons receiving placebo. Among children receiving both hepatitis B vaccine and diphtheria-tetanus-pertussis (DTP) vaccine, these mild side effects have been observed no more frequently than among children receiving DTP vaccine alone.

A low rate of anaphylaxis has been observed in vaccine recipients based on reports to the Vaccine Adverse Event Reporting System (VAERS), with an estimated incidence of 1 case in 600,000 vaccine doses distributed; two cases were in children. None of the persons who developed anaphylaxis died; however, anaphylaxis can be fatal and hepatitis B vaccine may, in very rare instances, cause a life-threatening hypersensitivity reaction in certain individuals. Therefore, further vaccination with hepatitis B vaccine is contraindicated in persons with a history of anaphylaxis after a previous dose of vaccine.

In the United States, surveillance of adverse reactions showed a possible association between Guillain-Barré syndrome (GBS) and receipt of the first vaccine dose of plasma-derived hepatitis B vaccine in adults. However, analysis of GBS reported to CDC, FDA, and vaccine manufactures for the estimated 2.5 million adults who received one or more doses of recombinant hepatitis B vaccine from 1986 to 1990 did not demonstrate an association between receipt of recombinant vaccine and GBS.

Case reports of other rare adverse events following hepatitis B vaccination that have been published in the medical literature have included multiple sclerosis, optic neuritis, rheumatoid arthritis, type I diabetes, autoimmune disease, and alopecia. Most of these reported adverse events have been in adults and no studies have compared the frequency of the purported vaccine associated disease/syndrome with the frequency in an unvaccinated population. Analysis of reports to VAERS has not found an increased frequency of adverse events among children since implementation of routine infant hepatitis B vaccination.

Any presumed risk of adverse events associated with hepatitis B vaccination must be balanced with the expected 2,000–5,000 deaths from HBV-related liver disease that would occur in the United States each year without immunization, assuming a 5% lifetime risk of HBV infection. Surveillance for vaccine associated adverse events will continue to be an important part of hepatitis B vaccination programs in spite of the current record of safety. Any adverse event suspected to be associated with hepatitis B vaccination should be reported to VAERS. VAERS forms can be obtained by calling 1-800-822-7967.

Table 13. Recommended doses of currently licensed hepatitis B vaccines

Group	Dose (μg)	
	Recombivax HB*	Engerix-B*
All infants (regardless of mother's HBsAg status) and children birth to 19 years of age	5	10
Adults ≥ 20 years	10	20
Dialysis patients and other immunocompromised persons	40[†]	40[§]

*Both vaccines are routinely administered in a three-dose series. Engerix-B also has been licensed for a four-dose series administered at 0, 1, 2, and 12 months.

[†]Special formulation (40 μg in 1.0 mL).

[§]Two 1.0-mL doses given at one site, in a four-dose schedule at 0, 1, 2, 6 months.

Pregnancy

On the basis of limited data, there is no apparent risk of adverse events to the developing fetus when hepatitis B vaccine is administered to pregnant women. The vaccine contains non-infectious HBsAg particles and should cause no risk to the fetus. HBV infection affecting a pregnant woman may result in serious disease for the mother and chronic infection for the newborn. Therefore, neither pregnancy nor lactation should be considered a contraindication for vaccination.

Hepatitis C

Description

Hepatitis C is a liver disease caused by the hepatitis C virus (HCV), which is found in the blood of most infected persons. The infection is most commonly spread by contact with the blood of an infected person; it is less commonly transmitted sexually and from mother to infant at birth.

Occurrence

Approximately 3% (170 million) of the world's population is infected with HCV. In most countries, the prevalence of infection is 1%–3%; however, in some regions it is greater than 10%. In areas with a high prevalence of infection, transmission has primarily occurred through unsafe injection practices, unsafe medical practices, or blood transfusions. Chronic HCV infection occurs in > 85% of infected persons, and chronic liver disease develops in 70% of persons with chronic infection. Many persons infected with HCV have no symptoms. Blood tests are available to diagnose HCV infection.

Risk to Travelers

Travelers' risk for contracting HCV infection depends on their potential risks for exposure to blood, including injecting drug use, blood transfusions, or medical care. Sharing of drug injection equipment and engaging in high-risk sexual practices, including sex with commercial sex workers, carry high risk for HCV infection, as well as other infectious diseases.

In regions where blood donor screening and hospital and clinical infection control practices are insufficient, the risk of transmission of HCV and other bloodborne infections from transfusions, injections, or other medical procedures is increased. In addition, body piercing, tattooing, and scarification are also potential sources of infection if equipment is not sterile or if the artist or piercer does not follow other proper infection-control procedures (e.g., washing hands, using latex gloves, and cleaning and disinfecting surfaces and instruments).

Vaccine

No vaccine is available for HCV.

Treatment

Monotherapy with interferon and combination therapy with interferon and ribavirin are licensed for the treatment of persons with chronic hepatitis C. Up to 30% of persons who are treated have a sustained response. Travelers who suspect that they may have symptoms of viral hepatitis should consult their health-care professional.

Prevention

Because there is no vaccination for HCV, taking the measures outlined above is the key to prevention.

Hepatitis E

In recent years, epidemic and endemic transmission of hepatitis E virus (HEV) spread by water or intimate personal contact has been reported from several areas of Asia (Afghanistan, Bangladesh, China, Central Asian Republics of the former Soviet Union, Indonesia, Malaysia, Mongolia, Myanmar, Pakistan, and India), North Africa, and from rural areas of central Mexico. Such epidemics generally affect adults and cause an unusually high mortality in pregnant women. HEV has been transmitted to experimental animals and the virus has been cloned and sequenced. Several experimental assays to detect antibody to HEV (anti-HEV) have been developed; however, none are yet available for commercial use in the United States. Several imported cases of hepatitis E have been identified in American travelers; studies are in progress to determine if hepatitis E is an endemic disease in the United States.

Travelers to areas where hepatitis E occurs (see above) may be at some risk of acquiring this disease by intimate contact with cases or through contaminated food or water. Immune globulin (IG) prepared from plasma collected in non-HEV endemic areas has not been effective in preventing clinical disease during hepatitis E outbreaks. The efficacy of IG prepared from plasma collected in HEV-endemic areas is unclear. The best prevention of

infection is to avoid potentially contaminated food and water, as with hepatitis A and other enteric infections.

Influenza

Description

Influenza A and B are the major types of influenza viruses that cause human upper respiratory disease. Influenza A viruses are further classified into subtypes on the basis of two surface antigens: hemagglutinin (H) and neuraminidase (N). Although both influenza A and B viruses undergo continual antigenic change (i.e., antigenic drift), influenza B viruses undergo antigenic change more slowly and are not divided into subtypes. Since 1977, influenza A (H1N1) viruses, influenza A (H3N2) viruses, and influenza B viruses have been in global circulation.

Occurrence

Epidemics of influenza occur during the winter and spring months on an annual or near annual basis and are responsible for an average of approximately 20,000 deaths in the United States each year. Influenza virus infections cause disease in all age groups. Rates of infection are highest among children, but rates of serious morbidity and mortality are highest among the elderly and persons of any age who have medical conditions that place them at high risk for complications from influenza. Influenza viruses also can cause global epidemics of disease, known as pandemics, during which rates of morbidity and mortality from influenza-related complications can increase dramatically.

Risk for Travelers

The risk for exposure to influenza during travel to foreign countries varies depending on the time of year and destination. In the tropics, influenza can occur throughout the year, while most activity occurs from April through September in the temperate regions of the Southern Hemisphere. In temperate climates, travelers can also be exposed to influenza during the summer, especially when traveling as part of large tourist groups containing persons from areas of the world where influenza viruses are circulating. Persons at high risk for complications of influenza should consider receiving influenza vaccine before travel if 1) influenza vaccine was not received during the preceding fall or winter and 2) if travel is planned to either the tropics or with large tourist groups at any time of year or to the Southern Hemisphere from April through September. Persons at high risk who received the previous season's vaccine before travel should be revaccinated in the fall or winter with the current vaccine.

Because influenza vaccine may not be available during the summer in North America, persons aged > 65 years and others at high risk who plan summer travel may wish to consult with their physicians before embarking on their travel to discuss the symptoms and risks of influenza.

Vaccine

In the United States, the main option for reducing the impact of influenza is immunoprophylaxis with inactivated (i.e., killed-virus) vaccine. In addition, the use of influenza-specific antiviral drugs (amantadine or rimantadine) for chemoprophylaxis or therapy of influenza A

is an important adjunct to vaccine. Annual vaccination of persons at high risk for complications before the influenza season is the most effective measure for reducing the impact. Vaccine is recommended for the following groups who are at risk for complications from influenza:

- Persons aged > 65 years
- Residents of nursing homes and other chronic-care facilities that house persons of any age who have chronic medical conditions.
- Adults and children who have chronic disorders of the pulmonary or cardiovascular systems, including asthma
- Adults and children who have required regular medical follow-up or hospitalization during the preceding year because of chronic metabolic diseases (including diabetes mellitus), renal dysfunction, hemoglobinopathies, or immunosuppression (including immunosuppression caused by medications)
- Children and teenagers (aged 6 months–18 years) who are receiving long-term aspirin therapy and therefore might be at risk for developing Reye syndrome after influenza
- Women who will be in the second or third trimester of pregnancy during the influenza season.

Dosing, Route, and Timing of Vaccination

Even when current influenza vaccine contains one or more of the antigens administered in previous years, annual vaccination with the current vaccine is necessary because immunity declines during the year following vaccination. Dosage recommendations differ according to age group. Two doses administered at least 1 month apart may be required for satisfactory antibody responses among previously unvaccinated children aged < 9 years. The second dose should be administered before December, if possible. In adults, studies have indicated little or no improvement in antibody response when a second dose is administered during the same season.

The intramuscular route is recommended for influenza vaccine. Adults and older children should be vaccinated in the deltoid muscle. Infants and young children should be vaccinated in the anterolateral aspect of the thigh.

Side Effects and Adverse Reactions

Inactivated influenza vaccine contains noninfectious viruses and cannot cause influenza. Respiratory disease after vaccination represents coincidental illness unrelated to influenza vaccination.

Local Reactions

The most frequent side effect of vaccination is soreness at the vaccination site that lasts up to 2 days. These local reactions generally are mild and rarely interfere with the ability to conduct usual daily activities.

Systemic Reactions

Fever, malaise, myalgia, and other systemic symptoms can occur following vaccination and most often affect persons who have had no previous exposure to the influenza virus antigens in the vaccine (e.g., young children). These reactions begin 6–12 hours after vaccination and can persist for 1–2 days.

Immediate—presumably allergic—reactions (e.g., hives, angioedema, allergic asthma, and systemic anaphylaxis) rarely occur after influenza vaccination. These reactions probably result from hypersensitivity to some vaccine component; most reactions likely are caused by residual egg protein and occur among persons who have severe egg allergy. Persons who have developed hives, have had swelling of the lips or tongue, or have experienced acute respiratory distress or collapse after eating eggs should consult a physician for appropriate evaluation to help determine if vaccine should be administered. Persons who have documented immunoglobulin E (IgE)-mediated hypersensitivity to eggs—including those who have had occupational asthma or other allergic responses due to exposure to egg protein—might also be at increased risk for reactions from influenza vaccine, and similar consultation should be considered. Protocols have been published for safely administering influenza vaccine to persons with egg allergies.

Guillain-Barré Syndrome (GBS)

Investigations to date suggest that there is no large increase in GBS associated with influenza vaccines (other than the "swine flu" vaccine) and that if influenza vaccine does pose a risk it is probably quite small—on the order of 1–2 episodes per million persons vaccinated. There are case reports of GBS following influenza but no epidemiologic studies documenting such an association.

Simultaneous Administration of Other Vaccines, Including Childhood Vaccines

The target groups for influenza and pneumococcal vaccination overlap considerably. For persons at high risk who have not previously been vaccinated with pneumococcal vaccine, health-care providers should strongly consider administering pneumococcal and influenza vaccines concurrently. Both vaccines can be administered at the same time at different sites without increasing side effects. However, influenza vaccine is administered each year, while pneumococcal vaccine is not. Children at high risk for influenza-related complications can receive influenza vaccine at the same time they receive other routine vaccinations, including pertussis vaccine (DTaP or DTP). Because influenza vaccine can cause fever when administered to young children, DTaP—which is less frequently associated with fever and other adverse events than is DTP—is preferable.

Pregnancy

Because currently available influenza vaccine is an inactivated vaccine, many experts consider influenza vaccination safe during any stage of pregnancy. A study of influenza vaccination of more than 2,000 pregnant women demonstrated no adverse fetal effects associated with influenza vaccine. However, more data are needed. Some experts prefer to administer influenza vaccine during the second trimester to avoid a coincidental association with spontaneous abortion, which is common in the first trimester, and because exposures to vaccines have traditionally been avoided during this time.

Breast-Feeding Mothers

Influenza vaccine does not affect the safety of mothers who are breast feeding or their infants. Breast feeding does not adversely affect immune response and is not a contraindication for vaccination.

Persons Infected with Human Immunodeficiency Virus

Limited information exists regarding the frequency and severity of influenza illness or the benefits of influenza vaccination among HIV-infected persons. Influenza vaccine has produced protective antibody titers against influenza in vaccinated HIV-infected persons who have minimal AIDS-related symptoms and high CD4+ T-lymphocyte cell counts. However, in patients who have advanced HIV disease and low CD4+ T-lymphocyte cell counts, influenza vaccine may not induce protective antibody titers; a second dose of vaccine does not improve the immune response in these persons. Deterioration of CD4+ T-lymphocyte cell counts and progression of HIV disease have not been demonstrated among HIV-infected persons who receive vaccine. The effect of antiretroviral therapy on potential increases in HIV RNA levels following either natural influenza infection or influenza vaccine is unknown. Because influenza can result in serious illness and complications and because influenza vaccination may result in the production of protective antibody titers, vaccination will benefit many HIV-infected patients, including HIV-infected pregnant women.

Preventive Measures

Antiviral drugs for influenza are an important adjunct to influenza vaccine for the control and prevention of influenza. The currently licensed agents are amantadine hydrochloride and rimantadine hydrochloride, which are chemically related antiviral drugs with specific activity against influenza A viruses but not influenza B viruses. Amantadine was approved in 1976 for the treatment and prophylaxis of influenza type A virus infections in adults and children aged ≥ 1 year. Rimantadine was approved in 1993 for treatment and prophylaxis in adults. Although rimantadine was approved only for prophylaxis in children, many experts consider it appropriate for treatment among children.

Lassa Fever

Description

Lassa fever is a severe, often fatal hemorrhagic fever that is caused by a virus transmitted from asymptomatically infected rodents to humans.

Occurrence

Limited to rural areas of West Africa.

Risk for Travelers

The risk of infection in international travelers is considered small. Medical personnel involved in the close management of patients in endemic areas should be aware of the risk of nosocomial transmission.

Vaccine

No vaccines are currently available.

Preventive Measures
Treatment with the antiviral drug ribavirin may be life-saving.

Leishmaniasis

Description
Leishmaniasis is a parasitic disease transmitted by the bite of some species of sand flies. The disease most commonly manifests either in a cutaneous (skin) form or in a visceral (internal organ) form. Cutaneous leishmaniasis is characterized by one or more skin sores (either open or closed) that develop weeks to months after a person is bitten by infected sand flies. The manifestations of visceral leishmaniasis, such as fever, enlargement of the spleen and liver, and anemia, typically develop months, but sometimes years, after a person becomes infected.

Occurrence
Tropical and subtropical areas of the world. The infection usually is acquired in rural areas but may be acquired in some urban areas as well.

Risk for Travelers
Risk is highest for persons who are outside in leishmaniasis-endemic areas between dusk and dawn.

Vaccine
Vaccines and drugs for preventing infection are not currently available.

Preventive Measures
Preventive measures for the individual traveler are aimed at reducing contact with sand flies. Outdoor activities should be avoided when sand flies are most active (dusk to dawn). Although sand flies are primarily night-time biters, infection may be acquired during the daytime if resting sand flies are disturbed. Sand fly activity in an area may easily be underestimated because sand flies are noiseless fliers, and rare bites may go unnoticed.

Protective clothing and insect repellent should be used for supplementary protection. Clothing should cover as much of the body as possible and tolerable in climate. Repellent with DEET (N,N-diethylmetatoluamide) should be applied to exposed skin and under the edges of clothing, such as under the ends of sleeves and pant legs. It should be applied according to the manufacturer's instructions; repeated applications may be necessary under conditions of excessive perspiration, wiping, and washing (see section on repellents, p. 161). Although impregnation of clothing with permethrin may provide additional protection, it does not eliminate the need for repellent on exposed skin and should be repeated after every five washings.

Contact with sand flies can be reduced by mechanical means, such as bed nets and screening of doors and windows. Fine-mesh netting (at least 18 holes to the linear inch; some sources

say even finer) is required for an effective barrier against sand flies, which are about one-third the size of mosquitoes. However, such closely woven bed nets may be difficult to tolerate in hot climates. Impregnating bed nets and window screens with permethrin aerosol may provide some protection, as may spraying dwellings with insecticides.

Leptospirosis

Description

Leptospirosis is a widespread zoonosis that is endemic in the tropics and infects a variety of wild and domestic animals that excrete the organism in their urine. Human infection occurs through exposure to water or soil contaminated by infected animal urine and has been associated with canoeing, kayaking, wading, and swimming in contaminated lakes and rivers. The acute generalized illness associated with infection may mimic other tropical diseases (e.g., dengue fever, malaria, and typhus), and common symptoms include fever, chills, myalgia, nausea, diarrhea, cough, and conjunctival suffusion. Manifestations of severe disease may include jaundice, renal failure, hemorrhage, pneumonitis, and hemodynamic collapse. The organism may be isolated from blood and cerebrospinal fluid obtained during the first 10 days of illness, and from the urine following the first week of illness. Identification of Leptospira by using culture methods, as well as serology and immunohistochemical staining, may be difficult because of the limited availability of laboratories with appropriate diagnostic capabilities and extensive expertise with the organism.

Occurrence

Leptospira proliferate in fresh water, damp soil, vegetation, and mud. The occurrence of flooding after heavy rainfall facilitates the spread of the organism because, as water saturates the environment, Leptospira present in the soil pass directly into surface waters. Leptospira may enter the body through cut or abraded skin, mucous membranes, and conjunctivae.

Risk to Travelers

Persons participating in recreational water activities in areas where leptospirosis is endemic may be at increased risk for the disease, particularly during periods of flooding.

Treatment

Treatment with antimicrobial agents (e.g., penicillin, amoxicillin, or doxycycline) should be initiated early in the course of disease, and intravenous antibiotics should be used for persons with severe manifestations.

Preventive Measures

Preventive measures such as wearing protective clothing and minimizing contact with potentially contaminated water should be considered.

Lyme Disease

Description

Lyme disease results from infection with spirochetes belonging to the *Borrelia burgdorferi sensu lato* complex. In Europe and Asia, most cases of Lyme disease are caused by *B. burgdorferi sensu stricto, B. afzelii,* or *B. gariniior*; however, in the United States, all cases are caused by *B. burgdorferi sensu stricto*. The spirochetes are transmitted to humans through the bite of infected ticks of the *Ixodes ricinus* complex. Manifestations of Lyme disease include a characteristic expanding rash called erythema migrans at the site of tick attachment, fever, arthritis, and neurologic manifestations, including facial palsy.

Occurrence

Lyme disease occurs in temperate forested regions of Europe and Asia and in the northeastern, north central, and Pacific coastal regions of North America. It is not transmitted in the tropics.

Risk for Travelers

Travelers to endemic areas who have frequent or prolonged exposure to tick habitats may be at increased risk of Lyme disease.

Vaccine

A safe and efficacious vaccine is available for protection from Lyme disease in endemic areas of the United States. However, because of the genospecies diversity of the agents that cause Lyme disease in Europe and Asia, the vaccine is not likely to be highly efficacious outside North America. Recommendations for vaccine use in travelers to high-risk areas of the United States are available on the Internet at <http://www.cdc.gov/ncidod/dvbid/lymeinfo.htm>.

Preventive Measures

Travelers to endemic areas should avoid tick habitat if possible. If exposure to tick habitat cannot be avoided, the application of repellents to skin and acaricides to clothing, as well as regular daily checks for any attached ticks may reduce the risk of infection. Individuals who develop erythema migrans or other manifestations of Lyme disease should seek early medical attention. Lyme disease can usually be cured by an appropriate course of antibiotic treatment.

Malaria

Description

Malaria in humans is caused by one of four protozoan species of the genus *Plasmodium*: *P. falciparum, P. vivax, P. ovale,* or *P. malariae*. All are transmitted by the bite of an infected female *Anopheles* mosquito. Occasionally transmission occurs by blood transfusion or congenitally from mother to fetus. The disease is characterized by fever and flu-like symptoms, including chills, headache, myalgias, and malaise; these symptoms may occur at intervals. Malaria may be associated with anemia and jaundice, and *P. falciparum* infections may cause

kidney failure, coma, and death. Deaths due to malaria are preventable; methods to prevent malaria infection are described in this section.

Occurrence

Information on malaria risk in specific countries (pp. 35

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Risk for Travelers

Malaria transmission occurs in large areas of Central and South America, Hispaniola, sub-Saharan Africa, the Indian Subcontinent, Southeast Asia, the Middle East, and Oceania. The estimated risk of a traveler's acquiring malaria varies markedly from area to area. This variability is a function of the intensity of transmission within the various regions and of the itinerary and time and type of travel. From 1980 through 1995, 3,513 cases of *P. falciparum* among U.S. civilians were reported to CDC. Of these, 2,907 (83%) were acquired in sub-Saharan Africa; 244 (7%) in Asia; 177 (5%) in the Caribbean and South America; and 185 (5%) in other parts of the world. During this period, there were 59 fatal malaria infections among U.S. civilians; 57 (97%) were caused by *P. falciparum*, of which 43 (75%) were acquired in sub-Saharan Africa.

Thus, most imported *P. falciparum* malaria among American travelers was acquired in Africa south of the Sahara, even though only 140,000 arrivals from the United States were reported by countries in that region in 1995. In contrast, 22 million arrivals from the United States were reported that year in other countries with malaria (including 19 million travelers to Mexico [World Tourism Organization]). This disparity in the risk of acquiring malaria reflects the fact that travelers to Africa tend to spend considerable time, including evening and nighttime hours, in rural areas where malaria risk is highest. Travelers to Asia and South America, in contrast, spend most of their time in urban or resort areas where there is limited, if any, risk of exposure and travel to rural areas mainly during daytime hours, when the risk of infection is limited.

Estimating the risk of infection for different categories of travelers is difficult and may be significantly different even for persons who travel or reside temporarily in the same general areas within a country. For example, tourists staying in air-conditioned hotels may be at lower risk than backpackers or adventure travelers. Similarly, longer-term residents living in screened and air-conditioned housing are less likely to be exposed than are missionaries or Peace Corps volunteers.

Vaccine

No vaccine is currently available.

Preventive Measures

General Advice for Travelers to Malaria-Endemic Areas

All travelers to malarious areas of the world are advised to use an appropriate drug regimen and personal protection measures to prevent malaria; however, travelers should be informed that regardless of methods employed, malaria still may be contracted. Malaria symptoms can develop as early as 6 days after initial exposure in a malaria-endemic area and as late as several months after departure from a malarious area, after chemoprophylaxis has been terminated. Travelers should understand that malaria can be treated effectively early in the course of the disease, but that delay of appropriate therapy can have serious or even fatal consequences. Individuals who have symptoms of malaria should seek prompt medical evaluation, including thick and thin blood smears, *as soon as possible*.

Resistance of *P. falciparum* to chloroquine has been confirmed or is probable in all countries with *P. falciparum* malaria except the Dominican Republic, Haiti, Central America west of the Panama Canal Zone, Egypt, and most countries in the Middle East. In addition, resistance to both chloroquine and Fansidar® is widespread in Thailand, Myanmar (formerly Burma), Cambodia, and the Amazon basin area of South America, and resistance has also been reported sporadically in sub-Saharan Africa. Resistance to mefloquine has been confirmed in those areas of Thailand and the western provinces of Cambodia with malaria transmission.

Personal Protection Measures

Because of the nocturnal feeding habits of *Anopheles* mosquitoes, malaria transmission occurs primarily between dusk and dawn. Travelers should take protective measures to reduce contact with mosquitoes, especially during these hours. Such measures include remaining in well-screened areas, using mosquito nets, and wearing clothes that cover most of the body. Additionally, travelers should be advised to purchase insect repellent before travel for use on exposed skin. The most effective repellents contain N,N diethylmetatoluamide (DEET), an ingredient in many commercially available insect repellents. The actual concentration of DEET varies among repellents and can be as high as 95%. Repellents with DEET concentrations of 30%–35% are quite effective, and the effect should last for about 4 hours. Rarely, children exposed to DEET have had toxic encephalopathy. The possibility of adverse reactions to DEET will be minimized if the following precautions are taken: apply repellent sparingly and only to exposed skin or clothing; avoid applying high-concentration products to the skin; do not inhale or ingest repellents or get them in the eyes; avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth; never use repellents on wounds or irritated skin; wash repellent-treated skin after coming indoors. If a reaction to insect repellent is suspected, wash treated skin and seek medical attention.

Travelers should use a pyrethroid-containing flying-insect spray in living and sleeping areas during evening and nighttime hours. In addition, persons who will not be staying in well-screened or air-conditioned rooms should take additional precautions, which include sleeping under mosquito netting, i.e., bed nets. Permethrin (Permanone®) may be sprayed on clothing and bed nets for additional protection against mosquitoes. Bed nets are more effective if they are treated with permethrin or deltamethrin insecticides. In the United States, permethrin spray or liquid can be used; permethrin or deltamethrin liquid may be purchased overseas for the treatment of bed nets.

Checklist for Travelers to Malarious Areas

The following is a checklist of key issues to be considered in advising travelers. The numbers in parentheses refer to pages in the text where these issues are discussed in detail.

Risk of malaria (pages 35–68)
Travelers should be informed about the risk of malaria infection and the presence of drug-resistant *P. falciparum* malaria in their areas of destination.

Anti-mosquito measures (page 161)
Travelers should know how to protect themselves against mosquito bites.

Chemoprophylaxis (pages 115–121)
Travelers should be:

- Advised to start prophylaxis before travel, and to use prophylaxis continuously while in malaria-endemic areas and for 4 weeks after leaving such areas.
- Questioned about drug allergies and other contraindications for use of drugs to prevent malaria.
- Advised which drug to use for prophylaxis, and, if chloroquine is used, whether Fansidar® should be carried for presumptive self-treatment.
- Informed that antimalarial drugs can cause side effects; if these side effects are serious, medical help should be sought promptly and use of the drug discontinued.
- Warned that they may acquire malaria even if they use malaria chemoprophylaxis.

In case of illness, travelers should be:

- Informed that symptoms of malaria may be mild, and that they should suspect malaria if they experience fever or other symptoms such as persistent headaches, muscular aching and weakness, vomiting, or diarrhea.
- Informed that malaria may be fatal if treatment is delayed. Medical help should be sought promptly if malaria is suspected, and a blood sample should be taken and examined for malaria parasites on one or more occasions.
- Reminded that self-treatment should be taken only if prompt medical care is not available and that medical advice should still be sought as soon as possible after self-treatment.

Special categories (page 120)
Pregnant women and young children require special attention because of the potential effects of malaria illness and inability to use some drugs (for example, doxycycline).

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(Adapted from International Travel and Health,
World Health Organization, Geneva, 1995)

Distribution of Malaria and Chloroquine-Resistant *Plasmodium falciparum*, 1997

Chemoprophylaxis

In choosing an appropriate chemoprophylactic regimen before travel, travelers and their health-care providers should consider several factors. The travel itinerary should be reviewed in detail and compared with the information on areas of risk within a given country (pages 35–68) to determine whether the traveler will actually be at risk of acquiring malaria. Whether the traveler will be at risk of acquiring drug-resistant *P. falciparum* malaria should also be determined. In addition, it should be established whether the traveler has previously experienced an allergic or other reaction to the antimalarial drug of choice and whether medical care will be readily accessible during travel.

Malaria chemoprophylaxis should preferably begin 1 2 weeks before travel to malarious areas (except for doxycycline, which can begin 1 2 days before). This allows any potential side effects to be evaluated and treated by the traveler's physician before departure. Chemoprophylaxis should continue during travel in the malarious areas and for 4 weeks after leaving the malarious areas.

Chemoprophylactic Regimens

(To be used in conjunction with pp. 35–68) .

Regimen A:

For travel to areas of risk where chloroquine-resistant *P. falciparum* has NOT been reported, once-a-week use of chloroquine alone is recommended. Chloroquine is usually well tolerated. The few people who experience uncomfortable side effects may tolerate the drug better by taking it with meals or in divided, twice-a-week doses. As an alternative, the related compound hydroxychloroquine may be better tolerated. Chloroquine prophylaxis should begin 1 2 weeks before travel to malarious areas. It should be continued weekly during travel in malarious areas and for 4 weeks after a person leaves such areas. (See Table 14a, p. 117, for recommended dosages.)

Regimen B:

For travel to areas of risk where chloroquine-resistant *P. falciparum* exists, use of mefloquine alone is recommended. Mefloquine is usually well tolerated, but precautions should be observed as described in the section on adverse reactions. Mefloquine prophylaxis should begin 1 2 weeks before travel to malarious areas. It should be continued weekly during travel in malarious areas and for 4 weeks after a person leaves such areas. Mefloquine can be used for long-term prophylaxis. (See Table 14a, p. 117, for recommended dosages.) Note: In some foreign countries a fixed combination of mefloquine and Fansidar® is marketed under the name Fansimef.® ® should not be confused with mefloquine, and it is not recommended for prophylaxis of malaria because of the potential for severe adverse reactions associated with prophylactic use of Fansidar.®

Alternatives to Mefloquine

Persons who travel to areas where drug-resistant *P. falciparum* is endemic and for whom mefloquine is not recommended may elect to use an alternative regimen, as follows:

Doxycycline alone taken daily is an alternative regimen for travelers who cannot tolerate mefloquine or for whom the drug is not recommended. Doxycycline is as efficacious as mefloquine for travel to most malarious areas. It is also the only available effective prophylactic drug for travelers to malaria-endemic areas of Thailand bordering Myanmar and

Cambodia. Travelers who use doxycycline should be cautioned about the possible side effects as described in the section on adverse reactions. Doxycycline prophylaxis should begin 1 2 days before travel to malarious areas. It should be continued daily during travel in malarious areas and for 4 weeks after the traveler leaves such areas. (See Table 14a, p. 117, for recommended dosages.)

Chloroquine alone taken weekly is recommended only for those travelers to areas with drug-resistant *P. falciparum* who cannot use mefloquine or doxycycline. Limited data suggest that the combination of chloroquine with daily proguanil (Paludrine®) is somewhat more effective than chloroquine alone in Africa, but not in Thailand and Papua New Guinea. Therefore, travelers to Africa who use chloroquine for prophylaxis should, if possible, also take 200 mg daily (adult) of proguanil. Proguanil is not available commercially in the United States but can be obtained in Canada, Europe, and many African countries.

Self-treatment

Because chloroquine (with or without proquanil) is a less effective chemoprophylaxis regimen in chloroquine-resistant areas, travelers who elect to use chloroquine either alone or with daily proguanil (except those with histories of sulfonamide intolerance) should be given a treatment dose of Fansidar® to be carried during travel. These travelers should take the Fansidar® promptly if they have a febrile illness during their travel and if professional medical care is not available within 24 hours; however, they should be aware that this self-treatment of a possible malarial infection is only a temporary measure and that prompt medical evaluation is imperative. They should continue their weekly chloroquine prophylaxis after presumptive treatment with Fansidar.® . 7

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Table 14a. Drugs used in the prophylaxis of malaria

Drug	Usage	Adult dose	Pediatric dose	Comments
Mefloquine (Lariam®)	In areas with chloroquine-resistant *Plasmodium falciparum*	228 mg base (250 mg salt) orally, once/ week	<15 kg: 4.6 mg/kg base (5 mg/ kg [salt]) once/week; 15 19 kg: 1/4 tab/wk 20 30 kg: 1/2 tab/wk 31 45 kg: 3/4 tab/wk > 45 kg: 1 tab/wk	Contraindicated in persons allergic to mefloquine. Not recommended for persons with epilepsy and other seizure disorders; with severe psychiatric disorders; or with cardiac conduction abnormalities.
Doxycycline	An alternative to mefloquine	100 mg orally, once/day	> 8 years of age: 2 mg/kg of body weight orally/day up to adult dose of 100 mg/day	Contraindicated in children < 8 years of age, pregnant women, and lactating women.
Chloroquine phosphate (Aralen®)	In areas with chloroquine-sensitive *Plasmo-dium falciparum*	300 mg base (500 mg salt) orally, once/week	5 mg/kg base (8.3 mg/kg [salt]) orally, once/week, up to maximum adult dose of 300 mg base	
Hydroxy-chloroquine sulfate (Plaquenil®)	An alternative to chloroquine	310 mg base (400 mg salt) orally, once/week	5 mg/kg base (6.5 mg/kg [salt]) orally, once/week, up to maximum adult dose of 310 mg base	
Chloroquine + Proguanil	A less effective alternative for use in Africa, only if mefloquine or doxycycline cannot be used	Weekly chloroquine dose as above, plus daily proguanil dose 200 mg orally, once/day	Weekly chloroquine dose as above, plus < 2 years: 50 mg/day 2 6 years: 100 mg/day 7 10 years: 150 mg/day >10 years: 200 mg/day	Proguanil is not sold in the United States, but is widely available in Canada, Europe, and many African countries.

Table 14b. Presumptive treatment of malaria

Drug	Adult dose	Pediatric dosage	Comment
Pyrimethamine-sulfadoxine (Fansidar®). Self-treatment drug to be used if professional medical care is not available within 24 hours. ***Seek medical care immediately after self treatment!***	3 tablets (75 mg pyrimethamine and 1,500 mg sulfadoxine), orally as a single dose	5–10 kg: 1/2 tablet 11–20 kg: 1 tablet 21–30 kg: 1 1/2 tablets 31–45 kg: 2 tablets > 45 kg: 3 tablets	Contraindicated in persons with sulfa allergy

Mefloquine should not be used for self-treatment because of the frequency of serious side effects (e.g., hallucinations, convulsions) that have been associated with the high dosages of mefloquine used for treatment of malaria.

Halofantrine (Halfan®) is **not** recommended for self-treatment of malaria because of potentially serious electrocardiogram changes which have been documented following treatment doses of halofantrine. In many of these reports, halofantrine was administered in the presence of other antimalarial drugs (for example, mefloquine). The safety of halofantrine for self-treatment of persons on mefloquine prophylaxis has not been established and, since halofantrine is widely available overseas, health-care providers may choose to caution travelers to avoid the use of halofantrine if they are taking mefloquine.

Primaquine: Prevention of Relapses of *P. vivax* and *P. ovale*

P. vivax and *P. ovale* parasites can persist in the liver and cause relapses for as long as 4 years after routine chemoprophylaxis is discontinued. Travelers to malarious areas should be alerted to this risk, and if they develop malaria symptoms after leaving a malarious area, they should report their travel history and the possibility of malaria to a physician as soon as possible. Primaquine decreases the risk of relapses by acting against the liver stages of *P. vivax* and *P. ovale*. Primaquine is administered after the traveler has left a malaria-endemic area, usually during or following the last 2 weeks of prophylaxis.

Since most malarious areas of the world (except Haiti) have at least one species of relapsing malaria, travelers to these areas have some risk of acquiring either *P. vivax* or *P. ovale*, although the actual risk for an individual traveler is difficult to define. Prophylaxis with primaquine is generally indicated only for persons who have had prolonged exposure in malaria-endemic areas (e.g., missionaries and Peace Corps volunteers). Most people can tolerate the standard regimen of primaquine, with the exception of individuals deficient in glucose-6-phosphate dehydrogenase (G6PD). (See discussion of adverse reactions and Table 14a, p. 117, for recommended dosages.)

Adverse Reactions and Contraindications to Antimalarials

The frequent or serious side effects of recommended antimalarials are discussed below. In addition, physicians should review the prescribing information in standard pharmaceutical

reference texts and in the manufacturers' package inserts.

Chloroquine and ***hydroxychloroquine*** rarely cause serious adverse reactions when taken at prophylactic doses for malaria. Minor side effects that may occur include gastrointestinal disturbance, headache, dizziness, blurred vision, and pruritus, but generally these effects do not require that the drug be discontinued. High doses of chloroquine, such as those used to treat rheumatoid arthritis, have been associated with retinopathy, but this serious side effect has not been associated with routine weekly malaria prophylaxis. Chloroquine and related compounds have been reported to exacerbate psoriasis. Chloroquine may interfere with the antibody response to human diploid cell rabies vaccine when the vaccine is administered intradermally.

Mefloquine is generally well tolerated when used for chemoprophylaxis. It has rarely been associated with serious adverse reactions (e.g., psychoses, convulsions) at prophylactic dosage; these reactions are more frequent with the higher dosages used in treatment. Minor side effects observed with prophylactic doses, such as gastrointestinal disturbance, insomnia, and dizziness, tend to be transient and self-limited.

Mefloquine is contraindicated for use by travelers with a known hypersensitivity to mefloquine and is not recommended for use by travelers with a history of epilepsy or severe psychiatric disorders. A review of available data suggests that mefloquine may be used in persons concurrently on beta blockers if they have no underlying arrhythmia. However, mefloquine is not recommended for persons with cardiac conduction abnormalities until additional data are available.

Doxycycline may cause photosensitivity, usually manifested as an exaggerated sunburn reaction. The risk of such a reaction can be minimized by avoiding prolonged, direct exposure to the sun and by using sunscreens that absorb long-wave ultraviolet (UVA) radiation. In addition, doxycycline use is associated with an increased frequency of *Candida* vaginitis. Gastrointestinal side effects (nausea or vomiting) may be minimized by taking the drug with a meal. To reduce the risk of esophagitis, doxycycline should not be taken before going to bed. Doxycycline is contraindicated in pregnancy and in children < 8 years of age.

Fansidar® is contraindicated in persons with a history of sulfonamide intolerance and in infants < 2 months of age.

Proguanil rarely causes serious adverse reactions at the prophylactic dosage. Reported side effects include nausea, vomiting, mouth ulcers, and hair loss.

Primaquine may cause severe hemolysis in G6PD-deficient individuals. Before primaquine is used, G6PD deficiency should be ruled out by appropriate laboratory testing.

Chemoprophylaxis for Children

Children of any age can contract malaria. Consequently, the indications for prophylaxis are identical to those described for adults. Limited data suggest that mefloquine is also well tolerated by young children (< 15 kg). Mefloquine may therefore be considered for use when travel to areas with chloroquine-resistant *P. falciparum* is unavoidable. Doxycycline is

contraindicated in children < 8 years of age. (See recommended dosages in Table 14a, p. 117.) Children who cannot take mefloquine or doxycycline can be given chloroquine (with proguanil for travel to sub-Saharan Africa) for prophylaxis.

Mefloquine and chloroquine phosphate are manufactured in the United States in tablet form only and have a very bitter taste. Pediatric doses should be calculated carefully according to body weight. Pharmacists can pulverize tablets and prepare gelatin capsules with calculated pediatric doses. Mixing the powder in food or drink may facilitate the administration of antimalarial drugs to children. Chloroquine in suspension is widely available overseas. Parents should calculate the dose and volume to be administered based on body weight, because the concentration of chloroquine base varies in different suspensions.

OVERDOSE OF ANTIMALARIAL DRUGS CAN BE FATAL. MEDICATION SHOULD BE STORED IN CHILDPROOF CONTAINERS OUT OF REACH OF CHILDREN.

Prophylaxis During Pregnancy

Malaria infection in pregnant women may be more severe than in nonpregnant women. Malaria may increase the risk of adverse pregnancy outcomes including prematurity, abortion, and stillbirth. For these reasons and because no chemoprophylactic regimen is completely effective, women who are pregnant or likely to become pregnant should avoid travel to areas with malaria transmission. Women traveling to areas where drug-resistant *P. falciparum* has not been reported may take chloroquine prophylaxis. Chloroquine has not been found to have any harmful effects on the fetus when used in the recommended doses for malaria prophylaxis; therefore, pregnancy is not a contraindication for malaria prophylaxis with chloroquine or hydroxychloroquine.

A review of mefloquine use in pregnancy from clinical trials and reports of inadvertent use of mefloquine during pregnancy suggests that its use during the second and third trimester of pregnancy is not associated with adverse fetal or pregnancy outcome. Limited data suggest it is also safe during the first trimester. Consequently, mefloquine may be considered for use by health-care providers for prophylaxis in women who are pregnant or likely to become so, when exposure to chloroquine-resistant *P. falciparum* is unavoidable.

Doxycycline is contraindicated for malaria prophylaxis during pregnancy and lactation. Adverse effects of tetracyclines on the fetus include discoloration and dysplasia of the teeth and inhibition of bone growth. During pregnancy, tetracyclines are indicated only to treat life-threatening infections due to multidrug-resistant *P. falciparum*.

Proguanil has been widely used for several decades, and no adverse effects on pregnancy or the fetus have been established.

Primaquine should not be used during pregnancy because the drug may be passed transplacentally to a G6PD-deficient fetus and cause hemolytic anemia in utero. Whenever radical cure or terminal prophylaxis with primaquine is indicated during pregnancy, chloroquine should be given once a week until delivery, at which time primaquine may be given.

Prophylaxis While Breast-Feeding

Very small amounts of antimalarial drugs are secreted in the breast milk of lactating women. The amount of drug transferred is not thought to be harmful to a nursing infant. Because the quantity of antimalarials transferred in breast milk is insufficient to provide adequate protection against malaria, infants who require chemoprophylaxis should receive the recommended dosages of antimalarials listed in Table 14a.

Malaria Hotline

Detailed recommendations for the prevention of malaria are available from CDC 24 hours a day from the voice information service (888-232-3228), the fax information service (888-232-3299) or the Internet at <http://www.cdc.gov/travel/index.htm>.

Measles (Rubeola)

Description

Measles is an acute, highly communicable viral disease with prodromal fever, conjunctivitis, coryza, cough, and Koplik spots on the buccal mucosa. A characteristic red blotchy rash appears on the third to seventh day, beginning on the face and becoming generalized. Measles may be severe, frequently complicated by middle ear infection or bronchopneumonia.

Occurrence

Prior to widespread immunization, measles was common in childhood, with > 90% of people infected by age 20. Since vaccine licensure in 1963, measles elimination efforts in the United States have resulted in record low numbers of reported measles cases. Fewer than 1,000 measles cases have been reported annually since 1993. Many of these cases are imported from outside the United States and have occurred among adults. It is unlikely that an individual will be exposed to measles in the United States. Unvaccinated persons may reach older ages still susceptible to measles.

Risk for Travelers

The risk of exposure to measles outside the United States may be high. Measles remains a common disease in many countries of the world, including some developed countries in Europe and Asia.

Vaccine

Measles vaccine contains live attenuated measles virus. It is available as a single antigen preparation or combined with live attenuated mumps and/or rubella vaccines. Combined measles-mumps-rubella (MMR) is recommended whenever one or more of the individual components is indicated.

Although vaccination against measles, mumps, or rubella is not a requirement for entry into any country (including the United States), persons traveling or living abroad should ensure that they are immune to all three diseases. In general, persons can be considered immune to measles if they have documentation of physician-diagnosed measles, laboratory evidence of

measles immunity, or proof of receipt of two doses of live measles vaccine on or after the first birthday. Most persons born before 1957 are likely to have had measles disease and generally need not be considered susceptible. However, measles or MMR vaccine may be given to older persons if there is reason to believe they may be susceptible.

The first dose of MMR should be routinely administered at 12–15 months of age. A single dose of MMR vaccine induces antibody formation to all three viruses in at least 95% of susceptibles vaccinated at 12–15 months of age or older. A second dose is expected to induce immunity in most vaccinees who do not respond to the first dose. The second dose should be separated from the first dose by a minimum of 28 days. See p. 26 for discussion of measles immunization schedule modifications for infants who will be traveling.

MMR may be administered simultaneously (but in a different site) with any other live or inactivated vaccine. Inactivated vaccines and oral poliovirus, rotavirus, and typhoid vaccines may be administered at any time before or after live measles-containing vaccine. However, if MMR vaccine and live yellow fever vaccine are not administered simultaneously, they should be separated by an interval of at least 28 days. See section on PHS Recommendations or the General Recommendations on Immunization (MMWR;1994:43[RR1]) for more details.

Side Effects and Adverse Reactions

Fever and rash are the most common adverse reactions following MMR vaccine, and are usually attributable to the measles component. About 5% of vaccinees may develop fever > 103^{o} F (> 39.4^{o} C) or a generalized rash. Fever and rash usually occur 7–12 days following vaccination and last for 1–2 days. Transient lymphadenopathy sometimes occurs following MMR and is attributable to the rubella component. Parotitis has rarely been reported following MMR and is attributable to the mumps component of the vaccine. Joint symptoms (arthralgia and/or arthritis) are reported in up to 25% of rubella-susceptible postpubertal women who receive MMR or other rubella-containing vaccine. Joint symptoms are usually mild and transient. Allergic reactions have been reported following MMR vaccine, and range from mild (urticaria or wheal and flare at injection site, generalized rash, pruritis) to severe anaphylactic reactions. Severe allergic reactions are estimated to occur less than once per million doses. Clinically apparent thrombocytopenia has been reported at a rate of less than one case per 30,000 doses. Central nervous system conditions, including aseptic meningitis, encephalitis and encephalopathy, have been reported following MMR, but are very uncommon (< 1 case per million doses).

Adverse reactions occur only in susceptible vaccinees and do not appear to be age-related. Reactions following the second dose of MMR (except allergic reactions) occur only among the small proportion of persons who did not respond to the first dose.

Precautions and Contraindications

Allergy

Persons with severe allergy (i.e., hives, swelling of the mouth or throat, difficulty breathing, hypotension, and shock) to gelatin or neomycin, or who have had a severe allergic reaction to a prior dose of MMR, should not be vaccinated with MMR except with extreme caution.

In the past, persons with a history of anaphylactic reactions following egg ingestion were considered to be at increased risk of serious reactions after receipt of measles- or mumps-

containing vaccines, which are produced in chick embryo fibroblasts. However, recent data suggest that anaphylactic reactions to measles- and mumps-containing vaccines are not associated with hypersensitivity to egg antigens, but to other components of the vaccines (such as gelatin). The risk for serious allergic reactions following receipt of these vaccines by egg-allergic persons is extremely low and skin-testing with vaccine is not predictive of allergic reaction to vaccination. MMR may be administered to egg-allergic persons without prior routine skin testing or the use of special protocols.

Pregnancy

Women known to be pregnant should not receive MMR vaccine. Pregnancy should be avoided for 1 month following receipt of monovalent measles vaccine and 3 months following MMR or other rubella-containing vaccine. Close contact with pregnant women is not a contraindication to MMR vaccination of the contact.

Immunosuppression

Replication of vaccine viruses can be prolonged in persons who are immunosuppressed or immunodeficient for any reason (e.g., congenital immunodeficiency, HIV infection, leukemia, lymphoma, generalized malignancy, or therapy with alkylating agents, antimetabolites, radiation, or large doses of corticosteroids). Evidence based on case reports has linked measles vaccine virus infection to subsequent death in six severely immunosuppressed persons. For this reason, patients who are severely immunosuppressed for any reason should not be given MMR vaccine. Healthy susceptible close contacts of severely immunosuppressed persons may be vaccinated.

In general, persons receiving large daily doses of corticosteroids (≥ 2 mg/kg per day or ≥ 20 mg per day of prednisone) for 14 days or more should not receive MMR vaccine because of concern about vaccine safety. MMR and its component vaccines should be avoided for at least one month after cessation of high-dose therapy. Persons receiving low-dose or short-course (< 14 days) therapy, alternate-day treatment, maintenance physiologic doses, or topical, aerosol, intra-articular, bursal, or tendon injections may be vaccinated. Although persons receiving high doses of systemic corticosteroids daily or on alternate days during an interval of < 14 days generally can receive MMR or its component vaccines immediately after cessation of treatment, some experts prefer waiting until 2 weeks after completion of therapy.

Patients receiving cancer chemotherapy or radiation who have not received chemotherapy for at least 3 months may receive MMR or its component vaccines.

Measles disease may be severe in persons with HIV infection. Available data indicate that vaccination with MMR has not been associated with severe or unusual adverse events in HIV-infected persons without evidence of severe immunosuppression, although antibody responses have been variable. MMR vaccine is recommended for all asymptomatic HIV-infected persons and should be considered for symptomatic persons who are not severely immunosuppressed. Asymptomatic children do not need to be evaluated and tested for HIV infection before MMR or other measles-containing vaccines are administered. A theoretical risk of an increase (probably transient) in HIV viral load following MMR vaccination exists because such an effect has been observed with other vaccines. The clinical significance of such an increase is not known.

MMR and other measles-containing vaccines are not recommended for HIV-infected persons with evidence of severe immunosuppression (e.g., persons with a very low CD4+ T-lymphocyte count), primarily because of the report of a case of measles pneumonitis in a measles vaccinee who had an advanced case of AIDS. Refer to the 1998 ACIP statement on MMR for additional details on vaccination of persons with symptomatic HIV infection.

Acute Illness

Vaccination of persons with moderate or severe acute illness should be postponed until their condition has improved. Minor illnesses, such as upper respiratory infections with or without low-grade fever, do not preclude vaccination.

Recent Administration of Immune Globulin (IG) or Other Antibody-Containing Blood Products

MMR or its component vaccines should be administered at least 14 days before the administration of antibody-containing blood products, such as IG. Because passively-acquired antibodies might interfere with the response to the vaccine, MMR should be delayed following administration of blood products. The length of the delay varies from 3 to 11 months, depending on the type of blood product received. See chapter on PHS Recommendations and the General Recommendations on Immunizations (MMWR 1994:43[RR-1]) for more details.

Tuberculosis

Tuberculosis may be exacerbated by measles disease. There is no evidence, however, that live measles virus vaccine has such an effect. Tuberculin testing (PPD) is not a prerequisite for vaccination with MMR or other measles-containing vaccine. PPD testing has no effect on the response to MMR vaccination. However, measles vaccine (and possibly mumps, rubella, and varicella vaccines) may suppress the response to PPD in a person infected with *Mycobacterium tuberculosis*. To minimize the risk of a false-negative interpretation, PPD testing should be delayed for 4–6 weeks after MMR vaccination. If PPD testing is needed, it should be done prior to MMR vaccination. It is also acceptable to apply the PPD and administer MMR simultaneously, since the mild immunosuppressive effect of the vaccine will not occur for several days after vaccination.

Breast-feeding is not a contraindication to MMR vaccination of either a woman or an infant. MMR vaccination has no effect on antibiotics or antimalarial drugs, and the drugs do not reduce the immunogenicity of MMR. Persons taking these products should be vaccinated as usual.

Meningococcal Disease

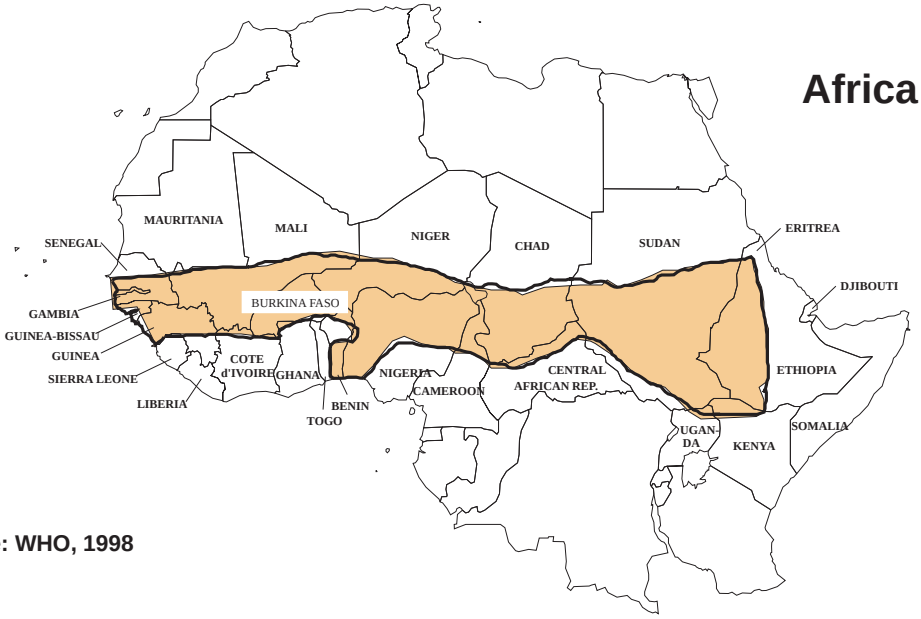
Description

An acute bacterial disease, characterized by sudden onset with fever, intense headache, nausea and often vomiting, stiff neck, and, frequently, a petechial rash with pink macules. Formerly, case-fatality rates exceeded 50%, but with early diagnosis, modern therapy, and supportive measures, the case-fatality rate is between 5% and 15%. Up to 5%–10% of populations in countries with endemic disease may be asymptomatic carriers.

Occurrence

In sub-Saharan Africa, epidemics of serogroup A or C meningococcal disease occur frequently during the dry season (December through June) particularly in the savannah areas extending from Mali eastward to Ethiopia known as the "meningitis belt" (see map).

Areas with Frequent Epidemics of Meningococcal Meningitis



Source: WHO, 1998

Risk for Travelers

Meningococcal disease in Americans traveling in such areas is rare. However, because of the lack of established surveillance and timely reporting from many of these countries, travelers to the meningitis belt during the dry season should receive meningococcal vaccine, especially if prolonged contact with the local populace is likely.

Vaccine

Vaccination against meningococcal disease is not a requirement for entry into any country, but it is required for pilgrims to Mecca, Saudi Arabia, for the annual Hajj. Vaccine is indicated for travelers to countries recognized as having epidemic meningococcal disease caused by a vaccine-preventable serogroup (i.e., A, C, Y, W135). Advisories for travelers to other countries will be issued when epidemics of meningococcal disease caused by vaccine-preventable serogroups are recognized.

Serogroup A is the most common cause of epidemics outside the United States, but serogroup C and serogroup B, can also cause epidemic disease. One formulation of meningococcal polysaccharide vaccine is currently available in the United States: quadrivalent A/C/Y/W-135 vaccine (Table 15). The vaccine is available, in single- and multiple-dose vials, and is distributed in the United States by Connaught Laboratories. No vaccine is yet available to offer protection against serogroup B. Meningococcal vaccines are chemically defined antigens consisting of purified bacterial capsular polysaccharides, each inducing serogroup-specific immunity. Serogroup A vaccine has not been shown to be effective in children < 3 months of age and may be less than fully effective in children 3–11 months of age. Serogroup C vaccine has not been shown to be effective in children < 2 years of age. The group Y and W-135 polysaccharides have been shown to be safe and immunogenic in adults; the response of children to these polysaccharides is unknown.

Table 15. Meningococcal vaccine

Type of vaccine	Dose	Dose volume*	Comments
Quadrivalent A/C/Y/W-135	Primary: 1	As indicated by manufacturer	Duration of immunity is unknown, but appears to be at least 3 years in those ≥ 4 years of age. Revaccination after 2–3 years should be considered for children first vaccinated at < 4 years of age who continue to be at high risk.

*For subcutaneous injection.

Precautions and Contraindications

Reactions

Adverse reactions to meningococcal vaccine are infrequent and mild, consisting principally of localized erythema that lasts 1–2 days. Up to 2% of young children develop fever transiently after vaccination.

Pregnancy

The safety of meningococcal vaccines in pregnant women has not been established, although the use of the vaccine in pregnant women during an epidemic in Brazil resulted in no adverse effects. Based on data from studies involving use of meningococcal vaccines and other polysaccharide vaccines administered during pregnancy, altering meningococcal vaccination recommendations during pregnancy is unnecessary.

Mumps

Description

Mumps is an acute viral disease characterized by fever, swelling, and tenderness of one or more salivary glands, usually the parotid and sometimes the sublingual or submaxillary glands.

Occurrence

Prior to vaccine licensure, 100,000–200,000 mumps cases are estimated to have occurred in the United States each year. Incidence declined to approximately 5,000 cases per year during 1980–1990. Since 1995, < 1,000 cases have been reported annually. The decline since 1995 is believed to be a result of widespread use of a second dose of MMR vaccine. Mumps primarily affects school-aged children. Since 1982, 50%–80% of reported cases have occurred among children 5–19 years of age.

Risk for Travelers

The risk of exposure to mumps outside the United States may be high. Few countries use mumps vaccine, so mumps remains a common disease in many countries of the world.

Vaccine

Mumps vaccine contains live attenuated mumps virus. It is available as a single antigen preparation, or combined with live attenuated measles and/or rubella vaccines. Combined measles-mumps-rubella (MMR) is recommended whenever one or more of the individual components is indicated.

Although vaccination against measles, mumps, or rubella is not a requirement for entry into any country (including the United States), persons traveling or living abroad should ensure that they are immune to all three diseases. Immunity to mumps is of particular importance for children approaching puberty, and for adolescents and adults, particularly males, who have not had mumps. Persons can be considered immune to mumps if they have documentation of receipt of one or more doses of a mumps-containing vaccine on or after the first birthday, physician-diagnosed mumps, or laboratory evidence of mumps immunity. Most adults born before 1957 are likely to have been infected naturally and generally may be considered immune, even if they did not have clinically recognizable disease. However, mumps or MMR vaccine may be given to older persons if there is reason to believe they may be susceptible.

The first dose of MMR should be routinely administered at 12–15 months of age. A single dose of MMR vaccine induces antibody formation to all three viruses in at least 95% of susceptibles vaccinated at 12–15 months of age or older. A second dose is expected to induce immunity in most vaccinees who do not respond to the first dose. The second dose should be separated from the first dose by a minimum of 28 days. See page 26 for a discussion of mumps immunization schedule modifications for infants who will be traveling.

Side Effects and Adverse Reactions

Refer to the measles section for information on side effects and adverse reactions following MMR vaccine.

Precautions and Contraindications

Refer to the measles section for information on precautions and contraindications for MMR vaccine.

Onchocerciasis (River Blindness)

Description

Onchocerciasis is caused by the pre-larval (microfilaria) and adult stages of the nematode *Onchocerca volvulus* and may result in dermatitis, subcutaneous nodules, lymphadenitis, and visual impairment, including blindness. The disease is transmitted by the bite of female *Simulium* flies (black flies) that bite by day and are found near rapidly flowing rivers and streams.

Occurrence

Onchocerciasis is endemic in more than 25 nations located in a broad band across the central part of Africa. Small endemic foci are also present in the Arabian peninsula (Yemen) and in Latin America (Brazil, Colombia, Ecuador, Guatemala, southern Mexico, Venezuela).

Risk for Travelers

Short-term travelers to onchocerciasis-endemic regions, such as most tourists, appear to be at low risk for acquiring this condition. However, temporary residents and others who visit endemic regions for > 3 months and live or work near black fly habitats are at greater risk for infection. Infections tend to occur in expatriate groups such as missionaries and their families, field scientists, and Peace Corps volunteers.

Vaccine

No vaccine is available.

Preventive Measures

No effective chemoprophylaxis is available. Protective measures include avoidance of black fly habitats and the use of personal protection measures against biting insects such as those outlined in the section “Health Hints” (page 161).

Plague

Description

Plague is a zoonosis involving rodents and their fleas. The causative agent of plague is a bacterium, *Yersinia pestis*. Humans are incidental hosts and are usually infected by the bite of rodent fleas. Plague may also be acquired by direct contact with infectious materials or by inhalation of infective respiratory droplets. Initial signs and symptoms of plague may be nonspecific, with fever, chills, malaise, myalgia, nausea, prostration, sore throat, and headache. Bubonic plague, the most common form, usually presents with painful, swollen lymph nodes (buboes) that develop in the afferent lymphatic chain draining the site of the flea bite.

Plague continues to be enzootic in wild rodent populations over large rural areas of the Americas, Africa, and Asia, with occasional outbreaks among commensal rodents in villages and small towns. Wild rodent plague poses a real, though limited, risk to humans. When infection spreads to rats in urban or populated areas, humans are at markedly increased risk of exposure. In the past several decades, however, urban outbreaks have been rare and limited in size.

Occurrence

Wild rodent plague exists in the western third of the United States, in widely scattered areas of South America, in north-central, eastern, and southern Africa, Madagascar, Iranian Kurdistan, along the frontier between Yemen and Saudi Arabia, Central and Southeast Asia (China, India, Indonesia, Kazakhstan, Mongolia, Myanmar [Burma], Vietnam), and portions of the Russian Federation. In recent years, human plague has been reported from the African region from Angola, Botswana, Democratic Republic of Congo (Zaire), Kenya, Libya, Madagascar, Malawi, Mozambique, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe; in Asia from China, India, Kazakhstan, Laos, Mongolia, Myanmar (Burma), and Vietnam; and in the Americas from the Bolivia, Brazil, Ecuador, Peru, and the United States.

Risk for Travelers

Risk to travelers in any of these areas is small.

Vaccine

The efficacy of plague vaccine in humans has not been demonstrated in a controlled trial. Limited indirect data suggest that the vaccine offers protection against flea-borne plague. Vaccination against plague is not required by any country as a condition for entry. Vaccine is usually recommended only for persons who are at a particularly high risk of exposure because they work with plague routinely in the laboratory or because of field exposures to rodents and their fleas in epizootic areas. In most of the countries of Africa, Asia, and Americas where plague is reported, the risk of infection exists primarily in rural mountainous or upland areas.

Vaccination is rarely indicated for travelers to countries reporting cases, particularly if their travel is limited to urban areas with modern hotel accommodations. In exceptional circumstances, vaccination might be considered for persons who will have direct contact with wild or commensal rodents or other animals in plague-epizootic areas and for persons who will reside or work in plague-endemic rural areas where avoidance of rodents and fleas is difficult. Primary and booster vaccinations for persons ≥ 18 years of age are summarized in Table 16; no safety and immunogenicity data are available supporting vaccine use in persons < 18 or > 61 years old.

Reactions

Mild pain, erythema, and side effects such as induration at the vaccine injection site occur frequently. With repeated doses, fever, headache, and malaise are more common and tend to be more severe. Sterile abscesses occur rarely. No fatal or disabling complications have been reported.

Table 16. Plague vaccine

Dose	Dose Volume* ≥ 18–61 years of age†	Comments
Primary series: 1 2 & 3	 1.0 mL 0.2 mL	Doses 1 and 2 are given 1–3 months apart; dose 3 is given 5–6 months after dose 2.
Booster	0.2 mL	Give booster doses 1–3 at 6-month intervals for persons with ongoing exposure risks; give booster doses 4 and above at 1– to 2-year intervals after the preceding booster dose.

*For intramuscular injection.

†No recommendations are given for other age groups because of insufficient data.

Preventive Measures

Travelers considered to be at high risk for plague because of unavoidable exposures in active epizootic or epidemic areas should consider short-term antibiotic chemoprophylaxis with tetracycline or doxycycline during periods of exposure. Trimethoprim-sulfamethoxazole is an acceptable substitute for use in children.

Poliomyelitis

Description

Poliomyelitis is an acute viral infection the involves the gastrointestinal tract, and, occasionally, the central nervous system. It is acquired by fecal-oral transmission. Clinical manifestations of poliovirus infection range from asymptomatic (the majority of infections) to acute flaccid paralysis of a single limb, to quadriplegia, respiratory failure, and death.

Occurrence

In the prevaccine era, infection with poliovirus was common, with epidemics occurring in the summer and fall in temperate areas. The incidence of poliomyelitis fell rapidly after the licensure of inactivated polio vaccine in 1955 and oral polio vaccine in 1960s. The last cases of indigenously acquired polio in the United States occurred in 1979. A polio eradication program has led to elimination of polio in the Western Hemisphere (last case in 1991) and substantial reductions in disease in many other parts of the world.

Risk for Travelers

Poliovirus transmission continues to occur in many developing countries of Africa, Asia, the Middle East, and eastern Europe. Travelers to these countries should be fully immunized. There is no risk of poliovirus infection in any country of the Western Hemisphere.

Vaccine

A primary series consists of at least three doses of either inactivated polio virus vaccine (IPV), live oral poliovirus vaccine (OPV), or a combination of IPV and OPV. Choice of vaccine and schedule depend on the age, previous vaccination history, and medical history of the vaccinee.

Children and Adolescents < 18 Years of Age

Vaccination schedules using IPV alone or OPV alone are both effective in the prevention of poliomyelitis, and both are appropriate under certain circumstances. However, the Advisory Committee on Immunization Practices recommends the use of a sequential schedule of IPV followed by OPV for the routine vaccination of children in the United States. IPV is recommended at 2 and 4 months of age, followed by OPV at 12–18 months and 4–6 years of age. Polio vaccination schedules that include IPV as at least the first two doses are intended to further reduce the already extremely low risk of vaccine-associated paralytic polio. If an accelerated schedule is required, all four doses of the sequential IPV-OPV schedule may be separated by a minimum of 4 weeks, with the first dose given no earlier than 6 weeks of age. For polio vaccination schedules that include a combination of both IPV and OPV, including the sequential schedule, a total of four doses is recommended.

A polio vaccination series consisting of OPV alone is an acceptable alternative to the routine sequential IPV-OPV schedule only under certain circumstances (e.g., parental refusal of additional injections or late initiation of the vaccination series). For a schedule which includes only OPV, vaccination should begin at 6–8 weeks of age, with the second and third doses given a minimum of 4–8 weeks after the preceding dose. A fourth dose of OPV should be routinely administered at 4–6 years of age. If an accelerated schedule is required, all four OPV doses may be separated by a minimum of 4 weeks, with the first dose given no earlier than 6 weeks of age. If the third dose of OPV is administered on or after the fourth birthday, a fourth dose is not required.

A polio vaccination series consisting of IPV alone is an acceptable alternative to the routine sequential IPV-OPV and is recommended for immunocompromised persons (e.g., chemotherapy, malignancy, HIV infection) and their household contacts. For a schedule which includes only IPV, vaccination should begin at 6–8 weeks of age, with the second dose given 4–8 weeks later. A third dose is usually given 6–12 months after the second. A fourth dose of IPV should be routinely administered at 4–6 years of age. If an accelerated schedule is required, the first three IPV doses may be separated by a minimum of 4 weeks, with the first dose given no earlier than 6 weeks of age. If the third dose of IPV is administered on or after the fourth birthday, a fourth dose is not required.

See pages 26–27 for information on polio vaccination of children requiring an accelerated schedule or whose travel to a polio-endemic country is imminent.

Adults ≥ 18 Years of Age

IPV is recommended for adults who are traveling to polio-endemic areas and who are unvaccinated or whose polio immunization status is unknown. IPV is preferred because the risk of vaccine-associated paralysis following OPV is higher in adults than in children. The recommended schedule is two doses given at a 1- to 2-month interval and a third dose given 6–12 months after the second.

In some circumstances, time will not allow completion of a routine IPV schedule. If 8 weeks or more are available before protection is needed, three doses of IPV should be given at least 4 weeks apart. If 4–8 weeks are available before protection is needed, two doses of IPV should be given at least 4 weeks apart. If < 4 weeks are available before protection is needed, a single dose of either OPV or IPV is recommended. In all instances, the remaining doses of vaccine should be given later, at the recommended intervals, if the person remains at increased risk.

Adults traveling to polio-endemic areas who have previously received one or more doses of either OPV or IPV, but who did not complete a primary series should be given the remaining required doses of either OPV or IPV, regardless of the interval since the last dose. It is not necessary to restart the series or add additional doses because of a prolonged interval between doses.

Adults traveling to polio-endemic areas and who have previously completed a primary course of OPV may be given another dose of OPV or IPV. These adults are not at increased risk of side effects, such as vaccine-associated paralytic polio. The need for further supplementary doses has not been established. Adults who previously completed a primary course of IPV may be given a dose of either IPV or OPV.

Side Effects and Adverse Reactions

Minor local reactions (pain, redness) may occur following IPV. No serious adverse reactions to IPV have been documented.

In rare instances, administration of OPV has been associated with paralysis in healthy recipients and their contacts. No procedures are currently available for identifying persons, other than those with immunodeficiency, who are likely to experience such adverse reactions. Although the risk of vaccine-associated paralysis is minimal (approximately one case per 2 million OPV doses), vaccinees (or their parents) and their susceptible, close personal contacts should be informed of this risk.

A serious allergic reaction to a vaccine component, or following a prior dose of vaccine, is a contraindication to further doses of either IPV or OPV. Since IPV contains trace amounts of streptomycin, neomycin, and polymyxin B, there is a possibility of allergic reactions in individuals sensitive to these antibiotics. Persons with anaphylactic allergy, hives, etc., should not receive IPV. Persons with allergies that are not anaphylactic, such as skin contact sensitivity, may be vaccinated.

Moderate or severe acute illness is a precaution for both IPV and OPV. However, mild illness, including mild diarrhea, is not a contraindication.

Immunosuppression

Immunosuppression increases the risk for vaccine-associated paralytic polio. OPV should not be given to immunosuppressed individuals or household contacts of individuals who have immune deficiency diseases, immunosuppression (due to disease or therapy), or if there is suspected familial immune deficiency. OPV should not be given to a person known to be infected with human immunodeficiency virus (HIV) regardless of the level of immune suppression. OPV should also not be administered to a healthy family contact of a person with HIV infection. IPV should be substituted for OPV in these circumstances.

Pregnancy

There is no convincing evidence of adverse effects of either OPV or IPV in pregnant women or a developing fetus. However, it is prudent to avoid polio vaccination of pregnant women unless immediate protection is needed. In this case, OPV is the vaccine of choice.

Breast-Feeding

Breast-feeding does not interfere with successful immunization against poliomyelitis with IPV or OPV. IPV may be administered to a child with diarrhea, and OPV may be administered to a child with mild diarrhea. Minor upper respiratory illnesses with or without fever, mild to moderate local reactions to a previous dose of vaccine, current antimicrobial therapy, and the convalescent phase of acute illness are not contraindications for vaccination with IPV or OPV.

Rabies

Description

Rabies is an acute, fatal viral encephalomyelitis. The disease progresses to paresis or paralysis; spasm of swallowing muscles leads to fear of water (hydrophobia); delirium and convulsions follow. Rabies is almost always transmitted by bites, which introduce the virus into wounds. Very rarely, rabies has been transmitted by non-bite exposures that introduce the virus into open cuts or mucous membranes. Although dogs are the main reservoir of the disease in many developing countries, the epidemiology of the disease in animals differs sufficiently from one region or country to another to warrant the evaluation of all mammal bites.

Occurrence

In certain areas of the world, canine rabies remains highly endemic, including (but not limited to) parts of Mexico, El Salvador, Guatemala, Peru, Colombia, Ecuador, India, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam. The disease is also found in dogs in most of the other countries of Africa, Asia, Central and South America, except as noted in Table 17.

Table 17 lists countries that have reported no cases of rabies during the most recent 2-year period for which information is available (formerly referred to as “rabies-free countries”). Additional information can be obtained from the local health authorities of the country, the embassy, or the local consulate’s office in the United States.

Risk for Travelers

Travelers to rabies-endemic countries should be warned about the risk of acquiring rabies, although rabies vaccination is not a requirement for entry into any country.

Vaccine

Preexposure vaccination with human diploid cell rabies vaccine (HDCV), purified chick embryo cell vaccine (PCEC), or Rabies Vaccine Adsorbed (RVA) may be recommended for international travelers based upon the local incidence of rabies in the country to be visited, the availability of appropriate anti-rabies biologicals, and the intended activity and duration of stay. It may include veterinarians, animal handlers, field biologists, spelunkers, and certain

laboratory workers. Preexposure prophylaxis may provide protection when there is an inapparent or unrecognized exposure to rabies and when postexposure therapy may be delayed. Preexposure prophylaxis is also of particular importance for persons at high risk of being exposed in countries where the locally available rabies vaccines may carry a high risk of adverse reactions. Preexposure vaccination does not eliminate the need for additional therapy after a rabies exposure but simplifies postexposure treatment by eliminating the need for rabies immune globulin (RIG) and by decreasing the number of doses of vaccine required.

Preventive Measures

Any animal bite or scratch should receive prompt local treatment by thoroughly cleansing the wound with copious amounts of soap and water; this local treatment significantly reduces the risk of rabies. Persons who may have been exposed to rabies should always contact local health authorities immediately for advice about postexposure prophylaxis and should also contact their personal physician or State health department as soon as possible thereafter.

Table 18 provides information on preexposure and postexposure prophylaxis. Routine serologic testing is not necessary for persons who receive the recommended preexposure or postexposure regimen with HDCV, PCEC, or RVA vaccines. Persons previously vaccinated with other vaccines should receive the complete postexposure regimen unless they developed a laboratory-confirmed antibody response to the primary vaccination. Serologic testing is still recommended for persons whose immune response might be diminished by drug therapy or by diseases. Rabies preexposure prophylaxis is not indicated for travelers to the countries listed in Table 17, and postexposure prophylaxis is rarely necessary after exposures to terrestrial animals in these countries.

Chloroquine phosphate (and possibly other structurally related antimalarials such as mefloquine, administered for malaria chemoprophylaxis) may interfere with the antibody response to HDCV. The intramuscular (IM) dose/route of preexposure prophylaxis, however, provides a sufficient margin of safety in this setting. HDCV should not be administered by the intradermal (ID) dose/route when chloroquine, mefloquine, or other drugs that may interfere with the immune response are being used. For international travelers, the ID dose/route should be initiated early, to allow the three-dose series to be completed before antimalarials are begun; otherwise the IM dose/route should be used. PCEC and RVA should never be administered ID.

Precautions and Contraindications

Reactions after vaccination with HDCV, PCEC, or RVA

Persons may experience local reactions such as pain, erythema, and swelling or itching at the injection site, or mild systemic reactions, such as headache, nausea, abdominal pain, muscle aches, and dizziness. Approximately 6% of persons receiving booster vaccinations with HDCV may experience an immune complex-like reaction characterized by urticaria, pruritis, and malaise. Once initiated, rabies postexposure prophylaxis should not be interrupted or discontinued because of local or mild systemic reactions to rabies vaccine.

Pregnancy

Pregnancy is not a contraindication to postexposure prophylaxis.

Age

In infants and children, the dose of HDCV, PCEC, or RVA for preexposure or postexposure prophylaxis is the same as that recommended for adults. The dose of RIG for postexposure prophylaxis is based on body weight (Table 18).

Table 17. Countries reporting no cases of rabies*

The following countries and political units reported that rabies was not present during 1996–1997.

Region	Countries
Africa	Cape Verde, Libya,† Mauritius,† Reunion, Seychelles†
Americas	**North:** Bermuda; St. Pierre and Miquelon
	Caribbean: Antigua and Barbuda; Aruba; Bahamas; Barbados; Cayman Islands; Guadeloupe; Jamaica; Martinique; Netherlands Antilles (Bonaire, Curaçao, Saba, Sint Maarten, and St. Eustatius); St. Christopher (St. Kitts) and Nevis; St. Martin; St. Vincent and Grenadines; Virgin Islands (U.K. and U.S.)
	South: Uruguay
ASIA	Bahrain; Brunei; Hong Kong; Japan; Kuwait; Malaysia (Malaysia-Sabah†); Maldives; Qatar; Singapore; Taiwan·
EUROPE	Albania; Cyprus; Denmark; Faroe Islands; Finland; Gibraltar; Greece; Iceland; Ireland; Isle of Man; Italy; Jersey; Macedonia; Malta; Monaco; Norway (mainland); Portugal; Spain (except Ceuta/Melilla); Sweden; United Kingdom
OCEANIA	American Samoa; Australia; Cook Islands; Fiji; French Polynesia; Guam; Indonesia (with exception of Java, Kalimantan, Sumatra and Sulawesi); Kiribati; New Caledonia; New Zealand; Niue; Papua New Guinea; Solomon Islands; Tonga; Vanuatu
Most of Pacific Oceania is "rabies-free." For information on specific islands not listed above, contact the Centers for Disease Control and Prevention, Division of Quarantine.	

*Bat rabies exists in some areas that are free of terrestrial rabies.
†Countries whose classifications may be considered provisional.

(1) World Health Organization: World Survey of Rabies 32, (for 1996); Division of Emerging and Other Communicable Diseases, WHO, Geneva, 1998.

(2) WHO Collaborating Centre for Rabies Surveillance and Research: Rabies Bulletin Europe, 1997;21(4).

(3) Pan American Health Organization. Epidemiological surveillance of rabies in the Americas, 1997;29(1-33).

Table 18. Rabies immunization

I. PREEXPOSURE IMMUNIZATION. Preexposure immunization consists of three doses of HDCV, PCEC, or RVA, 1.0 mL, IM (i.e., deltoid area), one each on days 0, 7, and 21 or 28. ONLY HDCV may be administered by the intradermal (ID) dose/route (0.1 mL ID on days 0, 7, and 21 or 28). If the traveler will be taking chloroquine or mefloquine for malaria chemoprophylaxis, the three-dose series must be completed before antimalarials are begun. If this is not possible, the IM dose/route should be used. Administration of routine booster doses of vaccine depends on exposure risk category as noted below. Preexposure immunization of immunosuppressed persons is not recommended.

Criteria for Preexposure Immunization

Risk category	Nature of risk	Typical populations	Preexposure regimen
Continuous	Virus present continuously, often in high concentrations. Specific exposures likely to go unrecognized. Bite, nonbite, or aerosol exposure.	Rabies research lab workers* Rabies biologics production workers.	Primary course. Serologic testing every 6 months; booster vaccination if antibody titer is below acceptable level.†
Frequent	Exposure usually episodic with source recognized, but exposure may also be unrecognized. Bite, nonbite, or aerosol exposure possible.	Rabies diagnostic lab workers,* spelunkers, veterinarians and staff, and animal control and wildlife workers in rabies-epizootic areas.	Primary course. Serologic testing every 2 years; booster vaccination if antibody titer is below acceptable level.†
Infrequent (greater than population at large)	Exposure nearly always episodic with source recognized. Bite or nonbite exposure.	Veterinarians and animal control and wildlife workers in areas with low rabies rates. Veterinary students.Travelers visiting areas where rabies is enzootic and immediate access to appropriate medical care, including biologics, is limited.	Primary course. No serologic testing or booster vaccination.
Rare (population at large)	Exposure always episodic, with source recognized. Bite or nonbite exposure.	U.S. population at large, including individuals in rabies-epizootic areas.	No preexposure immunization necessary.

II. POSTEXPOSURE IMMUNIZATION. All postexposure treatment should begin with immediate thorough cleansing of all wounds with soap and water.

Persons not previously immunized: RIG, 20 I.U./kg body weight, infiltrated at bite site (if possible), remainder IM; five doses of HDCV, PCEC, or RVA, 1.0 mL IM (i.e., deltoid area), one each on days 0, 3, 7, 14 and 28.

Persons previously immunized:§ Two doses of HDCV, PCEC, or RVA, 1.0 mL, IM (i.e., deltoid area), one each on days 0 and 3. RIG should not be administered.

*Judgment of relative risk and extra monitoring of vaccination status of laboratory workers is the responsibility of the laboratory supervisor (see U.S. Department of Health and Human Service's Biosafety in Microbiological and Biomedical Laboratories, 1984).

†Preexposure booster immunization consists of one dose of HDCV, PCEC, or RVA, 1.0 mL/dose, IM (deltoid area) or HDCV, 0.1 mL ID (deltoid). Minimum acceptable antibody level is complete virus neutralization at a 1:5 serum dilution by the rapid fluorescent focus inhibition test. A booster dose should be administered if titer falls below this level.

§Preexposure immunization with HDCV, PCEC, or RVA; prior postexposure prophylaxis with HDCV, PCEC, or RVA; or persons previously immunized with any other type of rabies vaccine *and* a documented history of positive antibody response to the prior vaccination.

Rift Valley Fever

Description
Rift Valley fever (RVF) is a viral disease that affects primarily livestock and humans. It is transmitted by several means, including the bites of mosquitoes and other biting insects, and percutaneous inoculation or inhalation of aerosols from contaminated blood or fluids of infected animals.

Occurrence
Occasionally, outbreaks occur involving large numbers of human cases, e.g., the Nile Delta, Egypt (1978 and 1993) and the lower Senegal River Basin of Mauritania (1987).

Risk for Travelers
The risk of RVF infection to persons who travel to endemic areas is generally low.

Vaccine
No vaccine is available.

Preventive Measures
Travelers can reduce their risk of exposure by avoiding contact with livestock and minimizing their exposure to arthropod bites. No commercial human vaccine is available.

Rotavirus

Description
Rotavirus is the most common cause of severe gastroenteritis among infants and young children in the United States. It is transmitted by fecal-oral spread, both through close person-to-person contact and by fomites, such as environmental surfaces contaminated by stool. Rotavirus illness may be mild and self-limited or may be severe, with dehydrating diarrhea, vomiting and fever. The most severe disease occurs following the first infection with rotavirus, usually at 3–35 months of age. Older children and adults may be reinfected with rotavirus but usually do not develop significant clinical illness.

Occurrence
Rotavirus infection is a ubiquitous childhood infection worldwide. An estimated 2.7 million cases occur each year in the United States alone, and 95% of children have at least one rotavirus infection by 5 years of age. The incidence of rotavirus is similar in developed and developing countries, suggesting that improved sanitation alone is not sufficient to prevent the infection. Worldwide, rotavirus is a major cause of childhood mortality.

Risk for Travelers
Because rotavirus occurs worldwide, children are as likely to be infected with rotavirus in the United States as outside. Children 3 months to 3 years of age who have not had rotavirus infection and have not been immunized with rotavirus vaccine are at significant risk for severe

rotavirus infection during travel, especially to areas with poor sanitation. Because of maternal antibody, children < 3 months of age are relatively protected against rotavirus gastroenteritis.

Vaccine

Rotavirus vaccine is a live reassortant vaccine that contains four strains of rotavirus common in the United States and other countries. In clinical trials the vaccine was 49%–68% effective against any rotavirus diarrhea and 69%–91% effective in preventing severe rotavirus diarrhea. The ACIP recommends routine immunization with rotavirus vaccine for all infants without contraindications. The vaccine should be administered as a series of three oral doses at 2, 4, and 6 months of age. The minimum age of the first dose is 6 weeks. The vaccination series may be started at any time between 6 weeks and 6 months of age. Infants > 6 months of age may have an increased risk of fever following vaccination. As a result, initiation of vaccination after age 6 months is not recommended. All three doses of rotavirus should routinely be separated by 2 months. However, the minimum interval between doses may be a short as 3 weeks if an accelerated schedule is required.

All doses of rotavirus vaccine should be administered in the first year of life because data on the safety and efficacy of the vaccine in older children are not available. The maximum age for any dose of rotavirus vaccine is 12 months. Rotavirus vaccine should not be administered on or after the child's first birthday, even if fewer than three doses have been administered.

Rotavirus vaccine may be administered simultaneously with all other vaccines that are routinely given at the same ages (hepatitis B, DTaP, IPV, OPV, Hib). Rotavirus and oral polio vaccines do not appear to interfere with each other. If rotavirus vaccine and OPV are not administered at the same visit, it is not necessary to wait a specified period before administering the second vaccine. It may be given as soon as desired.

Side Effects and Adverse Reactions

The most common adverse reaction following rotavirus vaccine is low-grade fever (> 38^{o} C) which can be attributed to the vaccine in about 15% of vaccinated children. Moderate fever (> 39^{o} C) attributable to the vaccine occurs in about 1% of vaccine recipients, usually 3–5 days following vaccination with the first or second dose. Fever generally lasts less than 24 hours. Decreased appetite, irritability, and decreased activity were reported following the first dose in some trials. Vomiting attributable to the vaccine has not been reported. An increase in diarrhea (about 1.4%) has been reported from only one study.

Precautions and Contraindications

Allergy

Rotavirus vaccine is contraindicated for infants who are known to have had a severe allergic (anaphylactic) reaction to a prior dose of vaccine or to a component of the vaccine, such as aminoglycoside antibiotics or amphotericin B.

Immunosuppression

Rotavirus vaccine is contraindicated for infants with known or suspected immunodeficiency diseases and conditions that could result in immunosuppression, such as combined immunodeficiency, hypogammaglobulinemia, agammaglobulinemia, thymic abnormalities, HIV infection, or treatment with corticosteroids, alkylating drugs or other immunosuppressive therapies. The vaccine is not approved by the FDA for use in children with solid organ or hematopoietic

malignancies (such as leukemia), children receiving immunosuppressive therapy or radiation, and in children who have received stem cell or solid organ transplants. Rotavirus vaccine should not be administered to infants born to women known to be HIV-infected until tests for HIV infection in the infant are negative at 2 months or older by polymerase chain reaction (PCR) or viral culture.

Infants living in households with persons known or suspected to be immunodeficient, including persons with HIV infection, should be immunized according to the normal infant schedule, unless the HIV-infected person is the infant's biologic mother, as noted above.

Acute Illness

Moderate or severe acute illness, an evolving neurologic condition, and persistent vomiting are precautions to vaccination with rotavirus vaccine. Infants with these conditions should be vaccinated as soon as their condition improves, but only if the first dose of the series can be given before 6 months of age. Rotavirus vaccine, like other vaccines, may be administered to infants with minor illnesses and low-grade fever.

The safety and efficacy of RRV-TV in children with pre-existing chronic gastrointestinal conditions, such as congenital malabsorption syndromes, Hirschsprung's disease, or short-gut syndrome, has not been determined. The decision to vaccinate children with these conditions must be made on a case-by-case basis.

Very limited data on the safety and immunogenicity of rotavirus vaccine for premature infants are available. There is concern that premature infants may have a lower level of passive maternal antibody to rotavirus, and, as a result, may be at increased risk of fever following vaccination. However, ACIP believes that the benefit of vaccination outweighs the theoretical risk of fever after vaccination and recommends that premature infants receive RRV-TV at or after discharge from the hospital nursery if they have achieved a chronologic age of at least 6 weeks and are clinically stable.

Breast-feeding is not a contraindication to rotavirus vaccination of an infant. Rotavirus vaccine is not believed to be affected by recent or concurrent administration of an antibody-containing blood product, such as immune globulin.

Preventive Measures

Meticulous attention to food and beverage consumption, as described for travelers' diarrhea, is likely to decrease the risk of rotavirus infection. However, these restrictions are difficult to observe, and rotavirus is infective even if only a few virus particles are ingested.

Rubella

Description

Rubella is an acute viral disease that may affect susceptible persons of any age. Although generally mild in children, rubella may be associated with significant morbidity in adults and is associated with a high rate of fetal wastage or anomalies if contracted in the early months of pregnancy.

Occurrence

The largest annual total of cases of rubella in the United States was in 1969, when 57,686 cases were reported. Following vaccine licensure in 1969, rubella incidence fell rapidly. Since 1992, fewer than 500 cases have been reported each year. Since 1992, an average of 4 cases of congenital rubella syndrome (CRS) have been reported annually. Since 1994, persons 20–39 years of age have accounted for more than half of reported cases. In 1997, this age group accounted for 77% of all reported cases. Most persons with rubella in this age group, as well as the mothers of all infants with CRS, were born outside the United States, in areas where rubella vaccine is not routinely given.

Risk for Travelers

Rubella occurs worldwide, and the risk of exposure to rubella outside the United States may be high. Few countries routinely use rubella vaccine, so rubella remains a common disease in many countries of the world.

Vaccine

Rubella vaccine contains live attenuated rubella virus. It is available as a single antigen preparation or combined with live attenuated measles and/or mumps vaccines. Combined measles-mumps-rubella (MMR) is recommended whenever one or more of the individual components is indicated.

Although vaccination against measles, mumps, or rubella is not a requirement for entry into any country (including the United States), persons traveling or living abroad should ensure that they are immune to all three diseases. Immunity to rubella is particularly important for women of childbearing age. Persons can be considered immune to rubella if they have documentation of receipt of one or more doses of a rubella-containing vaccine on or after the first birthday, or laboratory evidence of rubella immunity. Birth before 1957 provides only presumptive evidence of rubella immunity and does not guarantee that a person is immune. Rubella can occur in susceptible persons born before 1957, and congenital rubella syndrome can occur in the offspring of women infected with rubella during pregnancy. ACIP recommends that birth before 1957 not be accepted as evidence of rubella immunity for women who might become pregnant. The clinical diagnosis of rubella is unreliable and should not be considered in assessing immune status. Because many rash illnesses may mimic rubella infection and many rubella infections are unrecognized, the only reliable evidence of previous rubella infection is the presence of serum rubella IgG or documentation of prior vaccination.

The first dose of MMR should be routinely administered at 12–15 months of age. A single dose of MMR vaccine induces antibody formation to all three viruses in at least 95% of susceptibles vaccinated at 12–15 months of age or older. A second dose is expected to induce immunity in most vaccinees who do not respond to the first dose. The second dose should be separated from the first dose by a minimum of 28 days. See page 26 for a discussion of the rubella immunization schedule modifications for infants who will be traveling.

Side Effects and Adverse Reactions

Refer to the measles section for information on side effects and adverse reactions following MMR vaccine.

Precautions and Contraindications

Refer to the measles section for information on precautions and contraindications for MMR vaccine.

Schistosomiasis

Description

Schistosomiasis is caused by flukes whose complex life cycles involve specific fresh-water snail species as intermediate hosts. Infected snails release large numbers of minute free-swimming larvae (cercariae) which are capable of penetrating the unbroken skin of the human host. Even brief exposures to contaminated water can result in infection.

Clinical manifestations of acute infection can occur within 2–3 weeks of exposure to cercariae-infested water, but most acute infections are asymptomatic. The most common acute symptoms are: fever, lack of appetite, weight loss, abdominal pain, weakness, headaches, joint and muscle pain, diarrhea, nausea, and cough. Rarely, the central nervous system can be involved to produce seizures or transverse myelitis as a result of mass lesions of the brain or spinal cord. Chronic infections can cause disease of the lung, liver, intestines, and/or bladder. Many people who develop chronic infections can recall no symptoms of acute infection. Diagnosis of infection is usually confirmed by serologic studies or by finding schistosome eggs on microscopic examination of stool and urine. Schistosome eggs may be found as soon as 6–8 weeks after exposure but are not invariably present. Bathing with contaminated fresh water can also transmit infection. Human schistosomiasis cannot be acquired by wading or swimming in salt water (oceans or seas).

Occurrence

This infection is estimated to occur worldwide among some 200 million people. The countries where schistosomiasis is most prevalent include Brazil; Egypt and most of sub-Saharan Africa; and southern China, the Philippines, and Southeast Asia.

Risk for Travelers

Exposure to schistosomiasis is a health hazard for U.S. citizens who travel to endemic areas of the Caribbean, South America, Africa, and Asia. Outbreaks of schistosomiasis have occurred among adventure travelers participating in river trips in Africa as well as resident expatriates and Peace Corps volunteers. Those at greatest risk are travelers who engage in wading or swimming in fresh water in areas where poor sanitation and appropriate snail hosts are present.

Vaccine

No vaccine is available. At this time, no available drugs are known to be effective as chemoprophylactic agents. However, safe and effective oral drugs are available for the treatment of schistosomiasis.

Preventive Measures

Since there is no practical way for the traveler to distinguish infested from noninfested water, fresh-water swimming in rural areas of endemic countries should be avoided. In such areas, heating bathing water to 50^{o} C (122^{o} F) for 5 minutes or treating it with iodine or chlorine in a manner similar to the precautions recommended for preparing drinking water will destroy cercariae and make the water safe. Thus, swimming in adequately chlorinated swimming pools is virtually always safe, even in endemic countries. Filtering water with paper coffee filters may also be effective in removing cercariae from bathing water. If these measures are not feasible, allowing bathing water to stand for 3 days is advisable, since cercariae rarely survive longer than 48 hours. Vigorous towel drying after accidental exposure to water has been suggested as a way to remove cercariae in the process of skin penetration. Although toweling may prevent some infections, to recommend this to travelers might give them a false sense of security; it is far safer to recommend avoiding contact with contaminated water.

Upon return from foreign travel, those who may may have been exposed to schistosome-infested fresh water should undergo screening tests.

Sexually Transmitted Diseases (STDs)

Description

Sexually transmitted diseases (STDs) are the infections and resulting clinical syndromes caused by more than 25 infectious organisms transmitted through sexual activity. Serious sequelae include pelvic inflammatory disease, infertility, stillbirths and neonatal infections, genital cancers, and (in the case of human immunodeficiency virus [HIV] and tertiary syphilis) death.

Occurrence

AIDS has become a global health problem, and the prevalence of HIV infection in many populations continues to escalate (see page 71). Also of concern are the antibiotic-resistant STD agents, particularly penicillin-, tetracycline-, and quinolone-resistant strains of *Neisseria gonorrhoeae*.

Risk for Travelers

International travelers are at risk of contracting STDs, including HIV, if they have sex with partners who have these diseases. Travelers should be aware that the risk of STDs is high in some parts of the world.

Vaccine

Hepatitis B is the only STD for which a vaccine is available.

Preventive Measures

To avoid acquiring STDs, travelers should not have sexual contact with persons who may be infected. Persons most likely to be infected are those with numerous sex partners. In many

places, persons who make themselves available for sex with travelers are likely to be persons, such as commercial sex workers, with many partners. In addition, injecting drug users are at high risk of being infected with HIV, regardless of the number of their sex partners.

Since determining whether a person has an STD is impossible, travelers who wish to absolutely protect themselves from acquiring an STD should refrain from sexual contact. If, however, they choose not to do this, travelers can reduce their risk of acquiring infection by consistently and correctly using a latex condom during sexual contact, whether vaginal, oral or anal, as well as using a vaginal spermicide. If lubricants are used during sex, only water-based lubricants (e.g., K-Y Jelly® or glycerine) should be used with latex condoms, as oil-based lubricants (e.g., petroleum jelly, shortening, mineral oil, or massage oils) can weaken latex.

Anyone who may have been exposed to an STD who develops either a vaginal or urethral discharge, an unexplained rash or genital lesion, or genital or pelvic pain should cease sexual activity and promptly seek competent medical care. Because STDs are often asymptomatic, especially in women, anyone who believes that they may have been exposed to an STD should consult a physician regarding the advisability of screening for STDs.

Smallpox

In May 1980, the World Health Organization (WHO) declared the global eradication of smallpox. There is no evidence of smallpox transmission anywhere in the world. The last reported case of endemic smallpox occurred in Somalia in October 1977, and the last reported case of laboratory-acquired smallpox occurred in the United Kingdom in 1978. WHO amended the International Health Regulations on January 1, 1982, deleting smallpox from the diseases subject to the Regulations.

Smallpox vaccination should not be given for international travel. The risk from smallpox vaccination, although very small, now exceeds the risk of smallpox; consequently, smallpox vaccination of civilians is indicated only for laboratory workers directly involved with smallpox or closely related orthopox viruses, e.g., monkeypox, vaccinia, and others. Health-care workers whose contact to these viruses is limited to contaminated materials (e.g., dressings) are at lower risk of inadvertent infection than laboratory workers, but may be considered for vaccination.

Misuse of Smallpox Vaccine

Smallpox vaccine should never be used therapeutically. There is no evidence that vaccination has therapeutic value in the treatment of recurrent herpes simplex infection, warts, or any other disease.

Tetanus

(See Diphtheria, Tetanus, and Pertussis)

Tuberculosis

Description

Mycobacterium tuberculosis is a bacterium that can cause disseminated disease, but is most frequently associated with pulmonary infections. The bacilli are transmitted by the airborne route and, depending on host factors, may or may not lead to active disease. Tuberculosis can usually be treated successfully with multiple medications.

Occurrence

In many countries tuberculosis is much more common than in the United States, and it is an increasingly serious public health problem.

Risk for Travelers

To become infected, a person usually would have to spend a long time in a closed environment where the air was contaminated by a person with untreated tuberculosis who is coughing and has numerous *M. tuberculosis* organisms (or tubercle bacilli) in secretions from the lungs. Tuberculosis infection is generally transmitted through the air; therefore, there is virtually no danger of its being spread by dishes, linens, and items that are touched, or by food. However, it can be transmitted through unpasteurized milk or milk products.

Travelers who anticipate possible prolonged exposure to tuberculosis should have a tuberculin skin test before leaving. If the reaction is negative, they should have a repeat test after returning to the United States. Because persons with HIV infection are more likely to have an impaired response to the tuberculin skin test, travelers with HIV infection should inform their physician about their HIV status. Except for travelers with impaired immunity (e.g., HIV infection), travelers who already have a positive tuberculin reaction are unlikely to be reinfected. All persons who are infected or who become infected with *M. tuberculosis* can be treated to prevent tuberculosis disease. Travelers who suspect that they have been exposed to tuberculosis should inform their physician of the possible exposure and receive an appropriate medical evaluation.

Vaccine

The Bacille Calmette-Guerin (BCG) vaccine is used in most developing countries to reduce the severe consequences of tuberculosis in children. However, BCG vaccine has variable efficacy in preventing the adult forms of tuberculosis and is therefore not routinely recommended for use in the United States and other industrialized countries.

Preventive Measures

Travelers should avoid exposure to known TB patients in crowded environments (e.g., hospitals, prisons, homeless shelters). Additionally, TB patients should be educated and

trained to cover coughs and sneezes with their hands or tissue paper. Otherwise, no specific preventive measures can be taken or are routinely recommended for travelers.

Typhoid Fever

Description

Typhoid fever is an acute, life-threatening febrile illness caused by the bacterium *Salmonella* serotype *typhi*.

Occurrence

An estimated 16 million cases of typhoid fever and 600,000 deaths occur worldwide. There were 2.6 cases of typhoid fever reported to CDC per 1 million U.S. citizens and residents traveling abroad during 1992–1994.

Risk for Travelers

Typhoid vaccination is not required for international travel, but it is recommended for travelers to areas where there is a recognized risk of exposure to *Salmonella typhi*. Risk is greatest for travelers to the Indian Subcontinent and to other developing countries (in Asia, Africa, and Latin America) who will have prolonged exposure to potentially contaminated food and drink. Vaccination is particularly recommended for those who will be traveling in smaller cities, villages, and rural areas off the usual tourist itineraries. Travelers should be cautioned that typhoid vaccination is not 100% effective and is not a substitute for careful selection of food and drink.

Vaccine

Three typhoid vaccines are currently available for use in the United States: a) an oral live-attenuated vaccine (Vivotif Berna™ vaccine, manufactured from the Ty21a strain of *Salmonella typhi* (2) by the Swiss Serum and Vaccine Institute); b) a parenteral heat-phenol-inactivated vaccine that has been widely used for many years (manufactured by Wyeth-Ayerst); and c) a capsular polysaccharide vaccine (ViCPS) for parenteral use (Typhim Vi, manufactured by Pasteur Merieux). All three vaccines have been shown to protect 50%–80% of recipients.

Table 19 provides information on vaccine dosage and administration. The time required for primary vaccination differs for each of the three vaccines, and each has a different lower age limit for use among children. The parenteral inactivated vaccine causes significantly more adverse reactions and has, at best, only marginally greater efficacy. When not contraindicated (see below), either oral Ty21a or parenteral ViCPS is preferable.

Vaccine Administration

Primary vaccination with oral Ty21a vaccine consists of one capsule taken on alternate days, for a total of four capsules. The capsules should be kept refrigerated (not frozen), and all four doses must be taken to achieve maximum efficacy. Each capsule should be taken with cool

Table 19. Dosage and schedules for typhoid fever vaccination

		Dosage			+
Vaccination	**Age**	**Dose/mode of administration**	**Number of Doses**	**Interval Between Doses**	**Boosting Interval**
Oral live-attenuated Ty21a vaccine					
Primary series	≥ 6 yrs	1 capsule*	4	48 hrs	—
Booster	≥ 6 yrs	1 capsule*	4	48 hrs	every 5 yrs
Vi capsular polysaccharide vaccine					
Primary series	≥ 2 yrs	0.50 mL†	1	—	—
Booster	≥ 2 yrs	0.50 mL†	1	—	every 2 yrs
Heat-phenol-inactivated parenteral vaccine					
Primary series	6 mos–10 yrs ≥ 10 yrs	0.25 mL§ 0.50 mL§	2 2	≥ 4 wks ≥ 4 wks	— —
Booster	6 mos-10 yrs ≥10 yrs ≥6 mos	0.25 mL§ 0.50 mL§ 0.10 mL¶	1 1 1	— — —	every 3 yrs every 3 yrs every 3 yrs

*Administer with cool liquid no warmer than 37° C (98.6° F).

†Intramuscularly.

§Subcutaneously.

¶Intradermally.

—Not applicable.

Table 20. Common adverse reactions to typhoid fever vaccines

	Reactions		
Vaccine	**Fever**	**Headache**	**Local Reactions**
Ty21a*	0%–5%	0%–5%	Not applicable
ViCPS	0%–1%	1.5%–3%	Erythema or induration ≤ 1 cm: 7%
Parenteral inactivated	6.7%–24%	9%–10%	Severe local pain or swelling: 3%–35%

*The side effects of Ty21a are rare and mainly consist of abdominal discomfort, nausea, vomiting, and rash or urticaria.

liquid no warmer than 37° C (98.6° F), approximately 1 hour before a meal. The vaccine manufacturer recommends that Ty21a not be administered to children < 6 years of age. Primary vaccination with ViCPS consists of one 0.5-mL (25-μg) dose administered intramuscularly. The manufacturer does not recommend the vaccine for children < 2 years of age.
Primary vaccination with parenteral inactivated vaccine consists of two 0.5-mL subcutaneous injections separated by ≥ 4 weeks. The vaccine manufacturer does not recommend the vaccine for use among children < 6 months of age. If the two doses cannot be separated by ≥ 4 weeks, common practice has been to administer three doses of the vaccine at weekly intervals. Vaccines administered according to this schedule may be less effective.

See page 28 for discussion of typhoid immunization for infants who will be traveling.

Booster Doses

Current recommendations for revaccination are provided in Table 19. For travelers who have received one or more doses of parenteral vaccine in the past, a single parenteral booster dose is adequate, even if > 3 years have elapsed since the last immunization. As a reasonable, although unproven alternative, an oral vaccine booster series can be given. When the heat-phenol-inactivated vaccine is used for booster vaccination, the intradermal route causes less reaction than the subcutaneous route.

Contraindications

Theoretical concerns have been raised regarding the immunogenicity of live-attenuated Ty21a vaccine in persons concurrently receiving antibiotics, immunoglobulin, antimalarials, or viral vaccines. The growth of the live Ty21a strain is inhibited in vitro by various antibacterial agents and by the antimalarial prophylactic agent mefloquine. Vaccination with Ty21a should be delayed for > 24 hours after the administration of any antibacterial agent or mefloquine. Chloroquine does not significantly inhibit the growth of Ty21a and may be given concurrently. Available data do not suggest that simultaneous administration of oral polio or yellow fever vaccine decreases the immunogenicity of Ty21a. If typhoid vaccination is warranted, it should not be delayed because of the administration of viral vaccines. Simultaneous administration of Ty21a and immunoglobulin does not appear to pose a problem.

Reactions

Information on adverse reactions is presented in Table 22.

Information is not available on the safety of any of the three vaccines when used during pregnancy; it is prudent on theoretical grounds to avoid vaccinating pregnant women. Live-attenuated Ty21a vaccine should not be given to immunocompromised persons, including those infected with human immunodeficiency virus. The two available parenteral vaccines present theoretically safer alternatives for this group. The only contraindication to vaccination with either ViCPS or with parenteral inactivated vaccine is a history of severe local or systemic reactions following a previous dose. None of the three available vaccines should be given to persons with an acute febrile illness.

Typhus Fever

Description

Several distinct rickettsiae cause typhus fevers in humans. Each agent produces disease with a distinct epidemiology, but all cause illness with fever, headache, and rash. Treatment of all forms of typhus is similar and includes administration of appropriate antibiotics and supportive care; relapses are infrequent. Epidemic typhus is passed from human to human by the body louse. Endemic, or murine, typhus occurs worldwide and is transmitted by rat fleas. Tickborne typhus fevers occur most commonly in parts of Africa and Asia. Scrub typhus, transmitted by rodent mites, occurs in Asia and the South Pacific.

Occurrence

The highest incidence of endemic typhus in temperate areas occurs during the summer months when rats and their fleas are most active and abundant. Epidemic typhus is rare except during periods when municipal services are disrupted, as in war or natural disaster. Epidemic typhus occurs during the colder months when louse-infested clothing is not laundered and person-to-person spread of lice is common. Tick typhus, actually a form of spotted fever, is not uncommon in travelers who spend time trekking or on safari in Africa or the Indian subcontinent. Scrub typhus occurs throughout the year in tropical areas, and in temperate areas is most common in spring and summer.

Risk for Travelers

Endemic typhus occurs mostly in persons living in substandard, rat-infested housing. Foci of epidemic typhus exist in impoverished and dislocated populations in the highlands of some parts of Africa and South America, and tourists are rarely at risk of acquiring lice and disease. Scrub typhus occurs in persons who engage in occupational or recreational behavior that brings them in contact with mite-infested grassy and brushy habitats in rural areas.

Vaccine

Vaccination against typhus is not required by any country as a condition for entry. Production of typhus vaccine in the United States has been discontinued, and there are no plans for commercial production of a new vaccine.

Preventive Measures

Prevention is based on avoidance of vector-infested habitats, use of repellents and protective clothing when exposed, prompt detection and removal of lice or attached ticks on clothing and skin, and attention to hygiene, as well as on the early detection and treatment of disease to prevent complications of illness.

Varicella (Chickenpox)

Description

Varicella is an acute, highly communicable viral disease caused by varicella zoster virus (VZV). The first infection with VZV results in varicella (chickenpox), which presents as a generalized vesicular rash. The virus becomes latent in sensory nerve ganglia and may recur later in life. Recurrent disease with VZV results in herpes zoster (shingles), usually localized to one to three dermatomes. Transmission of VZV to a susceptible person occurs through contact with either a person with varicella or, less commonly, a person with zoster. Varicella is generally a mild disease in children but may result in secondary bacterial infections of skin lesions, pneumonia, cerebellar ataxia, and encephalitis. Adults are at higher risk for complications than are children.

Occurrence

Varicella is endemic in the United States and virtually all persons are infected by adulthood. Incidence is expected to decline as vaccine coverage levels increase. The majority of cases (approximately 85%) occur among children < 15 years of age. In recent years, the highest incidence has been among children 1–4 years of age, who account for 39% of all cases. This age distribution is probably the result of earlier exposure to VZV in preschool and child care settings. Children 5–9 years of age account for 38% of cases. Adults ≥ 20 years of age account for only 7% of cases.

Risk for Travelers

Varicella and herpes zoster occur worldwide, and the vaccine is routinely used in very few countries. The risk of varicella to the traveler is as high in the United States as anywhere in the world. Data suggest that varicella infection is less common in childhood in tropical areas, where chickenpox occurs more commonly among adults. The reason for this difference in age distribution are not known with certainty but are believed due to lack of childhood varicella exposure in rural populations.

Vaccine

Varicella vaccine contains live attenuated varicella zoster virus. It is currently available only as a single-antigen formulation. After one dose of varicella vaccine, 97% of children 12 months to 12 years of age develop detectable antibody titers. Vaccine-induced immunity is believed to be long-lasting. Vaccine efficacy is estimated to be 90% against VZV infection and 95% against severe disease. Among healthy adolescents and adults, an average of 78% develop antibody after one dose and 99% develop antibody after a second dose given 4–8 weeks later.

Although vaccination against varicella is not a requirement for entry into any country (including the United States), persons traveling or living abroad should ensure that they are immune. In general, persons can be considered immune to varicella if they have a reliable personal history of varicella, laboratory (serologic) evidence of varicella immunity, or proof of receipt of one or two doses of varicella vaccine (depending on the age of vaccination) on or after the first birthday.

One dose of varicella virus vaccine is recommended for all children without contraindications at 12–18 months of age. The vaccine may be given to children at this age regardless of their prior history of varicella. However, immunization is not necessary in children with reliable histories of chickenpox. A prior history of chickenpox is not a contraindication to varicella vaccination. Children < 12 months of age will generally be protected from varicella because of passive maternal antibody.

Varicella vaccine is recommended for susceptible older children, adolescents, and adults. Children 12 months to 12 years of age should receive one dose. Persons ≥ 13 years of age should receive two doses of vaccine separated by 4–8 weeks. Older children, adolescents, and adults with reliable parental or personal histories of chickenpox can be assumed to be immune. Those without a reliable history can be considered to be susceptible. Epidemiologic and serologic studies indicate that > 90% of adults are immune to varicella. In addition, 71%–93% of adults without a reliable history of chickenpox are actually immune. As a result, serologic testing prior to vaccination is likely to be cost effective for adults. As with children, a prior history of chickenpox is not a contraindication to varicella vaccination.

Varicella vaccine may be administered simultaneously (but in a different site) with any other live or inactivated vaccine. Inactivated vaccines and oral poliovirus, rotavirus, and typhoid vaccines may be administered at any time before or after varicella vaccine. However, if varicella vaccine and/or live MMR and yellow fever vaccines are not administered simultaneously, they should be separated by an interval of at least 28 days. See section on PHS Recommendations or the General Recommendations on Immunization (MMWR;1994:43 [RR1]) for more details.

Side Effects and Adverse Reactions

The most common adverse reactions following varicella vaccine are injection site complaints such as pain, soreness, redness, and swelling. Based on information from the manufacturer's clinical trials of varicella vaccine, local reactions are reported by 19% of children and by 24% of adolescents and adults (33% following the second dose). These local adverse events are generally mild and self-limited. A varicella-like rash at injection site is reported by 3% of children and by 1% of adolescents and adults following the second dose. In both circumstances, there has been a median of two lesions. These lesions generally occur within 2 weeks and are most commonly maculopapular rather than vesicular.

A generalized varicella-like rash is reported by 4%–6% of recipients of varicella vaccine (1% after the second dose in adolescents and adults), with a median of five lesions. Most of these generalized rashes occur within 3 weeks and most are maculopapular.

Fever within 42 days of vaccination is reported by 15% of children and 10% of adolescents and adults. The majority of these episodes of fever have been attributed to intercurrent illness rather than to the vaccine.

Varicella vaccine is a live-virus vaccine and results in a latent infection, similar to that caused by wild varicella virus. Consequently, zoster caused by the vaccine virus has been reported. To date, fewer than 50 reports of zoster in a vaccinated person, mostly children, have been received. Not all these cases have been confirmed as having been caused by vaccine virus.

All cases of zoster following vaccine have been mild and have not been associated with complications, including post-herpetic neuralgia.

Precautions and Contraindications

Allergy

Persons with severe allergy (i.e., hives, swelling of the mouth or throat, difficulty breathing, hypotension, and shock) to gelatin or neomycin or who have had a severe allergic reaction to a prior dose should generally not be vaccinated with varicella vaccine. Varicella vaccine does not contain egg protein or preservative.

Pregnancy

Women known to be pregnant or attempting to become pregnant should not receive varicella vaccine. The effects of varicella vaccine on a developing fetus are unknown. Since infection with wild varicella virus poses only a small risk to the fetus and the vaccine virus is attenuated, the risk to the fetus, if any, should be even lower. Although the manufacturer's package insert states otherwise, ACIP and the American Academy of Pediatrics recommend that pregnancy be avoided for 1 month following receipt of varicella vaccine.

Immunosuppression

Persons with immunosuppression due to leukemia, lymphoma, generalized malignancy, immune deficiency disease, or immunosuppressive therapy should not be vaccinated. However, treatment with low-dose (< 2 mg/kg/day or < 20 mg/day of prednisone), alternate day, topical, replacement, or aerosolized steroid preparations is not a contraindication to varicella vaccination. Persons whose immunosuppressive therapy with steroids has been stopped for 1 month (3 months for chemotherapy) may be vaccinated. Few data exist on the use of varicella vaccine in persons with asymptomatic or symptomatic infection with human immunodeficiency virus (HIV). Varicella vaccine is not currently recommended for persons known to be infected with HIV, regardless of the degree of immunosuppression. However, routine testing for HIV infection of asymptomatic children who come for vaccination is not recommended.

Acute Illness

Vaccination of persons with moderate or severe acute illness should be postponed until their condition has improved. Minor illnesses, such as upper respiratory infections with or without low-grade fever, do not preclude vaccination.

Recent Administration of Immune Globulin (IG) or Other Antibody-Containing Blood Products

The effect of the administration of antibody-containing blood products (e.g., immune globulin, whole blood or packed red blood cells, intravenous immune globulin, varicella zoster immune globulin [VZIG]) on the response to varicella vaccine virus is unknown. Because of the potential inhibition of the response to varicella vaccination by passively transferred antibodies, varicella vaccine should not be given for at least 5 months after antibody-containing blood products. Immune globulin or VZIG should not be given for 3 weeks following vaccination unless the benefits exceed those of the vaccine. In such cases, the vaccinees should either be revaccinated 5 months later or tested for immunity 6 months later and revaccinated if seronegative.

No adverse events following varicella vaccination related to the use of salicylates (e.g., aspirin) have been reported to date. However, the manufacturer recommends that vaccine

recipients should avoid the use of salicylates for 6 weeks after receiving varicella vaccine because of the association between aspirin use and Reye syndrome following chickenpox.

The effect of varicella vaccine, if any, on tuberculin testing is unknown. However, measles vaccine (and possibly mumps and rubella vaccines) may suppress the response to PPD in a person infected with *Mycobacterium tuberculosis*. Until additional information is available, it is prudent to apply the same procedures for PPD and measles vaccination to varicella vaccine. If PPD testing is needed, it should be done prior to MMR or varicella vaccination. PPD testing should be delayed for 4–6 weeks after MMR or varicella vaccination. It is also acceptable to apply the PPD and administer MMR and/or varicella simultaneously.

Breastfeeding is not a contraindication to varicella vaccination of either a woman or an infant. Varicella vaccination has no known effect on antibiotics, and these drugs are not known to reduce the immunogenicity of the vaccine. The effect of varicella vaccine on antimalarial drugs is not known; therefore, it is prudent to administer varicella vaccine before commencing antimalarial prophylaxis if possible.

Yellow Fever

Description

Yellow fever is a mosquito-borne viral disease. Illness varies in severity from a flu-like syndrome to severe hepatitis and hemorrhagic fever.

Occurrence

The disease occurs only in parts of Africa and South America.

Risk for Travelers

Yellow fever has rarely occurred in travelers.

Preventive Measures

In addition to vaccination, travelers should take precautions against exposure to mosquitoes when traveling in areas with yellow fever transmission. Yellow fever is rarely transmitted in urban areas except in the context of an epidemic. Travelers to rural areas of Africa and South America, however, may be exposed sporadically to mosquitoes transmitting yellow fever and other mosquito-borne diseases. Mosquitoes that transmit urban yellow fever generally feed during the day both indoors and outdoors. Staying in air-conditioned or well-screened quarters and wearing long-sleeved shirts and long pants will help to prevent mosquito bites. Insect repellents containing N,N-diethyl-metatoluamide (DEET) should be used on exposed skin only. Permethrin-containing repellents should be applied to clothing. Travelers to rural areas should bring mosquito nets and insecticidal space sprays. (For further prevention information see section entitled “Protection Against Mosquitoes and other Arthropod Vectors,” p. 161.)

Vaccine

Yellow fever is preventable by a safe, effective vaccine. International regulations require proof of vaccination for travel to and from certain countries. For purposes of international travel, vaccine produced by different manufacturers worldwide must be approved by WHO and administered at an approved Yellow Fever Vaccination Center. State and territorial health departments have authority to designate nonfederal vaccination centers; these can be identified by contacting state or local health departments. (CDC does not maintain a list of the designated centers.) Vaccinees should receive an International Certificate of Vaccination completed, signed, and validated with the center's stamp where the vaccine was given.

A number of countries require a certificate from travelers arriving from infected areas or from countries with infected areas. Some countries in Africa require evidence of vaccination from all entering travelers; others may waive the requirements for travelers coming from noninfected areas and staying less than 2 weeks.

Vaccination is also recommended for travel outside the urban areas of countries that do not officially report the disease, but which lie in the yellow fever endemic zone (see maps, pp. 156 and 157). Practitioners should note that the actual areas of yellow fever virus activity may extend beyond the officially reported infected zones. Fatal cases of yellow fever have occurred in unvaccinated tourists visiting rural areas within the yellow fever endemic zone.

Some countries require an individual, even if only in transit, to have a valid International Certificate of Vaccination if he or she has been in countries either known or thought to harbor yellow fever virus. Such requirements may be strictly enforced, particularly for persons traveling from Africa or South America to Asia. Travelers with a specific contraindication to the yellow fever vaccine should obtain a waiver before traveling to countries requiring vaccination (see Precautions and Contraindications).

Table 21. Yellow fever vaccine

Doses	Dose Volume	Comments
	> 9 months of age	
Primary: 1	0.5 mL	
Booster:	0.5 mL	1 dose every 10 years

Precautions and Contraindications

Age

Infants < 4 months of age are more susceptible to serious adverse reactions (encephalitis) than older children and should never be immunized. The risk of this complication appears to be age-related. Immunization should be delayed until age 9 months except when the risk of infection is high. See page 28 for discussion of yellow fever immunization for infants.

Pregnancy

A small study showed that yellow fever vaccine virus given in pregnancy can infect the developing fetus, but the potential risk of adverse events associated with congenital infection is unknown. Therefore, it is prudent to avoid vaccinating pregnant women and for non-immunized pregnant women to postpone travel to epidemic areas until after delivery. If the travel itinerary of a pregnant woman does not present a substantial risk of exposure and immunization is contemplated solely to comply with an international travel requirement, then efforts should be made to obtain a waiver letter from the traveler's physician. Pregnant women who must travel to areas with active ongoing transmission should be vaccinated. It is believed that under these circumstances, the small theoretical risk for mother and fetus from vaccination is far outweighed by the risk of yellow fever infection.

Immunosuppression

Infection with yellow fever vaccine virus poses a theoretical risk to patients with immunosuppression in association with acquired immunodeficiency syndrome (AIDS) or other manifestations of human immunodeficiency virus (HIV) infection; leukemia; lymphoma; or generalized malignancy, or with administration of corticosteroids, alkylating drugs, antimetabolites, or radiation. There are no anecdotal reports or systematically collected data, however, linking an immunosuppressed state with adverse events in a yellow fever vaccine recipient. The decision to immunize immunocompromised patients with yellow fever vaccine should be based on a physician's evaluation of the patient's state of immunosuppression weighed against the risk of exposure to the virus. If travel to a yellow fever-infected zone is necessary and immunization is contraindicated, patients should be advised of the risk, instructed in methods to avoid bites of vector mosquitoes, and a vaccination waiver letter should be supplied by the traveler's physician. Anecdotal experience suggests that low dose (10 mg of prednisone or equivalent daily) or short-term (< 2 weeks) corticosteroid therapy or intra-articular, bursal, or tendon injections with corticosteroid do not pose a risk to recipients of yellow fever vaccine. Persons with asymptomatic HIV infections who cannot avoid potential exposure to yellow fever virus should be offered the choice of immunization. Vaccinees should be monitored for possible adverse effects. Because immunization of these individuals may be less effective than for uninfected persons, one may consider measuring the neutralizing antibody response following vaccination prior to travel. Consult the state health department or CDC, Fort Collins, Colorado, (970) 221-6400.

Family members of immunosuppressed persons, who themselves have no contraindications, may receive yellow fever vaccine.

Hypersensitivity

Live yellow fever vaccine is produced in chick embryos and should not be given to persons clearly hypersensitive to eggs; generally persons who are able to eat eggs or egg products may receive the vaccine. If vaccination of an individual with a questionable history of egg hypersensitivity is considered essential because of a high risk of exposure, an intradermal test dose may be administered under close medical supervision. Specific directions for skin testing are found in the package insert. In some instances, small test doses of vaccine administered intradermally have led to an antibody response.

If international travel regulations are the only reason to vaccinate a patient hypersensitive to eggs, efforts should be made to obtain a waiver. A physician's letter clearly stating the contraindication to vaccination has been acceptable to some governments. (Ideally, it should

be written on letterhead stationery and bear the stamp used by health department and official immunization centers to validate the International Certificate of Vaccination.) Under these conditions, it is also useful for the traveler to obtain specific and authoritative advice from the embassy or consulate of the country or countries he or she plans to visit. Waivers of requirements obtained from embassies or consulates should be documented by appropriate letters and retained for presentation with the International Certificate of Vaccination.

Reactions

Reactions to yellow fever vaccine are generally mild. Two percent to 5% of vaccinees have mild headaches, myalgia, low-grade fevers, or other minor symptoms 5–10 days after vaccination. Fewer than 0.2% of vaccinees find it necessary to curtail regular activities. Immediate hypersensitivity reactions, characterized by rash, urticaria, and/or asthma, are extremely uncommon (incidence less than 1/1,000,000) and occur principally in persons with histories of egg allergy.

Simultaneous Administration of Other Vaccines and Drugs

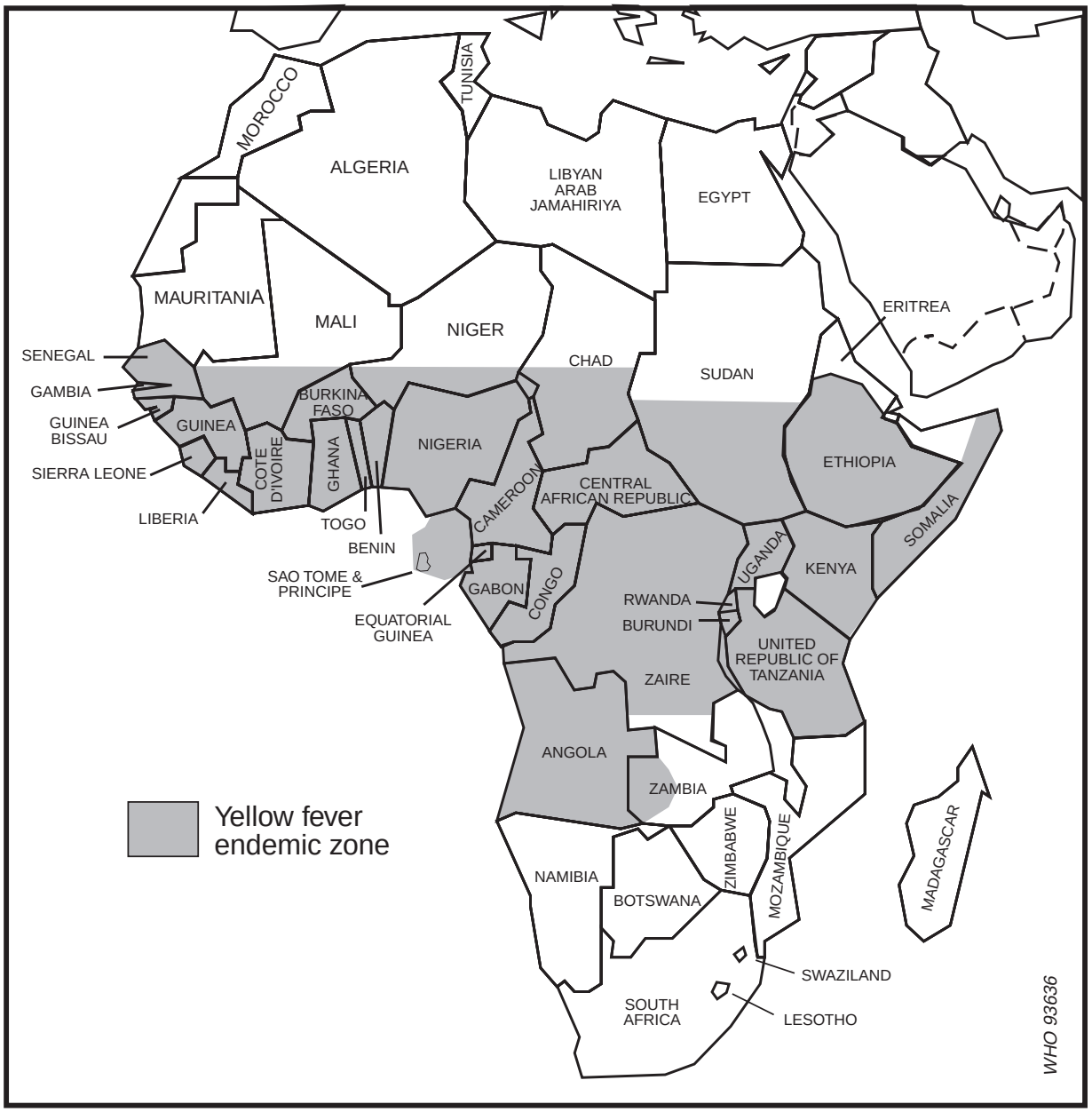
Studies have shown that the seroimmune response to yellow fever vaccine is not inhibited by administration of certain other vaccines concurrently or at various intervals of a few days to 1 month. Measles and BCG have been administered in combination with yellow fever vaccines without interference. Additionally, the severity of reactions to vaccination was not amplified by concurrent administration of yellow fever and measles vaccines. Hepatitis B and yellow fever vaccine may be given concurrently. If live-virus vaccines are not given concurrently, 4 weeks should be allowed to elapse between sequential vaccinations.

Some data have indicated that persons given yellow fever and cholera vaccines simultaneously or 1–3 weeks apart had lower-than-normal antibody responses to both vaccines. Unless there are time constraints, cholera and yellow fever vaccines should be administered at a minimal interval of 3 weeks. If the vaccines cannot be administered at least 3 weeks apart, then they can be given simultaneously or at any time within the 3-week interval.

There are no data on possible interference between yellow fever and typhoid, plague, rabies, or Japanese encephalitis vaccines.

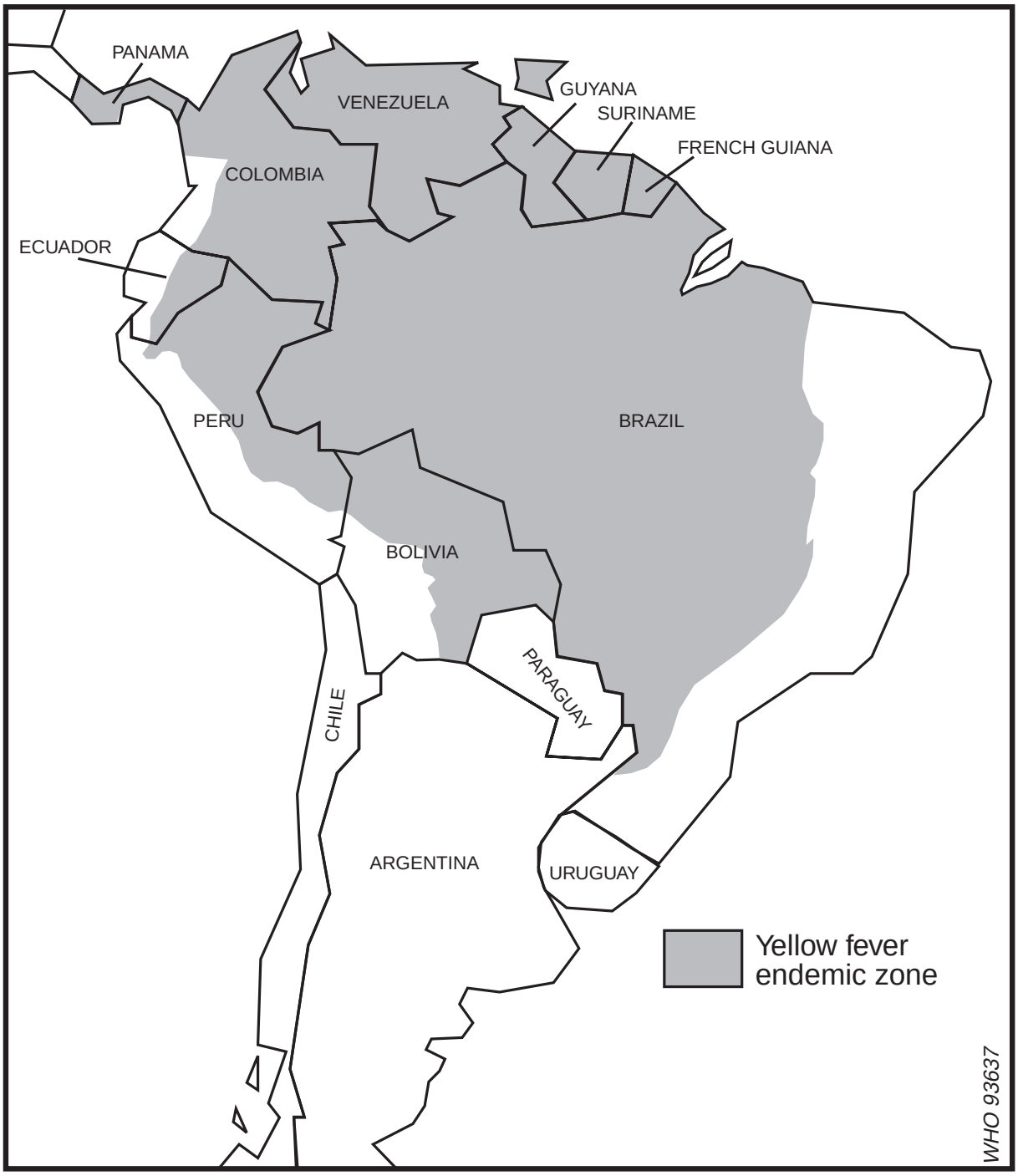
A prospective study of persons given yellow fever vaccine and 5 mL of commercially available immune globulin revealed no alteration of the immunologic response to yellow fever vaccine when compared with controls. Although chloroquine inhibits replication of yellow fever virus in vitro, it does not adversely affect antibody responses to yellow fever vaccine in humans receiving the drug as antimalarial prophylaxis.

Yellow Fever Endemic Zones in Africa



NOTE: Although the "yellow fever endemic zones" are no longer included in the International Health Regulations, a number of countries (most of them not bound by the Regulations or bound with reservations) consider these zones as infected areas and require an International Certificate of Vaccination against Yellow Fever from travelers arriving from those areas. The above map based on information from WHO is therefore included in this publication for practical reasons.

Yellow Fever Endemic Zones in America



NOTE: Although the "yellow fever endemic zones" are no longer included in the International Health Regulations, a number of countries (most of them not bound by the Regulations or bound with reservations) consider these zones as infected areas and require an International Certificate of Vaccination against Yellow Fever from travelers arriving from those areas. The above map based on information from WHO is therefore included in this publication for practical reasons.

HEALTH HINTS FOR THE INTERNATIONAL TRAVELER

Health Hints for the International Traveler

Introduction

This section includes practical information on how to avoid potential health problems. Some of these recommendations are common-sense precautions; others have been scientifically documented.

Personal and specific preventive measures against certain diseases may require advance planning and advice from a physician or the local health department concerning immunization and prophylaxis.

Travelers who take prescription medications should carry an adequate supply accompanied by a signed and dated statement from a physician; the statement should indicate the major health problems and dosage of such medications, to provide information for medical authorities in case of emergency. The traveler should take an extra pair of glasses or lens prescription and a card, tag, or bracelet that identifies any physical condition that may require emergency care.

Motion Sickness

Travelers with a history of motion sickness or sea sickness can attempt to avoid symptoms by taking anti-motion-sickness medication (e.g., antihistamines) before departure.

Protection Against Mosquitoes and Other Arthropod Vectors

Although vaccines or chemoprophylactic drugs are available against important vector-borne diseases such as yellow fever and malaria, there are none for most other mosquito-borne diseases such as dengue, and travelers still should avail themselves of repellents and other general protective measures against arthropods. The effectiveness of malaria chemoprophylaxis is variable, depending on patterns of resistance and compliance with medication. For many vector-borne diseases, no specific preventatives are available.

General preventive measures

The principal approach to prevention of vector-borne diseases is avoidance. Tick- and mite-borne infections characteristically are diseases of “place;” whenever possible, known foci of disease transmission should be avoided. Although many vector-borne infections can be prevented by avoiding rural locations, certain mosquito-and midge-borne arboviral and parasitic infections are transmitted around human residences and in urban locations. Most vector-borne infections are transmitted seasonally, and simple changes in itinerary may greatly reduce risk for acquiring certain infections.

Exposure to arthropod bites can be minimized by modifying patterns of activity or behavior. Some vector mosquitoes are most active in twilight periods at dawn and dusk or in the evening. Avoidance of outdoor activity during these periods may reduce risk of exposure. Wearing long-sleeved shirts, long pants, and hats will minimize areas of exposed skin. Shirts should be tucked in. Repellents applied to clothing, shoes, tents, mosquito nets and other gear will enhance protection.

When exposure to ticks or mites is a possibility, pants should be tucked into socks and boots should be worn; sandals should be avoided. Permethrin-based repellents applied as directed (see below) will enhance protection. During outdoor activity and at the end of the day, travelers should inspect themselves and their clothing for ticks. Ticks are detected more easily on light-colored or white clothing. Prompt removal of attached ticks may prevent infection.

When accommodations are not adequately screened or air-conditioned, bed nets are essential to provide protection and comfort. Bed nets should be tucked under mattresses and can be sprayed with repellent. Aerosol insecticides and mosquito coils may help to clear rooms of mosquitoes; however, some coils contain DDT and should be used with caution.

Repellents

Permethrin-containing repellents (Permanone®) are recommended for use on clothing, shoes, bed nets and camping gear. Permethrin is highly effective as an insecticide/acaricide and as a repellent. Permethrin-treated clothing repels and kills ticks, mosquitoes and other arthropods and retains this effect after repeated laundering. There appears to be little potential for toxicity from permethrin-treated clothing.

Permethrin-containing shampoo (Nix®) and cream (Elimite®), marketed for use against head lice and scabies infestations, potentially could be effective as repellents when applied on the hair and skin. However, they are approved only to treat existing conditions. Most authorities recommend repellents containing DEET (N,N-diethylmetatoluamide) as an active ingredient. DEET repels mosquitoes, ticks, and other arthropods when applied to skin or clothing. Formulations containing < 35% DEET are recommended because the additional gain in repellent effect with higher concentrations is not significant when weighed against the potential for toxicity. A microencapsulated formulation (Skedaddle®) may have a longer period of activity than liquid formulations.

DEET is toxic when ingested. High concentrations applied to skin may cause blistering. Rare cases of encephalopathy in children, some fatal, have been reported after cutaneous exposure. Other neurologic side effects also have been reported. Toxicity did not appear to be dose-related in many cases and these may have been idiosyncratic reactions in predisposed individuals. However, a dose-related effect leading to irritability and impaired concentration and memory has been reported.

Risks from Food and Drink

Contaminated food and drink are common sources for the introduction of infection into the body. Among the more common infections that travelers may acquire from contaminated food and drink are *Escherichia coli* infections, shigellosis or bacillary dysentery, giardiasis, cryptosporidiosis, and hepatitis A. Other less common infectious disease risks for travelers include typhoid fever and other salmonelloses, cholera, infections caused by rotavirus and Norwalk-like viruses, and a variety of protozoan and helminthic parasites (other than those that cause giardiasis and cryptosporidiosis). Many of the infectious diseases transmitted in food and water can also be acquired directly through the fecal-oral route.

Water

Water that has been adequately chlorinated, using minimum recommended water-works standards as practiced in the United States, will afford significant protection against viral and bacterial waterborne diseases. However, chlorine treatment alone, as used in the routine disinfection of water, may not kill some enteric viruses and the parasitic organisms that cause giardiasis, amebiasis, and cryptosporidiosis. In areas where chlorinated tap water is not available or where hygiene and sanitation are poor, travelers should be advised that only the following may be safe to drink:

1. Beverages, such as tea and coffee, made with boiled water

2. Canned or bottled carbonated beverages, including carbonated bottled water and soft drinks

3. Beer and wine

Where water may be contaminated, ice should also be considered contaminated and should not be used in beverages. If ice has been in contact with containers used for drinking, the containers should be thoroughly cleaned, preferably with soap and hot water, after the ice has been discarded.

It is safer to drink directly from a can or bottle of a beverage than from a questionable container. However, water on the outside of beverage cans or bottles might be contaminated. Therefore, wet cans or bottles should be dried before being opened, and surfaces which are contacted directly by the mouth in drinking should first be wiped clean. Where water may be contaminated, travelers should avoid brushing their teeth with tap water.

Treatment of water

Boiling is by far the most reliable method to make water of uncertain purity safe for drinking. Water should be brought to a vigorous rolling boil for 1 minute and allowed to cool to room temperature—do not add ice. At altitudes > 6,562 feet (2 km), for an extra margin of safety, boil for 3 minutes or use chemical disinfection. Adding a pinch of salt to each quart or pouring the water several times from one container to another will improve the taste.

Chemical disinfection with iodine is an alternative method of water treatment when it is not feasible to boil water. However, this method cannot be relied upon to kill Cryptosporidium unless the water is allowed to sit for 15 hours before drinking it. Two well-tested methods for disinfection with iodine are the use of tincture of iodine (Table 22) and the use of tetraglycine hydroperiodide tablets (Globaline,® Potable-Aqua,® Coghlan's,® etc.). These tablets are available from pharmacies and sporting goods stores. The manufacturer's instructions should be followed. If water is cloudy, the number of tablets should be doubled; if water is extremely cold, an attempt should be made to warm the water, and the recommended contact time should be increased to achieve reliable disinfection. Cloudy water should be strained through a clean cloth into a container to remove any sediment or floating matter, and then the water should be boiled or treated with iodine. Chlorine, in various forms, has also been used for chemical disinfection. However, its germicidal activity varies greatly with the pH, temperature, and organic content of the water to be purified, and it is less reliable than iodine. Chemically

treated water is intended for short-term use only. If iodine-disinfected water is the only water available, it should be used for only a few weeks.

Portable filters currently on the market will provide various degrees of protection against microbes. Reverse-osmosis type filters provide protection against viruses, bacteria, and protozoa, but they are expensive, are larger than most filters used by backpackers, and the small pores on this type of filter are rapidly plugged by muddy or cloudy water. In addition, the membranes in some filters can be damaged by chlorine in water. Microstrainer filters with pore sizes in the 0.1- to 0.3-micrometer range can remove bacteria and protozoa from drinking water, but they do not remove viruses. To kill viruses, users of microstrainer filters are advised to disinfect the water after filtration with iodine or chlorine as described above. Filters with iodine-impregnated resins are most effective against bacteria; the iodine will kill some viruses, but the contact time with the iodine in the filter is too short to kill Giardia in cold water and will not kill Cryptosporidium. Proper selection, operation, care, and maintenance of water filters is essential to producing safe water. The manufacturers' instructions should be followed. NSF International, an independent testing company, tests and certifies water filters for their ability to remove protozoa (Giardia and Cryptosporidium), but not for their ability to remove bacteria or viruses. Few published reports in the scientific literature have evaluated the efficacy of specific brands or models of filters against bacteria and viruses in water. Until such information becomes available, CDC cannot identify which specific brands or models of filters are most likely to remove bacteria and viruses. A list of filters that have passed NSF tests for parasite removal can be obtained by calling 1-800-673-8010 or writing to NSF at 3475 Plymouth Road, P.O. Box 130140, Ann Arbor, MI 48113-0140.

As a last resort, if no source of safe drinking water is available or can be obtained, tap water that is uncomfortably hot to touch may be safer than cold tap water; however, proper disinfection, filtering, or boiling is still advised.

Food

To avoid illness, food should be selected with care. All raw food is subject to contamination. Particularly in areas where hygiene and sanitation are inadequate, the traveler should be advised to avoid salads, uncooked vegetables, and unpasteurized milk and milk products such as cheese, and to eat only food that has been cooked and is still hot, or fruit that has been peeled by the traveler. Undercooked and raw meat, fish, and shellfish may carry various intestinal pathogens. Cooked food that has been allowed to stand for several hours at ambient temperature may provide a fertile medium for bacterial growth and should be thoroughly

Table 22. Treatment of water with tincture of iodine

Tincture of iodine (from medicine chest or first aid kit)	Drops* to be added per quart or liter	
	Clear water	Cold or cloudy water†
2%	5	10

*1 drop = 0.05 mL. Let stand for 30 minutes before water is safe to use.

†Very turbid or very cold water may require prolonged contact time; let stand up to several hours prior to use, if possible. To ensure that Cryptosporidium is killed, water must stand for 15 hours before drinking.

reheated before serving. Consumption of food and beverages obtained from street food vendors has been associated with increased risk of illness. The easiest way to guarantee a safe food source for an infant < 6 months of age is to have the child breast-feed. If the infant has already been weaned from the breast, formula prepared from commercial powder and boiled water is the safest and most practical food.

Some species of fish and shellfish can contain poisonous biotoxins, even when well cooked. The most common type of fish poisoning in travelers is ciguatera fish poisoning. Barracuda is the most toxic fish and should always be avoided. Red snapper, grouper, amberjack, sea bass, and a wide range of tropical reef fish contain the toxin at unpredictable times. The potential for ciguatera poisoning exists in all subtropical and tropical insular areas of the West Indies and the Pacific and Indian Oceans where the implicated fish species are eaten.

Cholera cases have occurred among persons who ate crab brought back from Latin America by travelers. Travelers should not bring perishable seafood with them when they return.

Travelers' Diarrhea

Epidemiology

Travelers' diarrhea (TD) is a syndrome characterized by a twofold or greater increase in the frequency of unformed bowel movements. Commonly associated symptoms include abdominal cramps, nausea, bloating, urgency, fever, and malaise. Episodes of TD usually begin abruptly, occur during travel or soon after returning home, and are generally self-limited. The most important determinant of risk is the destination of the traveler. Attack rates of 20%–50% are commonly reported. High-risk destinations include most of the developing countries of Latin America, Africa, the Middle East, and Asia. Intermediate-risk destinations include most of the Southern European countries and a few Caribbean islands. Low-risk destinations include Canada, Northern Europe, Australia, New Zealand, the United States, and a number of the Caribbean islands.

TD is slightly more common in young adults than in older people. The reasons for this difference are unclear, but may include a lack of acquired immunity, more adventurous travel styles, and different eating habits. Attack rates are similar in men and women. The onset of TD is usually within the first week, but may occur at any time during the visit and even after returning home.

TD is acquired through ingestion of fecally contaminated food and/or water. Both cooked and uncooked foods may be implicated if improperly handled. Especially risky foods include raw or undercooked meat and seafood and raw fruits and vegetables. Tap water, ice, and unpasteurized milk and dairy products may be associated with increased risk of TD; safe beverages include bottled carbonated beverages (especially flavored beverages), beer, wine, hot coffee or tea, or water boiled or appropriately treated with iodine or chlorine.

The place food is prepared appears to be an important variable; with private homes, restaurants, and street vendors listed in order of increasing risk.

TD typically results in four to five loose or watery stools per day. The median duration of diarrhea is 3–4 days. Ten percent of the cases persist longer than 1 week, approximately 2%

longer than 1 month, and < 1 % longer than 3 months. Persistent diarrhea is thus quite uncommon and may differ considerably from acute TD with respect to etiology and risk factors. Approximately 15% of ill persons experience vomiting, and 2%–10% may have diarrhea accompanied by fever or bloody stools or both. Travelers may experience more than one attack of TD during a single trip. Rarely is TD life-threatening.

Etiology

Infectious agents are the primary cause of TD. Travelers from industrialized countries to developing countries frequently develop a rapid, dramatic change in the type of organisms in their gastrointestinal tract. These new organisms often include potential enteric pathogens. Those who develop diarrhea have ingested an inoculum of virulent organisms sufficiently large to overcome individual defense mechanisms, resulting in symptoms.

Enteric Bacterial Pathogens

Enterotoxigenic *Escherichia coli* (ETEC) are the most common causative agents of TD in all countries where surveys have been conducted. ETEC produce a watery diarrhea associated with cramps and a low-grade or no fever.

Salmonella gastroenteritis is a well-known disease that occurs throughout the world. In the industrialized nations, this large group of organisms is the most common cause of outbreaks of food-associated diarrhea. In developing countries, the proportion of cases of TD caused by non-typhoidal salmonellae varies but is not high. Salmonellae also can cause dysentery characterized by small-volume stools containing bloody mucus.

Shigellae are well known as the cause of bacillary dysentery. The shigellae are the cause of TD in up to 20% of travelers to developing countries.

Campylobacter jejuni is a common cause of diarrhea throughout the world; it is responsible for a small percentage of the reported cases of TD, some with bloody diarrhea. Additional studies are needed to determine how frequently it causes TD.

Vibrio parahaemolyticus is associated with ingestion of raw or poorly cooked seafood and has caused TD in passengers on Caribbean cruise ships and in Japanese people traveling in Asia. How frequently it causes disease in other areas of the world is unknown.

Other less common bacterial pathogens include *E. coli*, *Yersinia enterocolitica*, *Vibrio cholerae* O1, O139, and other non-O1 *V. cholerae*, *Vibrio fluvialis*, and possibly *Aeromonas hydrophila* and *Plesiomonas shigelloides*.

Viral Enteric Pathogens—Rotavirus and Norwalk-like Virus

Along with the newly acquired bacteria, the traveler may also acquire many viruses. In six studies, for example, as much as 36% of diarrheal illnesses in travelers (median 22%) was associated with rotaviruses in the stools. However, a comparable number of asymptomatic travelers also had rotaviruses, and up to 50% of symptomatic persons with rotavirus infections also had nonviral pathogens. Ten to fifteen percent of travelers develop serologic evidence of infection with Norwalk-like viruses. The roles of adenoviruses, astroviruses, coronaviruses, enteroviruses, or other viral agents in causing TD are even less clear. Although viruses are commonly acquired by travelers, they do not appear to be frequent causes of TD in adults.

Parasitic Enteric Pathogens

The few studies that have included an examination for parasites reveal that up to 6% of persons with travelers' diarrhea have *Giardia lamblia* and up to 6% have *Entamoeba histolytica*. *Cryptosporidium* has recently been recognized in sporadic cases of TD.

Dientamoeba fragilis, Isospora belli, Balantidium coli, Cyclospora (previously known as cyanobacterium-like bodies), or *Strongyloides stercoralis* may cause occasional cases of TD. While not major causes of acute TD, these parasites should be sought in persistent, unexplained cases.

Unknown Causes

No data have been presented to support noninfectious causes of TD, such as changes in diet, jet lag, altitude, and fatigue. Current evidence indicates that in all but a few instances, e.g., drug-induced or preexisting gastrointestinal disorders, an infectious agent or agents cause diarrhea in tourists. However, even with the application of the best current methods for detecting bacteria, viruses, and parasites, 20%–50% of cases of TD remain without recognized etiologies.

Prevention

There are four possible approaches to prevention of TD. They include instruction regarding food and beverage consumption, immunization, use of nonantimicrobial medications, and prophylactic antimicrobial drugs. Data indicate that meticulous attention to food and beverage consumption, as mentioned above, can decrease the likelihood of developing TD. Most travelers, however, encounter difficulty in observing the requisite dietary restrictions.

No available vaccines and none that are expected to be available in the next 3 years are effective against TD. Several nonantimicrobial agents have been advocated for prevention of TD. Available controlled studies indicate that prophylactic use of difenoxine, the active metabolite of diphenoxylate (Lomotil®), actually increases the incidence of TD, in addition to producing other undesirable side effects. Antiperistaltic agents (e.g., Lomotil® and Imodium®) are not effective in preventing TD. No data support the prophylactic use of activated charcoal.

Bismuth subsalicylate, taken as the active ingredient of Pepto-Bismol® (2 oz. 4 times a day, or two tablets 4 times a day), has decreased the incidence of diarrhea by about 60% in several placebo-controlled studies. Side effects include temporary blackening of tongue and stools, occasional nausea and constipation, and rarely, tinnitus. Available data are not extensive enough to exclude a risk to the traveler from the use of such large doses of bismuth subsalicylate for a period of > 3 weeks. Bismuth subsalicylate should be avoided by persons with aspirin allergy, renal insufficiency, and gout, and by those who are taking anticoagulants, probenecid, or methotrexate. In patients already taking salicylates for arthritis, large concurrent doses of bismuth subsalicylate can produce toxic serum concentrations of salicylate. Caution should be used in giving bismuth subsalicylate to adolescents and children with chickenpox or influenza because of a potential risk of Reye syndrome. Bismuth subsalicylate has not been approved for children < 3 years old. Bismuth subsalicylate appears to be an effective prophylactic agent for TD, but is not recommended for prophylaxis of TD for periods of >3 weeks. Further studies of the efficacy and side effects of lower-dose regimens are needed.

Controlled data are available on the prophylactic value of several other nonantimicrobial drugs. Enterovioform® and related halogenated hydroxyquinoline derivatives (e.g., clioquinol, iodoquinol, Mexaform,® Intestopan,® and others) are not helpful in preventing TD, may have serious neurologic side effects, and should never be used for prophylaxis of TD.

Controlled studies have indicated that a variety of antibiotics, including doxycycline, trimethoprim/sulfamethoxazole (TMP/SMX), trimethoprim alone, and the fluoroquinolone agents ciprofloxacin and norfloxacin, when taken prophylactically have been 52%–95% effective in preventing traveler's diarrhea in several areas of the developing world. The effectiveness of these agents, however, depends on the antibiotic resistance patterns of the pathogenic bacteria in each area of travel, and such information is seldom available. Resistance to fluoroquinolones is the least common, but this may change as use of these agents increases worldwide.

Although effective in preventing some bacterial causes of diarrhea, antibiotics have no effect on the acquisition of various viral and parasitic diseases. Prophylactic antibiotics may give travelers a false sense of security about the risk associated with consuming certain local foods and beverages.

The benefits of widespread prophylactic use of doxycycline, quinolones, TMP/SMX or TMP alone in several million travelers must be weighed against the potential drawbacks. The known risks include allergic and other side effects (such as common skin rashes, photosensitivity of the skin, blood disorders, Stevens-Johnson syndrome, and staining of the teeth in children) as well as other infections that may be induced by antimicrobial therapy (such as antibiotic-associated colitis, *Candida* vaginitis, and *Salmonella* enteritis). Because of the uncertain risk of widespread administration of these antimicrobial agents, their prophylactic use is not recommended. Although it seems reasonable to use prophylactic antibiotics in certain high-risk groups, such as travelers with immunosuppression or immunodeficiency, no data directly support this practice. There is little evidence that other disease entities are worsened sufficiently by an episode of TD to risk the rare undesirable side effects of prophylactic antimicrobial drugs. **Therefore, prophylactic antimicrobial agents are not recommended for travelers.** Instead, available data support the recommendation that travelers be instructed in sensible dietary practices as a prophylactic measure. This recommendation is justified by the excellent results of early treatment of TD as outlined below. Some travelers may wish to consult with their physician and may elect to use prophylactic antimicrobial agents for travel under special circumstances, once the risks and benefits are clearly understood.

Treatment

Individuals with TD have two major complaints for which they desire relief—abdominal cramps and diarrhea. Many agents have been proposed to control these symptoms, but few have been demonstrated to be effective by rigorous clinical trials.

Nonspecific Agents

A variety of "adsorbents" have been used in treating diarrhea. For example, activated charcoal has been found to be ineffective in the treatment of diarrhea. Kaolin and pectin have been widely used for diarrhea. The combination appears to give the stools more consistency but has not been shown to decrease cramps and frequency of stools nor to shorten the course of

infectious diarrhea. Lactobacillus preparations and yogurt have also been advocated, but no evidence supports use of these treatments for TD.

Bismuth subsalicylate preparation (1 oz of liquid or two 262.5-mg tablets every 30 minutes for eight doses) decreased the frequency of stools and shortened the duration of illness in several placebo-controlled studies. Treatment was limited to 48 hours at most, with no more than eight doses in a 24-hour period. There is concern about taking large amounts of bismuth and salicylate without supervision, especially for individuals who may be intolerant of salicylates, who have renal insufficiency, or who take salicylates for other reasons.

Antimotility Agents

Antimotility agents are widely used in treating diarrhea of all types. Natural opiates (paregoric, tincture of opium, and codeine) have long been used to control diarrhea and cramps. Synthetic agents, diphenoxylate and loperamide, come in convenient dosage forms and provide prompt symptomatic but temporary relief of uncomplicated TD. However, they should not be used in patients with high fever or with blood in the stool. These drugs should be discontinued if symptoms persist beyond 48 hours. Diphenoxylate and loperamide should not be used in children under the age of 2.

Antimicrobial Treatment

Travelers who develop diarrhea with three or more loose stools in an 8-hour period, especially if associated with nausea, vomiting, abdominal cramps, fever, or blood in the stools, may benefit from antimicrobial treatment. A typical 3- to 5-day illness can often be shortened to 1–1 1/2 days by effective antimicrobial agents. The effectiveness of antibiotic therapy will depend on the etiologic agent and its antibiotic sensitivity. Antibiotic regimens most likely to be effective are TMP/SMX (160 mg TMP and 800 mg SMX) or ciprofloxacin (500 mg) taken twice a day. Other fluoroquinolones, such as norfloxacin and ofloxacin, may be equally effective as ciprofloxacin. Fewer side effects and less widespread resistance has been reported with the fluoroquinolones than with TMP/SMX. Three days of treatment is recommended, although 2 days or less may be sufficient. Nausea and vomiting without diarrhea should not be treated with antimicrobial drugs.

Travelers should consult a physician rather than attempt self-medication if the diarrhea is severe or does not resolve within several days; if there is blood and/or mucus in the stool; if fever occurs with shaking chills; or if there is dehydration with persistent diarrhea.

Oral fluids

Most cases of diarrhea are self-limited and require only simple replacement of fluids and salts lost in diarrheal stools. This is best achieved by use of an oral rehydration solution such as World Health Organization Oral Rehydration Salts (ORS) solution (Table 23). This solution is appropriate for treating as well as preventing dehydration. ORS packets are available at stores or pharmacies in almost all developing countries. ORS is prepared by adding one packet to boiled or treated water. Packet instructions should be checked carefully to ensure that the salts are added to the correct volume of water. ORS solution should be consumed or discarded within 12 hours if held at room temperature or 24 hours if kept refrigerated.

Iced drinks and noncarbonated bottled fluids made from water of uncertain quality should be avoided. Dairy products aggravate diarrhea in some people and should be avoided.

Infants with Diarrhea

Children ≤ 2 years of age are at high risk of acquiring traveler's diarrhea. The greatest risk to the infant with diarrhea is dehydration. Dehydration is best prevented by use of WHO ORS solution in addition to the infant's usual food. ORS packets are available at stores or pharmacies in almost all developing countries. ORS is prepared by adding one packet to boiled or treated water. Packet instructions should be checked carefully to ensure that the salts are added to the correct volume of water. ORS solution should be consumed or discarded within12 hours if held at room temperature, or 24 hours if kept refrigerated. The dehydrated child will drink ORS avidly; ORS should be given to the child as long as the dehydration persists. The infant who vomits the ORS will usually keep it down if it is offered by spoon in frequent small sips. Breast-fed infants should continue nursing on demand. For bottle-fed infants, full-strength lactose-free or lactose-reduced formulas should be administered. Older children

Table 23. Composition of World Health Organization Oral Rehydration Solution (ORS) for Diarrheal Illness

Ingredient	Amount
Sodium chloride	3.5 grams/liter
Potassium chloride	1.5 grams/liter
Glucose	20.0 grams/liter
Trisodium citrate*	2.9 grams/liter

*An earlier formulation that used sodium bicarbonate 2.5 grams/liter had a shorter shelf-life, but was physiologically equivalent and may still be produced in some countries.

Table 24. Assessment of dehydration levels in infants

	Signs		
	Mild	**Moderate**	**Severe**
General condition	Thirsty, restless, agitated	Thirsty, restless, irritable	Withdrawn, somnolent, or comatose
Pulse	Normal	Rapid, weak	Rapid, weak
Anterior fontanelle	Normal	Sunken	Very sunken
Eyes	Normal	Sunken	Very sunken
Tears	Present	Absent	Absent
Urine	Normal	Reduced, concentrated	None for several hours
Weight loss	4%–5%	6%–9%	10% or more

receiving semi-solid or solid foods should continue to receive their usual diet during the illness. Recommended foods include starches, cereals, yogurt, fruits, and vegetables. Immediate medical attention is required for the infant with diarrhea who develops signs of moderate to severe dehydration (Table 24), bloody diarrhea, fever of > 102^{o} F, or persistent vomiting. While medical attention is being obtained, the infant should be offered ORS.

More information is available from CDC in a publication entitled "The management of acute diarrhea in children: oral rehydration, maintenance, and nutritional therapy" (MMWR No. RR-16, October 16, 1992). ORS packets are available in the United States from Jianas Brothers Packaging Company, Kansas City, Missouri (telephone: 816-421-2880).

Precautions for Children and Pregnant Women

Although children do not make up a large proportion of travelers to high-risk areas, some children do accompany their families. Teenagers should follow the advice given to adults, with possible adjustment of doses of medication. Physicians should be aware of the risks of tetracyclines for children < 8 years of age. Few data are available about usage of antidiarrheal drugs in children. Drugs should be prescribed with caution for pregnant women and nursing mothers.

Bovine Spongiform Encephalopathy and New Variant Creutzfeldt-Jakob Disease

Since 1996, evidence has been increasing for a causal relationship between ongoing outbreaks in Europe of a disease in cattle called bovine spongiform encephalopathy (BSE, or "mad cow disease") and a disease in humans called new variant Creutzfeldt-Jakob disease (nvCJD). Both disorders are invariably fatal brain diseases that are caused by an unconventional transmissible agent. From 1995 through 1998, a total of 38 human deaths in the United Kingdom and one human death in France were attributed to nvCJD. Although there is strong evidence that the agent responsible for these deaths is the same agent responsible for the BSE outbreaks in cattle, the specific foods, if any, that may be associated with the transmission of this agent from cattle to humans are unknown. However, through 1998, bioassays have identified the presence of the BSE agent in the brain, spinal cord, retina, dorsal root ganglia (nervous tissue located near the backbone), and possibly the bone marrow of infected cattle.

Cases of BSE in cattle have been reported almost exclusively (over 99% through 1998) from the United Kingdom, but endemic cases of BSE have also been reported in other European countries, including Belgium, France, Liechtenstein, Luxembourg, Netherlands, Portugal, Republic of Ireland, and Switzerland. Most of these latter countries reported their first endemic case of BSE during 1994–1998. The numbers of reported cases, by country, are available on the Internet web page of the Office International Des Epizooties, at <http://www.oie.int/status/A_BSE.htm>. These numbers should be interpreted with caution, however, because of presumed, but unmeasured, differences in the intensity of surveillance over time and by country.

Public health control measures have been instituted in each country of Europe to prevent potentially BSE-infected tissues from entering into the human food chain. The most stringent of these control measures have been applied in the United Kingdom and appear to be highly effective. In addition, strict bans on the use of ruminant protein for ruminant feed, a practice believed to have amplified the spread of BSE in cattle, have been instituted throughout Europe.

The current risk of acquiring nvCJD from eating beef (muscle meat) and beef products produced from cattle in Europe appears to be extremely small (perhaps fewer than 1 case per 10 billion servings), if it exists at all. However, to reduce this possible risk, travelers to Europe may wish to consider either 1) avoiding such beef and beef products altogether or 2) selecting beef or beef products, such as solid pieces of muscle meat (versus beef products such as burgers and sausages), which might have a reduced opportunity for contamination with tissues that may harbor the BSE agent. Milk and milk products are not believed to pose any risk for transmitting the BSE agent.

Cruise Ship Sanitation

In 1975, because of several major disease outbreaks on cruise vessels, CDC established the Vessel Sanitation Program (VSP) as a cooperative activity with the cruise ship industry. This joint program strives to achieve and maintain a level of sanitation on passenger vessels that will lower the risk of gastrointestinal disease outbreaks and provide a healthful environment for ships' passengers and crew. The program goals are addressed through encouraging industry to establish and maintain a comprehensive sanitation program and oversight of its success through an inspections process. Every vessel with a foreign itinerary that carries 13 or more passengers is subject to twice yearly inspections and when necessary reinspection. Inspections, conducted only at ports under U.S. control, cover such environmental aspects as:

1. Water supply, storage, distribution, backflow protection, and disinfection.

2. Food handling during storage, preparation, and service, and product temperature control.

3. Potential contamination of food, water, and ice.

4. Employee practices and personal hygiene.

5. General cleanliness, facility repair, and vector control.

6. The ship's training programs in general environmental and public health practices.

A score of 86 or higher at the time of the inspection indicates that the ship is providing an accepted standard of sanitation. In general, the lower the score the lower the level of sanitation; however, a low score does not necessarily imply an imminent risk of an outbreak of gastrointestinal disease or other illness related to environmental sanitation. Each ship is required to document a plan for corrective action following each inspection. Inspectors will recommend a ship not sail if they detect an imminent health hazard aboard ship (e.g., inadequate facilities for maintaining safe food temperatures or a contaminated drinking-water system.) Full information on inspection criteria can be obtained by writing to the VSP office at the address listed at the end of this section. At any time, the Director of CDC may determine that failure to implement corrective actions presents a threat of communicable disease being introduced into the United States and may take additional action, including detaining the ship in port.

The scores for each ship are published biweekly in the Summary of Sanitation Inspections of International Cruise Ships, commonly known as the "green sheet." This sheet is widely

distributed to travel-related services worldwide and is a way to communicate a ship's compliance with VSP recommendations to both the cruise ship industry and the consumer. The green sheet is available via Internet at <http://www.cdc.gov/nceh/programs/vsp> or by the CDC fax information service by dialing 1-888-232-6789 and requesting Document 510051. Interested persons may obtain the green sheet or a copy of the complete inspection for a specific ship by writing to the Vessel Sanitation Program, National Center for Environmental Health, CDC, 4770 Buford Hwy., N.E., Mailstop F-16, Atlanta, GA 30341-3724.

Disinsection of Aircraft

International travelers should be aware that some countries require disinsection of certain passenger aircraft to prevent the importation of insects such as mosquitoes. Disinsection procedures may include spraying the aircraft passenger compartment with insecticide while passengers are present. While the recommended disinsection procedures have been determined to be safe by the World Health Organization, they may aggravate certain health conditions (i.e., allergies). Travelers who are interested in determining what disinsection procedures may be performed on a particular flight should contact their travel agent or airline.

Tuberculosis Risk in Aircraft

CDC and state and local health departments have conducted six investigations of possible TB transmission on commercial aircraft. In all six instances, a passenger or a member of the flight crew traveled on commercial airplanes while infectious with TB. In none of the six instances were the airlines aware that the passengers were infected with TB. In two of the instances, CDC concluded that TB was probably transmitted to others on the airplane. CDC found that the risk of TB transmission from an infectious person to others on an airplane was greater on long flights (i.e., ≥ 8 hours). The risk of exposure to TB was higher for passengers and flight crew sitting or working near an infectious person. These persons may inhale droplets containing TB bacteria.

The risk of TB transmission on a airplane does not appear to be greater than in any other enclosed space. To prevent the possibility of exposure to TB on airplanes, CDC recommends that persons known to have infectious TB travel by private transportation (i.e., not by commercial airplanes or other commercial carriers), if travel is required. CDC has issued guidelines for notifying passengers who may have been exposed to TB aboard airplanes. Passengers concerned about a possible exposure to TB should see their primary health-care provider for a TB skin test.

Environmental Effects

International travelers may be subject to certain stresses that may lower resistance to disease, such as crowding, disruption of usual eating and drinking habits, and time changes, with "jet lag" contributing to a disturbed pattern of the sleep and wakefulness cycle. These conditions of stress can lead to nausea, indigestion, fatigue, or insomnia. Complete adaptation depends on the number of time zones crossed but may take a week or more.

Heat and cold can be directly or indirectly responsible for some diseases and can give rise to serious skin conditions. Dermatophytoses such as athlete's foot are often made worse by warm, humid conditions.

Excessive heat and humidity alone, or strenuous activity under those conditions, may lead to heat exhaustion due to salt and water deficiency and to the more serious heat stroke or hyperthermia. The ultraviolet rays of the sun can cause severe and very debilitating sunburn in lighter-skinned persons.

Excessive cold affects persons who may be inadequately dressed, particularly the elderly; it can lead to hypothermia and to frostbite of exposed parts of the body. Alcohol consumption can amplify the adverse effects of cold temperatures.

Breathing and swallowing dust when traveling on unpaved roads or in arid areas may be followed by nausea and malaise and may cause increased susceptibility to infections of the upper respiratory tract.

Traveling at high altitudes may lead to insomnia, headache, nausea, and altitude sickness, even in young, healthy persons, and can cause distress to those with cardiac or pulmonary conditions. Individual susceptibility to acute mountain sickness is highly variable. Travelers who are at greatest risk are those who ascend rapidly to tourist sites in the Andes and the Himalayas. Acetazolamide has been shown, under both simulated and actual climbing conditions, to hasten the process of acclimatization to high altitudes. The recommended dosage to prevent acute mountain sickness is 125–250 mg every 8–12 hours, with medication initiated 24–48 hours before and continued during ascent. Acetazolamide should not be taken by individuals who are allergic to sulfonamides.

Natural Disasters and Environmental Hazards

Natural disasters can contribute to the transmission of some diseases; however, unless the causative agent is in the environment, transmission cannot take place. Natural disasters often disrupt water supplies and sewage systems. Epidemic typhoid has been conspicuously absent following natural disasters in developing countries where typhoid is endemic. It takes several weeks for typhoid antibodies to develop, and even then immunization provides only moderate protection. Floods pose no additional risk of typhoid. In flood areas where the organism has been present, recent studies have identified outbreaks of leptospirosis. See text on page 109 on how to minimize risk of infection.

Of greatest importance in preventing enteric disease transmission when water and sewage systems have been disrupted is to ensure that water and food supplies are safe to consume. If contamination is suspected, water should be boiled and appropriately disinfected (see pages 163–164).

Contamination of rivers and lakes with chemical, organic or inorganic compounds such as heavy metals or other toxins can be harmful to both fish and humans who eat them. Sufficient warning that such hazard exists in a body of water is often difficult to provide.

Air pollution is widespread in large cities. Uncontrolled forest fires have been known to cause widespread pollution over vast expanses of the world at one time. Health risks associated with these environmental occurrences have not been fully studied, and travelers with chronic pulmonary disease may be more susceptible to respiratory infection. Any risk to short-term healthy travelers to such areas is probably small.

Chernobyl

Effects of the Radiological Release at Chernobyl

The Chernobyl Nuclear Power station, located in the Ukraine Republic about 100 kilometers (62 miles) northwest of Kiev and 310 kilometers (193 miles) southeast of Minsk (in Belarus), had an uncontrolled release of radioactive material in April 1986. This event resulted in the largest short-term release of radioactive materials into the atmosphere ever recorded. The radiologic contamination primarily affected three republics: Ukraine, Belarus, and Russia. The highest radioactive ground contamination occurred within 30 km (19 miles) of Chernobyl.

Area Considerations

Short-term international travelers to Ukraine, Belarus, and Russia (i.e., those who plan to stay in the region less than a few months) should not be concerned about residing in areas that are not controlled (i.e., marked with signs or fenced). However, longer-term visitors should be aware that in some noncontrolled areas an individual could receive a radiation dose from the radioactive ground contamination in excess of the international radiological health standards recommended for the public. Long-term visitors should investigate the local conditions prior to choosing a long-term residence. (For example, ground contamination that exceeds 5 curies per square kilometer [5 Ci/km2] of cesium-137 could result in a radiation dose greater than the recommended standards.)

Food and Water Considerations

Officials of the three republics attempt to monitor all foodstuffs sold in the public markets for levels of radioactivity. Radioactive concentration limits have been established for various classes of food, e.g., milk, meat, and vegetables. These limits are comparable with standards used by many western nations, including the European Economic Community. Food with contamination levels in excess of these limits is not allowed to be sold in the market. Private farmers regularly make food available for sale outside the official market system. This food is not monitored for radioactivity, and travelers should not consume this food. Likewise, travelers should not eat any wild berries, wild mushrooms or wild game from these regions and should drink only bottled water.

Age and Health Considerations

Young children, unborn babies, and nursing infants are potentially at greater risk from exposure to radiation than adults. Pregnant or nursing mothers should pay extra attention to acquiring food from reliable well-monitored sources.

Injuries

Injuries, especially those from motor vehicle crashes, pose the greatest risk of serious disability or loss of life to international travelers. The risk of motor vehicle-related death is generally many times higher in developing countries than in the United States. Motor vehicle crashes result from a variety of factors, including inadequate roadway design, hazardous conditions, lack of appropriate vehicles and vehicle maintenance, unskilled or inexperienced drivers, inattention to pedestrians and cyclists, or impairment due to alcohol or drug use; all these factors are preventable or can be abated. Defensive driving is an important preventive measure. When driving or riding, request a vehicle equipped with safety belts, and, where available, use them. Cars and trucks should be carefully inspected to assure that tires,

windshield wipers, and brakes are in good condition and that all lights are in good working order. Where available, also request a vehicle equipped with air bags. As a high proportion of crashes occur at night when drivers are returning from "social events," avoid nonessential night driving, alcohol, and riding with persons who are under the influence of alcohol or drugs. This risk of death in a motor vehicle crash is greater for persons sitting in the front seat than for those in the rear seat. Where possible, travelers should ride in the rear seats of motor vehicles. Pedestrian, bicycle, and motorcycle travel are often dangerous, and helmet use is imperative for bicycle and motorcycle travel. In developing countries, helmets will likely not be available, so bring your own with you if you plan to ride bicycles or motorcycles. For travel with young children, you should bring your own child safety seat.

Fire injuries are also a significant cause of injuries and death. Do not smoke in bed, and inquire about whether hotels have smoke detectors and sprinkler systems. Travelers may wish to bring their own smoke detectors with them. Always look for a primary and alternate escape route from rooms in which you are meeting or staying. Look for improperly vented heating devices which may cause carbon monoxide poisoning. Remember to escape a fire by crawling low under smoke.

Other major causes of injury trauma include drowning (see swimming precautions, page 177) and injuries to water skiers and divers due to boat propellers. Boats equipped with propeller guards should be used whenever possible. Wear a personal flotation device (PFD) whenever you ride on a boat.

Travelers should also be aware of the potential for violence-related injuries. Risk for assault or terrorist attack varies from country to country; heed advice from residents and tour guides about areas to be avoided, going out at night, and going out alone. Do not fight attackers. If confronted, give up your valuables. For more information, contact the U.S. Department of State, Overseas Citizens Emergency Center at (202) 647-5225 or their website, <http://travel.state.gov>, for specific country travel warnings and information.

Animal-Associated Hazards

Animals in general tend to avoid human beings, but they can attack, particularly if they are protecting their young. In areas of endemic rabies, domestic dogs, cats, or other animals should not be petted. Wild animals should be avoided; most injuries from wild animals are the direct result of attempting to handle or feed the animals.

The bites, stings, and contact with some insects cause unpleasant reactions. Medical attention should be sought if an insect bite or sting causes redness, swelling, bruising, or persistent pain. Many insects also transmit communicable diseases. Some insects can bite and transmit disease without the person being aware of the bite, particularly when camping or staying in rustic or primitive accommodations. Insect repellents, protective clothing, and mosquito netting are advisable in many parts of the world (See page 161, Protection Against Mosquitoes and Other Arthropod Vectors).

Poisonous snakes are hazards in many parts of the world, although deaths from snake bites are relatively rare. The Australian brown snake, Russell's viper and cobras in southern Asia, carpet vipers in the Middle East, and coral and rattlesnakes in the Americas are particularly dangerous. Most snakebites are the direct result of handling or harassing snakes, which bite

as a defensive reaction. Attempts to kill snakes are dangerous, often leading to bites on the fingers. The venom of a small or immature snake may be even more concentrated than that of larger ones; therefore, all snakes should be left alone.

Fewer than half of all snake bite wounds actually contain venom, but medical attention should be sought any time a bite wound breaks the skin. A pressure bandage, ice (if available), and immobilization of the affected limb are recommended first aid measures while the victim is moved as quickly as possible to a medical facility. Specific therapy for snakebite is controversial, and should be left to the judgment of local emergency medical personnel. Snakes tend to be active at night and in warm weather. As a precaution, boots and long pants may be worn when walking outdoors at night in snake-infested regions. Bites from scorpions may be painful but seldom are dangerous, except possibly in infants. In general, exposure to bites can be avoided by sleeping under mosquito nets and by shaking clothing and shoes before putting them on, particularly in the morning. Snakes and scorpions tend to rest in shoes and clothing.

Anthrax-Contaminated Goatskin Handicrafts

Anthrax is a disease caused by a bacterial organism that produces spores that are highly resistant to disinfection. These infectious spores may persist on a contaminated item for many years. Anthrax spores have been found on goatskin handicrafts from Haiti. Travelers to Caribbean countries are advised not to purchase Haitian goatskin handicrafts. Because of the risk, importation of goatskin handicrafts from Haiti is not permitted at U.S. ports of entry; such items will be confiscated and destroyed.

Swimming Precautions

Swimming in contaminated water may result in skin, eye, ear, and certain intestinal infections, particularly if the swimmer's head is submerged. Generally for infectious disease prevention, only pools that contain chlorinated water can be considered safe places to swim. In certain areas, fatal primary amebic meningoencephalitis has occurred following swimming in warm dirty water. Swimmers should avoid beaches that might be contaminated with human sewage or with dog feces. Wading or swimming should be avoided in freshwater streams, canals, and lakes liable to be infested with the snail hosts of schistosomiasis (bilharziasis) or contaminated with urine from animals infected with Leptospira. Biting and stinging fish and corals and jelly fish may be hazardous to the swimmer. **Never swim alone or when under the influence of alcohol or drugs, and never dive head first into an unfamiliar body of water.**

Emerging Infectious Diseases

Emerging infectious diseases are diseases of infectious origin whose incidence in humans has increased within the past two decades or threatens to increase in the near future. Many factors, or combinations of factors, can contribute to disease emergence. New infectious diseases may emerge from genetic changes in existing organisms; known diseases may spread to new geographic areas and populations; and previously unknown infections may appear in humans living or working in changing ecologic conditions that increase their exposure to insect vectors, animal reservoirs, or environmental sources of novel pathogens. Reemergence may occur because of the development of antimicrobial resistance in existing infections (e.g., gonorrhea, malaria, pneumococcal disease) or breakdowns in public health measures for previously controlled infections (e.g., cholera, tuberculosis, pertussis). For current outbreak bulletins on diseases of concern for international travelers one may call the CDC Travelers' Health hotline at 1-877-FYI-TRIP (394-8747).

Illness Abroad

If Medical Care Is Needed Abroad

If an American citizen becomes seriously ill or is injured abroad, a U.S. consular officer can assist in locating appropriate medical services and informing family or friends. If necessary, a consular officer can also assist in the transfer of funds from the United States. However, payment of hospital and other expenses is the responsibility of the traveler.

Protection against potentially hazardous drugs is nonexistent in some countries, increasing the risk of adverse reactions. Do not buy medications "over the counter" unless you are familiar with the product.

Before going abroad, learn what medical services your health insurance will cover overseas. If your health insurance policy provides coverage outside the United States, remember to carry both your insurance policy identity card, as proof of such insurance, and a claim form. Although some health insurance companies will pay "customary and reasonable" hospital costs abroad, very few will pay for medical evacuation to the United States. Medical evacuation can easily cost $10,000 or more, depending on the location and medical condition.

WHO Blood Transfusion Guidelines for International Travelers

There is a growing public awareness of the AIDS epidemic and a resulting concern about acquiring the AIDS virus through blood transfusion. Systematic screening of blood donations is not yet feasible in all developing countries. Persons planning international travels have requested to have their own blood or blood from their home country available to them in case of urgent need. These requests raise logistic, technical, and ethical issues that are not easy to resolve. Ultimately, the safety of blood for such persons will depend upon the quality of blood transfusion services in the host country. The strengthening of these services is of the highest priority. While efforts are being made to achieve this end, other approaches are also needed.

Basic Principles:

1. Unexpected, emergency blood transfusion is rarely required. It is needed only in situations of massive hemorrhage such as severe trauma, gynecologic and obstetric emergency, or gastrointestinal bleeding.

2. In many cases, resuscitation can be achieved by use of colloid or crystalloid plasma expanders instead of blood.

3. Blood transfusion is not free of risk, even in the best of conditions. In most developing countries, the risk is increased by limited technical resources for screening blood donors for HIV infection and other diseases transmissible by blood.

4. The international shipment of blood for transfusion is practical only when handled by agreement between two responsible organizations, such as national blood transfusion services. This mechanism is not useful for emergency needs of individual patients and should not be attempted by private individuals or organizations not operating recognized blood programs.

Therefore:

1. There are no medical indications for travelers to take blood with them from their home country.

2. The limited storage period of blood and the need for special equipment negate the feasibility of independent blood banking for individual travelers or small groups.

3. Blood should be transfused only when absolutely indicated. This applies even more forcefully in those countries where screening of blood for transmissible diseases is not yet widely performed.

Proposed Options:

1. When urgent resuscitation is necessary, the use of plasma expanders rather than blood should always be considered.

2. In case of emergency need for blood, use of plasma expanders and urgent evacuation home may be the actions of choice.

3. When blood transfusion cannot be avoided, the attending physician should make every effort to ensure that the blood has been screened for transmissible diseases, including HIV.

4. International travelers should:
   a. take active steps to minimize the risk of injury, such as avoiding night driving, employing safe driving practices, and wearing seatbelts whenever possible;
   b. establish a plan for dealing with medical emergencies;
   c. support the development within countries of safe and adequate blood supplies.

This information is taken from the WHO publication "World Health Organization Global Programme on AIDS: Blood Transfusion Guidelines for International Travelers."

Death Overseas

Importation or Exportation of Human Remains

There are no federal restrictions on the importation of human remains unless the death was the result of one of the following communicable diseases: cholera or suspected cholera, diphtheria, infectious tuberculosis, plague, suspected smallpox, yellow fever, suspected viral hemorrhagic fevers (Lassa, Marburg, Ebola, Congo-Crimean, and others not yet isolated or named). If the death was the result of one of these diseases, the remains must be cremated or properly embalmed, placed in a hermetically sealed casket, and be accompanied by a death certificate, translated into English, which states the cause of death. Following importation, the local mortician will be subject to the regulations of the state and local health authorities for interstate or intrastate shipment.

The United States has no requirements for the exportation of human remains; however, the requirements of the country of destination must be met. Information regarding these requirements may be obtained from the appropriate embassy or local consulate general.

The Post-Travel Period

Some diseases may not manifest themselves immediately. If travelers become ill after they return home, they should tell their physician where they have traveled.

Most persons who acquire viral, bacterial, or parasitic infections abroad become ill within 6 weeks after returning from international travel. However, some diseases may not manifest themselves immediately; for example, malaria may not cause symptoms for as long as 6 months to a year after the traveler returns to the United States. It is recommended that a traveler always advise a physician of the countries visited within the 12 months preceding onset of illness. Knowledge of such travel and the possibility the patient may be ill with a disease the physician rarely encounters will help the physician arrive at a correct diagnosis.

Miscellaneous Information

Importation or Reentry of Pets

Pets that are transported internationally should be free of communicable diseases that may be transmissible to humans. U.S. Public Health Service regulations place the following restrictions on the importation of dogs, cats, nonhuman primates, and turtles:

Dogs

Dogs older than 3 months presented for importation from countries where rabies is known to occur (See Table 17), must be accompanied by a valid rabies vaccination certificate which includes the following information:

1. The breed, sex, age, color, markings, and other identifying information,

2. Vaccination date at least 30 days prior to importation (See below)

3. Vaccination expiration date. If not shown, the date of vaccination must be within 12 months prior to the importation, and

4. Signature of a licensed veterinarian.

Dogs not accompanied by the above-described certificate may be admitted, provided the importer completes a confinement agreement. Such dogs must be kept in confinement during transit to, and be vaccinated within 4 days after arrival at, the U.S. destination. Such dogs must remain in confinement for at least 30 days after the date of vaccination.

Dogs < 3 months of age may be admitted, provided the importer completes a confinement agreement. Such dogs must be kept in confinement during transit and at the U.S. destination until vaccinated at 3 months of age and for at least 30 days after vaccination. Routine rabies vaccination of dogs is recommended in the United States and is required by most State and local health authorities.

Cats

Although proof of rabies vaccination is not required for cats, routine rabies vaccination of cats is recommended in the United States and is required by most state and local health authorities.

Turtles

Turtles may transmit salmonellosis to humans, and because small turtles are often kept as pets, restrictions apply to their importation. Live turtles with a carapace (shell) length of less than 4 inches and viable turtle eggs may be imported into the United States if the importation is not for commercial purposes. The Public Health Service has no restrictions on the importation of live turtles with a carapace length of more than 4 inches.

Monkeys and Other Nonhuman Primates

Nonhuman primates may transmit a variety of serious diseases to humans. Live monkeys and other nonhuman primates may be imported into the United States only by importers registered with CDC and only for scientific, educational, or exhibition purposes. Monkeys and other nonhuman primates may not be imported for use as pets.

Measures at Ports of Entry

U.S. Public Health Service regulations provide for the examination of admissible dogs, cats, nonhuman primates and turtles presented for importation into the United States. Animals with evidence of disease that may be transmissible to humans may be subject to additional disease control measures.

General

For additional information regarding importation of these animals, contact the Centers for Disease Control and Prevention, Attention: National Center for Infectious Diseases, Division of Quarantine, Mailstop E03, Atlanta, Georgia 30333, telephone (404) 639-8107.

Persons planning to import horses, ruminants, swine, poultry, birds, and dogs used in handling livestock should contact the U.S. Department of Agriculture regarding additional requirements, telephone (301) 436-8170.

Persons planning to import fish, reptiles, spiders, wild birds, rabbits, bears, wild members of the cat family, or other wild or endangered animals should contact the U.S. Department of the Interior, Fish and Wildlife Service, telephone (202) 342-9242.

Travelers planning to take a pet to a foreign country are advised to meet entry requirements of the country of destination. To obtain this information write to or call the country's embassy in Washington, D.C., or the consulate nearest you.

GEOGRAPHIC DISTRIBUTION OF POTENTIAL HEALTH HAZARDS TO TRAVELERS

Geographic Distribution of Potential Health Hazards to Travelers

This section* is intended to give a *broad* indication of the health risks to which travelers may be exposed in various areas of the world and which they may not encounter in their usual place of residence.

In practice, to identify areas accurately and define the degree of risk likely in each of them is extremely difficult, if not impossible. For example, viral hepatitis A is ubiquitous, but the risk of infection varies not only according to area but also according to eating habits; hence, there may be more risk from communal eating in an area of low incidence than from eating in a private home in an area of high incidence. Generalizations may therefore be misleading. Current efforts to eradicate poliomyelitis worldwide are significantly reducing the risk of infection with wild poliovirus in almost all endemic areas.

Another factor is that tourism is an important source of income for many countries and to label specific areas as being of high risk for a disease may be misinterpreted. However, this does not absolve national health administrations from their responsibility to provide an accurate picture of the risks from communicable diseases that may be encountered in various parts of their countries.

AFRICA

Northern Africa (Algeria, Egypt, Libyan Arab Jamahiriya, Morocco, and Tunisia) is characterized by a generally fertile coastal area and a desert hinterland with oases that are often foci of infections.

Arthropod-borne diseases are unlikely to be a major problem to the traveler, although dengue fever, filariasis (focally in the Nile Delta), leishmaniasis, malaria, relapsing fever, Rift Valley fever, sandfly fever, typhus, and West Nile fever do occur in some areas.

Foodborne and waterborne diseases are endemic; the dysenteries and other diarrheal diseases are particularly common. Hepatitis A occurs throughout the area, and hepatitis E is endemic in some regions. Typhoid fever is common in some areas. Schistosomiasis (bilharziasis) is prevalent both in the Nile Delta area in Egypt and in the Nile valley; it occurs focally elsewhere in the area. Alimentary helminthic infections, brucellosis, and giardiasis are common. Echinococcosis (hydatid disease) may occur. Sporadic cases of cholera occur.

Other hazards. Poliomyelitis eradication efforts in northern Africa have been very successful and wild virus transmision in most of the area may have been interrupted. Egypt is the only country where confirmed cases of poliomyelitis were still reported in 1997. Trachoma, rabies, snakes, and scorpions are hazards in certain areas.

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*This section has been reprinted from International Travel and Health:Vaccination Requirements and Health Advice—Situation as on 1 January 1999, published by the World Health Organization.

Sub-Saharan Africa (Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo (formerly Zaire), Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Réunion, Rwanda, São Tomé and Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, Togo, Uganda, United Republic of Tanzania, Zambia, and Zimbabwe). In this area, entirely within the tropics, the vegetation varies from the tropical rain forests of the west and center to the wooded steppes of the east, and from the desert of the north through the Sahel and Sudan savannahs to the moist orchard savannah and woodlands north and south of the equator.

Many of the diseases listed below occur in localized rural foci and are confined to rural areas. They are mentioned so that the international traveler and the medical practitioner concerned may be aware of the diseases that may occur.

Arthropod-borne diseases are a major cause of morbidity. Malaria in the severe *Plasmodium falciparum* (malignant) form occurs throughout the area, except at over 2,600 meters altitude and in the islands of Réunion, and Seychelles. Various forms of filariasis are widespread; endemic foci of onchocerciasis (river blindness) exist in all the countries listed except in the greater part of Kenya and in Djibouti, Gambia, Mauritania, Mozambique, Somalia, Zambia, Zimbabwe, and the island countries of the Atlantic and Indian Oceans. However, onchocerciasis exists in the island of Bioko, Equatorial Guinea. Both cutaneous and visceral leishmaniasis may be found, particularly in the drier areas. Visceral leishmaniasis is epidemic in eastern and southern Sudan. Human trypanosomiasis (sleeping sickness), mainly in discrete foci, is reported from all countries except Djibouti, Eritrea, Gambia, Mauritania, Niger, Somalia, and the island countries of the Atlantic and Indian Oceans. The transmission of human trypanosomiasis is high in northwestern Uganda and very high in northern Angola, the Democratic Republic of Congo (mostly Equateur and Bandundu) and southern Sudan, and there is significant risk of infection for travelers visiting or working in rural areas. Relapsing fever and louse-, flea-, and tickborne typhus occur. Natural foci of plague* have been reported from Angola, Democratic Republic of Congo, Kenya, Madagascar, Mozambique, Uganda, the United Republic of Tanzania, and Zimbabwe. Tungiasis is widespread. Many viral diseases, some presenting as severe hemorrhagic fevers, are transmitted by mosquitos, ticks, sandflies, etc., which are found throughout this region. Large outbreaks of yellow fever occur periodically in the unvaccinated population.

Foodborne and waterborne diseases are highly endemic. Schistosomiasis (bilharziasis) is present throughout the area except in Cape Verde, Comoros, Djibouti, Réunion, and the Seychelles. Alimentary helminthic infections, the dysenteries and diarrheal diseases, including giardiasis, typhoid fever, and hepatitis A and E are widespread. Cholera is actively transmitted in many countries in this area. Dracunculiasis (Guinea worm) infection occurs in isolated foci. Paragonimiasis (oriental lung fluke) has been reported from Cameroon, Gabon, Liberia and most recently from Equatorial Guinea. Echinococcosis (hydatid disease) is widespread in animal-breeding areas.

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*A natural focus of plague is a strictly delimited area where ecological conditions ensure the persistence of plague in wild rodents (and occasionally other animals) for long periods of time, and where epizootics and periods of quiescence may alternate.

Other diseases. Hepatitis B is hyperendemic. Poliomyelitis (also a foodborne and water-borne disease) is probably endemic in most countries except in Cape Verde, Comoros, Mauritius, Réunion, and the Seychelles. Trachoma is widespread. Among other diseases, certain frequently fatal arenavirus haemorrhagic fevers have attained notoriety. Lassa fever has a virus reservoir in a commonly found multimammate rat. Studies have shown that an appreciable reservoir exists in some rural areas of West Africa; people visiting these areas should take particular care to avoid rat-contaminated food or food containers, but the extent of the disease should not be exaggerated. The Ebola and Marburg hemorrhagic fevers are present but reported only infrequently.

Epidemics of meningococcal meningitis may occur throughout tropical Africa, particularly in the savannah areas during the dry season.

Other hazards include rabies and snake bites.

Southern Africa (Botswana, Lesotho, Namibia, St. Helena, South Africa, and Swaziland) varies physically from the Namib and Kalahari deserts to fertile plateaus and plains and to the more temperate climate of the southern coast.

Arthropod-borne diseases such as Crimean-Congo hemorrhagic fever, malaria, plague, relapsing fever, Rift Valley fever, tick-bite fever, and typhus, mainly tickborne, have been reported from most of this area except St. Helena, but except for malaria in certain areas, they are not likely to be a major health problem for the traveler. Trypanosomiasis (sleeping sickness) may occur in Botswana and Namibia.

Foodborne and waterborne diseases are common in some areas, particularly amebiasis and typhoid fever. Hepatitis A occurs in this area. Schistosomiasis (bilharziasis) is endemic in Botswana, Namibia, South Africa, and Swaziland.

Other hazards. The southern African countries are on the verge of becoming poliomyelitis-free, and the risk of contracting poliovirus is now low. Hepatitis B is hyperendemic. Snakes [and rabies*] may be a hazard in some areas.

THE AMERICAS

North America (Bermuda, Canada, Greenland, St. Pierre and Miquelon, and the United States of America [with Hawaii]) extends from the Arctic to the subtropical cays of the southern United States.

In 1994, an international commission certified the eradication of endemic wild poliovirus from the Americas. Ongoing surveillance in formerly endemic Central and South American countries confirms that poliovirus transmission remains interrupted.

The incidence of communicable diseases is such that they are unlikely to prove a hazard for international travelers greater than that found in their own country. There are, of course, health risks, but in general, the precautions required are minimal. Certain diseases occasionally

*Editor's note: CDC addition.

occur, such as plague, rabies in wildlife, including bats, Rocky Mountain spotted fever, tularemia, and arthropod-borne encephalitis. Recently, rodent-borne hantavirus has been identified, predominantly in the western states of the United States. Lyme disease is endemic in the northeastern United States, Mid-Atlantic, and the upper Midwest and the southwestern provinces of Canada. Occasional cases have been reported from the Pacific Northwest. During recent years, the incidence of certain food-borne diseases, e.g., salmonellosis, has increased in some regions. Other hazards include poisonous snakes, poison ivy, and poison oak. In the north, a serious hazard is the very low temperature in the winter.

In the United States, proof of immunization against diphtheria, measles, poliomyelitis, and rubella is now universally required for entry into school. In addition, the school entry requirements of most states include immunization against tetanus (49 states), pertussis (44 states), mumps (43 states), and hepatitis B (26 states).

Mainland Middle America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama) ranges from the deserts of the north to the tropical rain forests of the southeast.

Of the *arthropod-borne diseases*, malaria and cutaneous and mucocutaneous leishmaniasis occur in all eight countries. Visceral leishmaniasis occurs in El Salvador, Guatemala, Honduras, Mexico, and Nicaragua. Onchocerciasis (river blindness) is found in two small foci in the south of Mexico and four dispersed foci in Guatemala. American trypanosomiasis (Chagas disease) has been reported to occur in localized foci in rural areas in all eight countries. Bancroftian filariasis is present in Costa Rica. Dengue fever and Venezuelan equine encephalitis may occur in all countries.

The *foodborne and waterborne diseases*, including amebic and bacillary dysenteries and other diarrheal diseases, and typhoid fever are very common throughout the area. All countries except Panama reported cases of cholera in 1996. Hepatitis A occurs throughout the area, and hepatitis E has been reported in Mexico. Helminthic infections are common. Paragonimiasis (oriental lung fluke) has been reported in Costa Rica, Honduras and Panama. Brucellosis occurs in the northern part of the area. Many *Salmonella typhi* infections from Mexico and Shigella dysenteriae type 1 infections from mainland Middle America as a whole have been caused by drug-resistant enterobacteria.

Other diseases. Rabies in animals (usually dogs and bats) is widespread throughout the area. Snakes may be a hazard in some areas.

Caribbean Middle America (Antigua and Barbuda, Aruba, Bahamas, Barbados, British Virgin Islands, Cayman Islands, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Netherlands Antilles, Puerto Rico, St. Christopher and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos Islands, and the Virgin Islands [USA)]). The islands, a number of them mountainous with peaks 1000–2500 m high, have an equable tropical climate with heavy rainstorms and high winds at certain times of the year.

Of the *arthropod-borne diseases*, malaria occurs in endemic form only in Haiti and in parts of the Dominican Republic. Diffuse cutaneous leishmaniasis was recently discovered in the

Dominican Republic. Bancroftian filariasis occurs in Haiti and some other islands, and other filariases may occasionally be found. Human fascioliasis due to *Fasciola hepatica* is endemic in Cuba. Outbreaks of dengue fever occur in the area, and dengue hemorrhagic fever has also occurred. Tularemia has been reported from Haiti.

Of the *foodborne and waterborne diseases*, bacillary and amebic dysenteries are common, and hepatitis A is reported, particularly in the northern islands. No cases of cholera have been reported in the Caribbean. Schistosomiasis (bilharziasis) is endemic in the Dominican Republic, Guadeloupe, Martinique, Puerto Rico, and Saint Lucia, in each of which control operations are in progress. It may also occur sporadically in other islands.

Other diseases. Other hazards may occur from spiny sea urchins and coelenterates (coral and jellyfish) and snakes. Animal rabies, particularly in the mongoose, is reported from several islands (see page 135).

Tropical South America (Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, and Venezuela) covers the narrow coastal strip on the Pacific Ocean, the high Andean range with numerous peaks 5000–7000 m high, and the tropical rain forests of the Amazon basin, bordered to the north and south by savannah zones and dry tropical forest or scrub.

Arthropod-borne diseases are an important cause of ill health in rural areas. Malaria (in the *falciparum*, *malariae*, and *vivax* forms) occurs in all ten countries or areas, as do American trypanosomiasis (Chagas disease), and cutaneous and mucocutaneous leishmaniasis. There has been an increase of the latter in Brazil and Paraguay. Visceral leishmaniasis is endemic in northeast Brazil, with foci in other parts of Brazil, less frequent in Colombia and Venezuela, rare in Bolivia and Paraguay, and unknown in Peru. Endemic onchocerciasis occurs in isolated foci in rural areas in Ecuador, Venezuela, and northern Brazil. The bites of blackflies may cause unpleasant reactions. Bancroftian filariasis is endemic in parts of Brazil, Guyana and Suriname. Plague has been reported in natural foci in Bolivia, Brazil, Ecuador, and Peru. Among the arthropod-borne viral diseases, jungle yellow fever may be found in forest areas in all countries except Paraguay and areas east of the Andes; in Brazil it is confined to the northern and western states. Epidemics of viral encephalitis and dengue fever occur in some countries of this area. Bartonellosis, or Oroya fever, a sandfly-borne disease, occurs in arid river valleys on the western slopes of the Andes up to 3,000 meters. Louse-borne typhus is often found in mountain areas of Colombia and Peru.

Foodborne and waterborne diseases are common and include amebiasis, diarrheal diseases, helminthic infections, and hepatitis A. The intestinal form of schistosomiasis (bilharziasis) is found in Brazil, Suriname, and north-central Venezuela. Paragonimiasis (oriental lung fluke) has been reported from Ecuador, Peru and Venezuela. Brucellosis is common and echinococcosis (hydatid disease) occurs, particularly in Peru. Bolivia, Brazil, Colombia, Ecuador, Peru, and Venezuela all reported autochthonous cases of cholera in 1996.

Other diseases include rodent-borne arenavirus hemorrhagic fever in Bolivia. Hepatitis B and D (delta hepatitis) are highly endemic in the Amazon Basin. Rabies has been reported from many of the countries in this area. Meningococcal meningitis occurs in epidemic outbreaks in Brazil.

Snakes and leeches may be a hazard in some areas.

Temperate South America (Argentina, Chile, Falkland Islands [Malvinas], and Uruguay). The mainland ranges from the Mediterranean climatic area of the western coastal strip over the Andes divide on to the steppes and desert of Patagonia in the south and to the prairies of the northeast.

The *arthropod-borne diseases* are relatively unimportant except for the occurrence of American trypanosomiasis (Chagas disease). Outbreaks of malaria occur in northwestern Argentina, and cutaneous leishmaniasis is also reported from the northeastern part of the country.

Of the *foodborne and waterborne diseases*, gastroenteritis (mainly salmonellosis) is relatively common in Argentina, especially in suburban areas and among children < 5 years of age. Some cases of cholera were reported in Argentina in 1996. Typhoid fever is not very common in Argentina but hepatitis A and intestinal parasitosis are widespread, the latter especially in the coastal region. Taeniasis (tapeworm), typhoid fever, viral hepatitis, and echinococcosis (hydatid disease) are reported from the other countries.

Other diseases. Anthrax is an occupational hazard in the three mainland countries. [Animal rabies is endemic in Argentina and Chile.*] Meningococcal meningitis occurs in the form of epidemic outbreaks in Chile. Rodent-borne hantavirus pulmonary syndrome has been identified in the north-central and southwestern regions of Argentina and in Chile.

ASIA

East Asia (China [including Hong Kong Special Administration Region], the Democratic People's Republic of Korea, Japan, Macao, Mongolia, and the Republic of Korea). The area includes the high mountain complexes, the desert and the steppes of the west, the various forest zones of the east, down to the subtropical forests of the southeast.

Among the *arthropod-borne diseases*, malaria now occurs in China, and in recent years cases have also been reported from the Korean peninsula. Although reduced in distribution and prevalence, bancroftian and brugian filariasis are still reported in southern China. A resurgence of visceral leishmaniasis is occurring in China, and cutaneous leishmaniasis has been recently reported from Xinjiang, Uygur Autonomous Region. Plague may be found in China and Mongolia. Hemorrhagic fever with renal syndrome—rodent-borne, Korean hemorrhagic fever—is endemic except in Mongolia, and epidemics of dengue fever and Japanese encephalitis may occur in some areas. Mite-borne or scrub typhus may be found in scrub areas in southern China, certain river valleys in Japan, and in the Republic of Korea.

Foodborne and waterborne diseases such as diarrheal diseases and hepatitis A are common in most countries. Hepatitis E is prevalent in western China. The present endemic area of schistosomiasis (bilharziasis) is in the central Chang Jiang (Yangtze) river basin in China; active foci no longer occur in Japan. Clonorchiasis (oriental liver fluke) and paragonimiasis (oriental lung fluke) are reported in China, Japan, Macao and the Republic of Korea, and fasciolopsiasis (giant intestinal fluke) in China. Brucellosis occurs in China. Cholera may

*Editor's note: CDC addition.

occur in some countries in this area.

Other diseases. Hepatitis B is highly endemic. Low levels of poliomyelitis morbidity are reported from China and Mongolia. Trachoma and leptospirosis occur in China. Outbreaks of meningococcal meningitis occur in Mongolia. [Rabies is endemic in China and Korea.*] Poliomyelitis eradication activities have rapidly reduced poliovirus transmission.

Eastern South Asia (Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar [Burma], the Philippines, Singapore, Thailand, and Vietnam). From the tropical rain and monsoon forests of the northwest, the area extends through the savannah and the dry tropical forests of the Indochina peninsula, returning to the tropical rain and monsoon forests of the islands bordering the South China Sea.

The *arthropod-borne diseases* are an important cause of morbidity throughout the area. Malaria and filariasis are endemic in many parts of the rural areas of all the countries or areas—except for malaria in Brunei Darussalam and Singapore, where normally only imported cases occur. Plague exists in Myanmar and Vietnam. Japanese encephalitis, dengue and dengue hemorrhagic fever can occur in epidemics in both urban and rural areas. Mite-borne typhus has been reported in deforested areas in most countries.

Foodborne and waterborne diseases are common. Cholera and other watery diarrheas, amebic and bacillary dysentery, typhoid fever, and hepatitis A and E may occur in all countries in the area. Schistosomiasis (bilharziasis) is endemic in the Southern Philippines and in central Sulawesi (Indonesia) and occurs in small foci in the Mekong Delta in Vietnam. Among helminthic infections, fasciolopsiasis (giant intestinal fluke) may be acquired in most countries in the area; clonorchiasis (oriental liver fluke) in the Indochina peninsula; opisthorchiasis (cat liver fluke) in the Indochina peninsula, the Philippines, and Thailand; and paragonimiasis in most countries. Melioidosis can occur sporadically throughout the area.

Other diseases. Hepatitis B is highly endemic. The only remaining focus of poliovirus transmission is in the Mekong Delta area of Cambodia and southern Vietnam. Poliovirus transmission has probably been interrupted in Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, and Thailand. Trachoma exists in Indonesia, Myanmar, Thailand, and Vietnam.

Other hazards include rabies, snake bites, and leeches.

Middle South Asia (Afghanistan, Armenia, Azerbaijan, Bangladesh, Bhutan, Georgia, India, Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Maldives, Nepal, Pakistan, Sri Lanka, Tajikistan, Turkmenistan, and Uzbekistan). Bordered for the most part by high mountain ranges in the north, the area extends from steppes and desert in the west to monsoon and tropical rain forests in the east and south.

Arthropod-borne diseases are endemic in all these countries except for malaria in Georgia, Kazakhstan, Krygyzstan, the Maldives, Turkmenistan and Ubekistan. There are small foci of malaria in Armenia, Azerbaijan, and Tajikistan. In some of the other countries, malaria occurs

*Editor's note: CDC addition.

in urban as well as rural areas. Filariasis is common in Bangladesh, India, and the southwestern coastal belt of Sri Lanka. Sand fly fever is on the increase. A sharp rise in the incidence of visceral leishmaniasis has been observed in Bangladesh, India and Nepal. In Pakistan, it is mainly reported from the north (Baltisan). Cutaneous leishmaniasis occurs in Afghanistan, India (Rajasthan), the Islamic Republic of Iran, and Pakistan. There are very small foci of cutaneous and visceral leishmaniasis in Azerbaijan and Tajikistan. There is evidence that natural foci of plague exist in India and Kazakhstan. Tickborne relapsing fever is reported from Afghanistan, India, and the Islamic Republic of Iran, and typhus occurs in Afghanistan and India. Outbreaks of dengue fever may occur in Bangladesh, India, Pakistan, and Sri Lanka, and the hemorrhagic form has been reported from eastern India and Sri Lanka. Japanese encephalitis has been reported from the eastern part of the area and Crimean-Congo hemorrhagic fever from the western part. Another tickborne hemorrhagic fever has been reported in forest areas of Karnataka State in India and in a rural area of Rawalpindi District in Pakistan.

Foodborne and waterborne diseases are common throughout the area, in particular cholera and other watery diarrheas, the dysenteries, typhoid fever, hepatitis A and E, and helminthic infections. Large epidemics of hepatitis E can occur. Giardiasis is common in the area. A very limited focus of urinary schistosomiasis (bilharziasis) persists in the southwest of the Islamic Republic of Iran. Brucellosis and echinococcosis (hydatid disease) are found in many countries in the area.

Other diseases. Hepatitis B is endemic. Outbreaks of meningococcal meningitis have been reported in India and Nepal. Poliomyelitis eradication activities have begun in all countries in the area, rapidly reducing the risk of infection with wild poliovirus. However, surveillance data are incomplete and poliovirus transmission should still be assumed to be a risk to travelers in most countries, especially in the Indian subcontinent. Trachoma is common in Afghanistan, in parts of India, the Islamic Republic of Iran, Nepal, and Pakistan. Snakes and the presence of rabies in animals are hazards in most of the countries in the area.

Western South Asia—Bahrain, Cyprus, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, the United Arab Emirates, and Yemen). The area ranges from the mountains and steppes of the northwest to the large deserts and dry tropical scrub of the south.

The *arthropod-borne diseases*, except for malaria in certain areas, are not a major hazard for the traveler. Malaria does not exist in Kuwait and no longer occurs in Bahrain, Cyprus, Israel, Jordan, Lebanon, or Qatar. Its incidence in Oman, the Syrian Arab Republic, and the United Arab Emirates is low, but elsewhere it is endemic in certain rural areas. Cutaneous leishmaniasis is reported throughout the area; visceral leishmaniasis, although rare throughout most of the area, is common in central Iraq, in the southwest of Saudi Arabia, in the northwest of the Syrian Arab Republic, in Turkey (southeast Anatolia only) and in the west of Yemen. Murine and tickborne typhus can occur in certain countries. Tickborne relapsing fever may occur. Crimean-Congo hemorrhagic fever has been reported from Iraq. Limited foci of onchocerciasis are reported in Yemen.

The *foodborne and waterborne diseases* are a major hazard in most countries. The typhoid fevers and hepatitis A exist in all countries. Schistosomiasis (bilharziasis) occurs in Iraq, Saudi Arabia, the Syrian Arab Republic, and Yemen. Dracunculiasis (guinea worm) occurs in

isolated foci in Yemen. Taeniasis (tapeworm) is reported from many of the countries. Brucellosis is reported from most countries, and there are foci of echinococcosis (hydatid disease).

Other diseases. Hepatitis B is endemic. The risk of poliomyelitis (also a food-borne and water-borne disease) is low in most countries of the area, with the exception of Yemen. Trachoma and animal rabies are found in many countries in the area.

The greatest hazards to pilgrims to Mecca and Medina are heat and water depletion if the period of the Hajj coincides with the hot season.

EUROPE

Northern Europe (Belarus, Belgium, Czech Republic, Denmark [with the Faroe Islands], Estonia, Finland, Germany, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Republic of Moldova, Russian Federation, Slovakia, Sweden, Ukraine, and the United Kingdom [with the Channel Islands and the Isle of Man]. The area encompassed by these countries extends from the broadleaf forests and the plains of the west to the boreal and mixed forest to be found as far east as the Pacific Ocean.

The incidence of communicable diseases in most countries is such that they are unlikely to prove a hazard to international travelers greater than that found in their own country. There are, of course, health risks, but in most areas very few precautions are required.

Of the *arthropod-borne diseases*, there are very small foci of tickborne typhus in east and central Siberia. Tickborne encephalitis, for which a vaccine exists, and Lyme disease may occur throughout forested areas where vector ticks are found. Rodent-borne hemorrhagic fever with renal syndrome is now recognized as occurring at low endemic levels in this area.

The *foodborne and waterborne diseases* reported, other than the ubiquitous diarrheal diseases are taeniasis (tapeworm) and trichinellosis in parts of northern Europe, diphyllobothriasis (fish tapeworm) from the freshwater fish around the Baltic Sea area. *Fasciola hepatica* infection can occur. Hepatitis A occurs in the eastern European countries. The incidence of certain food-borne diseases, e.g., salmonellosis and campylobacteriosis, is increasing significantly in some of these countries.

Other diseases. All endemic countries in the area are now making intense efforts to eradicate poliomyelitis. Rabies is endemic in wild animals (particularly foxes) in rural areas of northern Europe. In recent years, Belarus, the Russian Federation, and Ukraine have experienced extensive epidemics of diphtheria. Diphtheria cases, mostly imported from these three countries, have also been reported from neighboring countries: Estonia, Finland, Latvia, Lithuania, Poland, and the Republic of Moldova.

A climatic hazard in part of northern Europe is the extreme cold in winter.

Southern Europe (Albania, Andorra, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, France, Gibraltar, Greece, Hungary, Italy, Liechtenstein, Malta, Monaco, Portugal [with the Azores and Madeira], Romania, San Marino, Slovenia, Spain [with the Canary Islands], Switzerland, and the Former Yugoslav Republic of Macedonia, and Yugoslavia. The area

extends from the broadleaf forests in the northwest and the mountains of the Alps to the prairies and, in the south and southeast, the scrub vegetation of the Mediterranean.

Among the *arthropod-borne diseases,* sporadic cases of murine and tickborne typhus and mosquito-borne West Nile fever occur in some countries bordering the Mediterranean littoral. Both cutaneous and visceral leishmaniasis and sandfly fever are also reported from this area. Recently an increasing number of *Leishmania*/HIV co-infections have been notified from France, Greece, Italy, Portugal and Spain. Tickborne encephalitis, for which a vaccine exists, Lyme disease, and rodent-borne hemorrhagic fever with renal syndrome may occur in the eastern and southern parts of the area.

The *foodborne and waterborne diseases*—bacillary dysentery and other diarrheas, and typhoid fever—are more common in the summer and autumn months, with a high incidence in the southeastern and southwestern parts of the area. Brucellosis can occur in the extreme southwest and southeast and echinococcosis (hydatid disease) in the southeast. Fasciola hepatica infection has been reported from different countries in the area. The incidence of certain foodborne diseases, e.g., salmonellosis and campylobacteriosis, is increasing significantly in some of these countries.

Other diseases. All countries in southern Europe where poliomyelitis was until recently endemic are conducting eradication activities, and the risk of infection in most countries is very low. However, a large poliomyelitis outbreak occurred in 1996 in Albania, also affecting Greece and Yugoslavia; it had been interrupted by the end of 1996. Hepatitis B is endemic in the southern part of eastern Europe (Albania, Bulgaria, and Romania). Rabies in animals* exists in most countries of southern Europe except Albania, Gibraltar, Greece, Italy, Malta, Monaco, the former Yugoslav Republic of Macedonia, Portugal, and Spain, except Ceuta/Melilla.

OCEANIA

Australia, New Zealand, and the Antarctic. In Australia the mainland has tropical monsoon forests in the north and east, dry tropical forests, savannah and deserts in the center, and Mediterranean scrub and subtropical forests in the south. New Zealand has a temperate climate with the North Island characterized by subtropical forests and the South Island by steppe vegetation and hardwood forests.

International travelers to Australia and New Zealand will, in general, not be subjected to the hazards of communicable diseases to an extent greater than that found in their own country.

Arthropod-borne diseases (mosquito-borne epidemic polyarthritis and viral encephalitis) may occur in some rural areas of Australia. Occasional outbreaks of dengue have occurred in northern Australia in recent years.

Other hazards. Coelenterates (corals and jellyfish) may prove a hazard to the sea-bather, and heat is a hazard in the northern and central parts of Australia. Insectivorous and fruit-eating bats in Australia have been found to harbor a virus related to rabies virus and therefore should

*Editor's note: CDC addition.

be avoided.

Melanesia and Micronesia-Polynesia (American Samoa, Cook Islands, Easter Island, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Pitcairn, Samoa, Solomon Islands, Tokelau, Tonga, Trust Territory of the Pacific Islands, Tuvalu, Vanuatu, Wake Island [U.S.] and the Wallis and Futuna Islands). The area covers an enormous expanse of ocean with the larger, mountainous, tropical and monsoon rainforest-covered islands of the west giving way to the smaller, originally volcanic peaks and coral islands of the east.

Arthropod-borne diseases occur in the majority of the islands. Malaria is endemic in Papua New Guinea, Solomon Islands and Vanuatu. Filariasis is widespread but its prevalence varies. Mite-borne typhus has been reported from Papua New Guinea. Dengue fever, including its hemorrhagic form, can occur in epidemics in most islands.

Foodborne and waterborne diseases such as the diarrheal diseases, typhoid fever and helminthic infections are commonly reported. Biointoxication may occur from raw or cooked fish and shellfish. Hepatitis A occurs in this area.

Other diseases. Hepatitis B is endemic. No cases of poliomyelitis have been reported from any of these islands for more than 5 years. Trachoma occurs in parts of Melanesia.

Hazards to bathers are coelenterates, poisonous fish, and sea snakes.

ADVISING THE TRAVELER WITH SPECIAL NEEDS

General Information Regarding HIV and Travel

Acquired immunodeficiency syndrome (AIDS), caused by the human immunodeficiency virus (HIV), has a very long and variable incubation period, ranging from a few months to many years. Some persons infected with HIV have remained asymptomatic for more than a decade. Currently, there is no vaccine to protect against infection with HIV. Although there is no cure for AIDS, treatments are available for HIV infection and prophylaxis for many opportunistic diseases that characterize AIDS.

International travelers should be aware that some countries serologically screen incoming travelers (primarily those with extended visits, such as for work or study) and deny entry to persons with AIDS and those whose test results indicate infection with HIV. Persons who are intending to visit a country for a substantial period or to work or study abroad should be informed of the policies and requirements of the particular country. This information is usually available from consular officials of individual nations. An unofficial list that has been compiled by the U.S. State Department can be found at the following Internet address: <http://travel.state.gov/HIVtestingreqs.html>.

Specific Precautions for HIV-Infected Travelers

Health-care providers should advise HIV-infected patients of the following:

1. Travel, particularly to developing countries, may carry significant risks for exposure to opportunistic pathogens for HIV-infected persons, especially those who are severely immunosuppressed. Consultation with the provider or with experts in travel medicine will help in planning itineraries.

2. During travel to developing countries, HIV-infected persons are at even higher risk for food and waterborne disease than they are in the United States. Food and beverages—in particular, raw fruits and vegetables, raw or undercooked seafood or meat, tap water, ice made with tap water, unpasteurized milk and dairy products, and food and beverages purchased from street vendors—may be contaminated. Foods and beverages that are generally safe include steaming hot foods, fruits that are peeled by the traveler, bottled (especially carbonated) beverages, hot coffee or tea, beer, wine, or water brought to a rolling boil for one minute. When local sources of water must be used and boiling is not practical, certain portable water filtration units when used in conjunction with chlorine or iodine can increase the safety of water. Some units are available that offer the effects of iodine treatment with filtration in the same unit. For more information about how to select a proper water filter, write to the CDC National Prevention Information Network for CDC's pamphlet, "You can prevent cryptosporidiosis: a guide for people with HIV infection" at P.O. Box 6003, Rockville, MD 20849-6003 or call 800-458-5231. International callers must dial 301-562-1098.

3. Waterborne infections may also result from swallowing water during recreational water activities. To reduce the risk of cryptosporidiosis and giardiasis, avoid swallowing water during swimming and avoid swimming in water that may be contaminated (e.g., with sewage or animal waste).

4. Prophylactic antimicrobial agents against travelers' diarrhea are not recommended routinely for HIV-infected persons traveling to developing countries. These agents have adverse effects and can promote the emergence of drug-resistant organisms. Several studies have shown that prophylactic antimicrobials can reduce the risk of diarrhea in travelers, though none has involved an HIV-infected population. In selected circumstances (e.g., a brief period of travel to an area where the risk of infection is very high), after weighing the potential risks and benefits, the provider and patient may decide that prophylactic antibiotics are warranted.

   For individuals to whom prophylaxis is offered, fluoroquinolones, such as ciprofloxacin 500 mg taken once a day, can be considered. Trimethoprim-sulfamethoxazole (TMP-SMX) (one double-strength tablet daily) has also been shown to be effective as a prophylactic agent against travelers' diarrhea, but drug resistance is now common in tropical areas. Persons already taking TMP-SMX for prophylaxis against *Pneumocystis carinii* pneumonia (PCP) may receive some protection against travelers' diarrhea. For HIV-infected persons who are not already taking TMP-SMX, the provider should carefully consider using this agent solely for diarrhea prophylaxis because of high rates of adverse reactions and the anticipated future need for the agent (e.g., for PCP prophylaxis).

5. All HIV-infected travelers to developing countries should carry an antimicrobial (e.g., ciprofloxacin 500 mg twice a day for 3–7 days) with them to be taken as empirical therapy should diarrhea develop. Alternative antibiotics (e.g., TMP-SMX) for empirical therapy for children and pregnant women should be discussed. Travelers should consult a physician if the diarrhea is severe and does not respond to empiric therapy, if there is blood in the stool, if fever occurs with shaking chills, or if there is dehydration. Antiperistaltic agents, e.g., diphenoxylate (Lomotil) and loperamide (Imodium), are used for treatment of diarrhea; however, they should not be used in patients with high fever or with blood in the stool; these drugs should be discontinued if symptoms persist beyond 48 hours. These drugs are not recommended for children.

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

7. In general, live virus vaccines should be avoided. An exception is measles vaccine, which is recommended for non-immune persons. However, measles vaccine is not recommended for persons who are severely immunocompromised; immune globulin should be considered for measles-susceptible, severely immunosuppressed persons who are anticipating travel to measles-endemic countries. Inactivated (killed) polio vaccine should be used instead of oral (live) polio vaccine. Persons at risk for exposure to typhoid fever should be given the inactivated, parenteral typhoid vaccine, instead of the live, attenuated oral typhoid vaccine. Yellow fever vaccine is a live virus vaccine with uncertain safety and efficacy in HIV-infected persons. Travelers with asymptomatic HIV infection who cannot avoid potential exposure to yellow fever should be offered the choice of vaccination. If travel to a yellow fever-infected zone is necessary and immunization is not performed, advise patients of the risk, instruct in methods to avoid bites of vector mosquitoes, and provide a vaccination waiver letter.

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

9. Identify other area-specific risks and instruct travelers in ways to reduce the risk of infection. Geographically focal infections that pose high risk to HIV-infected persons include: visceral leishmaniasis and several fungal infections (e.g., *Penicillium marneffei*, coccidioidomycosis, histoplasmosis). Many tropical and developing areas of the world have high rates of tuberculosis. (Refer to the section on tuberculosis, page 144)

Vaccine Recommendations for Travelers with Altered Immunocompetence, Including HIV

Killed or inactivated vaccines do not represent a danger to immunocompromised persons and generally should be administered as recommended for healthy persons. However, the immune response to these vaccines may be suboptimal.

Virus replication after administration of live, attenuated-virus vaccines can be enhanced and prolonged in persons with immunodeficiency diseases and in those with suppressed capacity for immune response, as occurs with HIV disease, leukemia, lymphoma, generalized malignancy, or therapy with corticosteroids, alkylating agents, antimetabolites, or radiation. Severe complications have been reported following vaccination with live attenuated virus vaccines (e.g., measles, polio) and with live bacterial vaccines (e.g., BCG) in patients with HIV disease, leukemia, and lymphoma or other persons with suppressed capacity for immune response. In general, patients with such conditions should not be given live-organism vaccines.

Evidence based on case reports has linked measles vaccine virus infection to subsequent death in six severely immunosuppressed persons. For this reason, patients who are severely immunosuppressed for any reason should not be given MMR vaccine. Healthy susceptible close contacts of severely immunosuppressed persons may be vaccinated. MMR and other measles-containing vaccines are not recommended for HIV-infected persons with evidence of severe immunosuppression (e.g., persons with a very low CD4+ T-lymphocyte count), primarily because of the report of a case of measles pneumonitis in a measles vaccinee who had an advanced case of AIDS. Refer to the 1998 ACIP statement on MMR for additional details on vaccination of persons with symptomatic HIV infection.

Measles disease may be severe in persons with HIV infection. Available data indicate that vaccination with MMR has not been associated with severe or unusual adverse events in HIV-infected persons without evidence of severe immunosuppression, although antibody responses have been variable. MMR vaccine is recommended for all asymptomatic HIV-infected persons and should be considered for symptomatic persons who are not severely immunosuppressed. Asymptomatic children do not need to be evaluated and tested for HIV

infection before MMR or other measles-containing vaccines are administered. A theoretical risk of an increase (probably transient) in HIV viral load following MMR vaccination exists because such an effect has been observed with other vaccines. The clinical significance of such an increase is not known.

In general, persons receiving large daily doses of corticosteroids (> 2 mg/kg per day or > 20 mg per day of prednisone) for 14 days or more should not receive MMR vaccine because of concern about vaccine safety. MMR and its component vaccines should be avoided for at least one month after cessation of high-dose therapy. Persons receiving low dose or short course (< 14 days) therapy, alternate-day treatment, maintenance physiologic doses, or topical, aerosol, intra-articular, bursal, or tendon injections may be vaccinated. Although persons receiving high doses of systemic corticosteroids daily or on alternate days during an interval of less than 14 days generally can receive MMR or its component vaccines immediately after cessation of treatment, some experts prefer waiting until 2 weeks after completion of therapy.

Patients receiving cancer chemotherapy or radiation who have not received chemotherapy for at least 3 months may receive MMR or its component vaccines.

Patients with leukemia in remission whose chemotherapy has been terminated for at least 3 months and transplant recipients who are beyond the period of immunosuppression may receive live-virus vaccines. Most experts agree that steroid therapy usually does not contra-indicate administration of live-virus vaccine when it is short term; low to moderate dose (< 2 weeks); long-term, alternate-day treatment with short-acting steroids; maintenance physiologic doses (replacement therapy); or administered topically (i.e., skin or eyes), by aerosol; or by intra-articular, bursal, or tendon injection.

Children infected with HIV should receive on schedule all the routinely recommended inactivated childhood vaccines (i.e., DTaP, Hib, and hepatitis B vaccine) whether or not they are symptomatic. IPV is the polio vaccine of choice for HIV-infected asymptomatic and symptomatic persons and their household members and other close contacts. Because measles can be severe in HIV-infected persons, MMR vaccine is recommended for all asymptomatic HIV-infected persons who do not have evidence of severe immunosuppression; it should also be considered for those who are symptomatic; however, MMR should not be given to severely immunocompromised persons. Pneumococcal vaccine is recommended for any person > 2 years of age with HIV infection. Because influenza may result in serious illness and complications, vaccination against influenza is a prudent precaution in HIV-infected persons. Varicella vaccine may be considered for asymptomatic HIV-infected persons with CD4+ percentages ≥ 25% (CDC Class 1).

Immunosuppression increases the risk for vaccine-associated paralytic polio. OPV should not be given to immunosuppressed individuals or household contacts of individuals who have immune deficiency diseases, immunosuppression (due to disease or therapy), or if there is suspected familial immune deficiency. OPV should not be given to a person known to be infected with HIV regardless of the level of immunosuppression. OPV should also not be administered to a healthy family contact of a person with HIV infection. IPV should be substituted for OPV in these circumstances.

OPV should not be given to any immunocompromised patient, their household members, or their close contacts. If polio immunization is indicated for these persons, IPV is recommended. Because of the possibility of immunodeficiency in other children born to a family in which there has been a case of congenital immunodeficiency, family members should not receive OPV until the immune status of the recipient and other children in the family is known.

Vaccine recommendations specific for persons infected with HIV are found under the individual diseases in the "Specific Recommendations for Vaccinations and Prophylaxis," pages 69–158.

Pregnancy, Breast-Feeding, and Travel

Factors Affecting the Decision to Travel

Although pregnancy is a normal state rather than a disabled condition, pregnant women need to consider the potential problems associated with international travel, as well as the quality of medical care available at the destination and during transit. According to the American College of Obstetrics and Gynecology, the safest time for a pregnant woman to travel is during the second trimester (18–24 weeks) when she usually feels best and is in least danger of experiencing a spontaneous abortion or premature labor. Women in the third trimester may be asked by their physicians to stay within 300 miles of home because of concerns about access to medical care in case of problems such as hypertension, phlebitis, or false or premature labor. The final decision to travel should be based on consultation with the woman's health-care provider.

General Recommendations for Travel

Once a pregnant woman has decided to travel, a number of issues need clarification prior to departure (Table 25). It is advisable for pregnant women to travel with a companion; in addition, attention to comfort becomes more important. The checklist (Table 25a) provides a guideline for planning with regard to medical considerations.

Motor vehicle accidents are a major cause of morbidity and mortality. When available, seat belts should be fastened at the pelvic area. Lap and shoulder restraints are best; in most accidents, the fetus recovers quickly from the seat belt pressure. However, even after seemingly blunt, mild trauma, a physician should be consulted.

Typical problems of pregnant travelers are the same as those experienced at home: fatigue, heartburn, indigestion, constipation, vaginal discharge, leg cramps, increased frequency of urination, and hemorrhoids. Signs and symptoms that indicate the need for immediate medical attention are bleeding, passing tissue or clots, abdominal pain or cramps, contractions, ruptured membranes, excessive leg swelling, headaches, or visual problems.

Breast Feeding and Travel

The decision to travel internationally while nursing brings another set of challenges. However, breast feeding has nutritional and anti-infective advantages that serve an infant well while traveling. Supplements are usually not needed by breast-fed infants younger than 6 months, and breast feeding should be maintained as long as possible. If supplementation is considered

necessary, powdered formula that requires reconstitution with boiled water should be carried. For short trips, it may be feasible to carry an adequate supply of pre-prepared canned formula. Exclusive breast feeding relieves concerns about sterilizing bottles and about availability of clean water.

Nursing women may be immunized for maximum protection, depending on the travel itinerary, but consideration needs to be given to the neonate who cannot be immunized at birth and who would not gain protection against many of these infections (e.g., yellow fever, measles, meningococcal meningitis) through breast feeding.

Neither inactivated nor live-virus vaccines affect the safety of breast-feeding for mothers or infants. Breast-feeding does not adversely affect immunization and is not a contraindication to the administration of any vaccines, including live-virus vaccines, to the breast-feeding woman. Although rubella vaccine virus may be transmitted in breast milk, the virus usually does not infect the infant, and if it does, the infection is well tolerated. Breast-fed infants should be vaccinated according to routine recommended schedules.

Nursing women need to realize that their eating and sleeping patterns, as well as stress, will inevitably affect their milk output. They need to increase their fluid intake, avoid excess alcohol and caffeine, and, as much as possible, avoid exposure to smoke.

Specific Recommendations for Pregnancy and Travel

Routine Immunizations

Because of the theoretical risks to the fetus from maternal vaccination, the risks and benefits of each immunization should be carefully reviewed. Ideally, all women who are pregnant should be up to date on their routine immunizations. In general, pregnant women should avoid live vaccines and women should avoid becoming pregnant within 3 months of having received one; however, no harm to the fetus has been reported from the accidental administration of these vaccines during pregnancy.

Diphtheria/Tetanus

The combination diphtheria/tetanus immunization should be given if the traveler has not been immunized within 10 years, although preference would be for its administration during the second or third trimesters.

Measles/Mumps/Rubella

Immunity to measles is essential for all travelers. Many young adults require immunization (and in some cases, reimmunization) for protection. The specific recommendations for different age groups depend on the traveler's country of origin, itinerary, and the epidemiology of measles in the country to be visited. The measles vaccine as well as the MMR (measles, mumps, and rubella combination) are live-virus vaccines and are contraindicated in pregnancy. Because of the increased incidence of measles in children in developing countries, its communicability, and its potential for causing serious consequences in adults, some authorities recommend delaying travel for nonimmune women until after delivery, when immunization can be given safely. However, in cases in which the rubella vaccine was accidentally administered, no complications were reported. If a pregnant woman has a documented exposure to measles, immune globulin should be given within a 6-day period to prevent illness.

Polio

It is important for the pregnant traveler to be protected against polio. Paralytic disease may occur with greater frequency when infection develops during pregnancy. Anoxic fetal damage has also been reported, with up to 50% mortality in neonatal infection. If not previously immunized, a pregnant woman should have at least two doses of vaccine before travel (day 0 and at 1 month). Despite being a live-virus vaccine, the oral preparation (OPV) is recommended when immediate protection is needed. The recommendation for the nonimmune pregnant traveler is one dose of OPV prior to travel followed by completion of the regimen after delivery. However, for routine boosting or for when immediate protection is not required, the inactivated vaccine (IPV) is preferred. There is no convincing evidence of adverse effects of either OPV or IPV in pregnant women or a developing fetus. However, it is prudent to avoid polio vaccination of pregnant women unless immediate protection is needed. In this case, OPV is the vaccine of choice.

Breast feeding does not interfere with successful immunization against poliomyelitis with IPV or OPV. IPV may be administered to a child with diarrhea, and OPV may be administered to a child with mild diarrhea. Minor upper respiratory illnesses with or without fever, mild to moderate local reactions to a previous dose of vaccine, current antimicrobial therapy, and the convalescent phase of an acute illness are not contraindications for vaccination.

Hepatitis B

The hepatitis B vaccine may be administered during pregnancy. For tourists or business travelers, it is not routinely recommended unless a woman will be working in a health-care setting, sexually active with new partners, planning delivery overseas, or will be a long-term traveler. It is desirable, however, for everyone to be protected against hepatitis B.

Pneumococcal/Influenza

The pneumococcal and influenza vaccines should be given to all who would otherwise qualify for special protection against these diseases: pregnant women with chronic diseases or pulmonary problems. In general, women with serious underlying illnesses should not travel to developing countries when pregnant.

Travel-Related Immunizations During Pregnancy

Yellow Fever

The yellow fever vaccine should not be given to a pregnant woman unless travel to an endemic or epidemic area is unavoidable. In these instances, the vaccine can be administered. Although concerns exist, no congenital abnormalities have been reported after administration of this vaccine to pregnant women.

If traveling to or transiting regions within a country where the disease is not a current threat but where policy requires a yellow fever certificate, a physician waiver should be carried, along with documentation on the immunization record. In general, travel to areas where yellow fever is a risk should be postponed until after delivery, when the vaccine can be administered without concern of fetal toxicity. A nursing mother should also delay travel, as the neonate cannot be immunized because of the risk of vaccine-associated encephalitis. Breast feeding is not a contraindication to the vaccine for the mother.

Table 25. Relative Contraindications to International Travel during Pregnancy

Patients with Obstetrical Risk Factors
• History of miscarriage
• Incompetent cervix
• History of ectopic pregnancy (ectopic with present pregnancy should be ruled out prior to travel)
• History of premature labor or premature rupture of membranes
• History of or present placental abnormalities
• Threatened abortion or vaginal bleeding during present pregnancy
• Multiple gestation in present pregnancy
• History of toxemia, hypertension, or diabetes with any pregnancy
• History of infertility or difficulty becoming pregnant
• Primigravida > 35 years of age or < 15 years of age
Patients with General Medical Risk Factors
• Valvular heart disease or congestive heart failure
• History of thromboembolic disease
• Severe anemia
• Chronic organ system dysfunction requiring frequent medical interventions
Patients Contemplating Travel to Destinations That May Be Hazardous
• High altitudes
• Areas endemic for or with ongoing outbreaks of life-threatening food- or insect-borne infections
• Areas where chloroquine-resistant *Plasmodium falciparum* is endemic
• Areas where live-virus vaccines are required and recommended

Table 25a. Checklist for the Pregnant Traveler

- ✓ Make sure health insurance is valid while abroad and during pregnancy. Check to see if the policy covers a newborn should delivery take place. Obtain a supplemental travel insurance policy and a prepaid medical evacuation insurance policy.
- ✓ Check medical facilities at the destination. For women in the last trimester, medical facilities should be able to manage complications of pregnancy, toxemia, and cesarean sections.
- ✓ Determine beforehand whether prenatal care will be required abroad and, if so, who will provide it. Make sure prenatal visits requiring specific timing are not missed.
- ✓ Check ahead of time whether blood is screened for HIV and hepatitis B at the destination. Pregnant travelers and their companions should know their blood types.
- ✓ Check facilities at the destination for availability of safe food and beverages, including bottled water and pasteurized milk.

Hepatitis A

Pregnant women without immunity to hepatitis A need protection before traveling to developing countries. Hepatitis A is usually no more severe during pregnancy than at other times and does not affect the outcome of pregnancy. There have been reports, however, of acute fulminant disease in pregnant women during the third trimester, when there is also an increased risk of premature labor and fetal death. These events have occurred in women from developing countries and may have been related to underlying malnutrition. The hepatitis A virus is rarely transmitted to the fetus, but this can occur during viremia or from fecal contamination at delivery. Immune globulin is a safe and effective means of preventing hepatitis A, but immunization with one of the hepatitis A vaccines give a more complete and prolonged protection. The effect of these inactivated virus vaccines on fetal development is unknown, but the production methods for the vaccines are similar to that for IPV, which is considered safe during pregnancy.

Typhoid

The older injectable typhoid vaccine is not recommended during pregnancy because of febrile reactions, which can result in spontaneous abortions. It can be administered intradermally with less risk of systemic symptoms. The safety of the oral typhoid vaccine in pregnancy is not known. Nonetheless, neither of these is absolutely contraindicated during pregnancy, according to the Advisory Committee on Immunization Practices. The Vi injectable preparation may be the vaccine of choice, as it is inactivated and requires only one injection. With any of these, the vaccine efficacy (about 70%) needs to be weighed against the risk of disease.

Meningococcal Meningitis

The polyvalent meningococcal meningitis vaccine may be administered during pregnancy if the woman is entering an area where the disease is epidemic. The vaccine's safety during pregnancy has not been conclusively demonstrated.

Rabies

The cell-culture rabies vaccines may be given during pregnancy for either pre- or postexposure prophylaxis.

Japanese Encephalitis

No information is available on the safety of Japanese encephalitis vaccine during pregnancy. It should not be routinely administered during pregnancy, except when a woman must stay in a high-risk area. If not mandatory, travel to such areas should be delayed.

Miscellaneous

There are no data available on the use of plague vaccine for pregnant women. BCG vaccine for the prevention of tuberculosis can theoretically cause disseminated disease and thus affect the fetus; skin testing for tuberculosis exposure before and after travel is preferable when the risk is high. Therefore, neither of these vaccines is recommended.

Malaria During Pregnancy

Malaria in pregnancy carries significant morbidity and mortality for both the mother and the fetus. Because no antimalarial agent is 100% effective, it is imperative that pregnant women use personal protective measures when traveling through a malaria-endemic area. Pregnant women should remain indoors between dusk and dawn, but if outdoors at night, should wear light-colored clothing, long sleeves, long pants, and shoes and socks. Pregnant women should sleep in air-conditioned quarters or use screens and permethrin-impregnated bed nets.

Pyrethrum-containing house sprays or coils should also be used indoors if insects are a problem. Insect repellents containing a low percentage of DEET (recommendations vary from 10% to 35%) can be used on the skin. Nursing mothers should be careful to wash repellents off hands and breast skin prior to handling infants.

Chloroquine and proguanil have been used by pregnant women for malaria chemoprophylaxis for decades with no documented increase in birth defects. Mefloquine has been recommended for chemoprophylaxis during the second and third trimesters. Women in the first trimester should be discouraged from visiting areas where chloroquine-resistant malaria occurs. However, if they do travel to these areas, experience suggests that mefloquine causes no significant increase in spontaneous abortions or congenital malformations among women who have inadvertently taken the drug during this period.

Nursing mothers should take the usual adult dose of antimalarial appropriate for the country to be visited. The amount of medication in the breast milk will not be helpful or harmful to the infant. Therefore, the breast-feeding child needs his or her own prophylaxis.

Any pregnant traveler returning with malaria from an area where chloroquine-resistant *P. falciparum* is endemic should be treated as a medical emergency and as if she had illness due to chloroquine-resistant organisms. Because of the serious nature of malaria, quinine or intravenous quinidine should be used and should be followed by Fansidar, or even doxycycline, despite concerns regarding potential fetal problems. Frequent glucose levels and careful fluid monitoring often require intensive care supervision.

Travelers' Diarrhea During Pregnancy

Dietary vigilance should be adhered to while traveling during pregnancy because dehydration due to travelers' diarrhea (TD) can lead to inadequate placental blood flow. Potentially contaminated water should be boiled. Iodine-containing purification systems should not be used long-term. Iodine tablets can probably be used for short-term travel up to several weeks, but congenital goiters have been reported in association with administration of iodine-containing drugs during pregnancy. Eating only well-cooked meats and pasteurized dairy products, as well as avoiding pre-prepared salads, should help avoid diarrheal disease, as well as infections such as toxoplasmosis and listeria, which can have serious sequelae in pregnancy. It is not recommended that pregnant women use prophylactic antibiotics for the prevention of TD.

Oral rehydration is the mainstay of TD therapy. Bismuth subsalicylate compounds are contraindicated due to the theoretical risks of fetal bleeding from salicylates and teratogenicity from the bismuth. The combination of kaolin-pectin may be used, and loperamide should be used only when necessary. The antibiotic treatment of TD during pregnancy can be complicated. An oral third-generation cephalosporin may be the best option for treatment if an antibiotic is needed.

Table 26. Vaccination During Pregnancy

	Vaccine	Use during pregnancy
Cholera	Inactivated bacterial	Data on safety in pregnancy are not available. Should weigh the theoretical risk of vaccination against the risk of disease.
Hepatitis A	Inactivated virus	Data on safety in pregnancy are not available. Should weigh the theoretical risk of vaccination against the risk of disease.
Hepatitis B	Subunit virus	Administer if indicated
Immune globulins, pooled or hyperimmune	Immune globulin or specific globulin preparations	Administer if indicated
Influenza	Inactivated whole virus or subunit	Administer if indicated
Japanese encephalitis	Inactivated virus	Data on safety in pregnancy are not available. Should weigh the theoretical risk of vaccination against the risk of disease.
Measles	Live-attenuated virus	Contraindicated
Meningococcal meningitis	Polysaccharide	Administer if indicated
Mumps	Live-attenuated virus	Contraindicated
Plague	Inactivated bacterial	Data on safety in pregnancy are not available. Should weigh the theoretical risk of vaccination against the risk of disease.
Pneumococcal	Polysaccharide	Administer if indicated
Polio, inactivated	Inactivated virus	Administer if indicated
Polio, oral	Live-attenuated virus	Administer if indicated
Rabies	Inactivated virus	Administer if indicated
Rubella	Live-attenuated virus	Contraindicated
Tetanus-diphtheria	Toxoid	Administer if indicated
Typhoid	Inactivated bacterial	Data on safety in pregnancy are not available. Should weigh the theoretical risk of vaccination against the risk of disease.
Typhoid (Ty21a)	Live bacterial	Data on safety in pregnancy are not available. Should weigh the theoretical risk of vaccination against the risk of disease.
Varicella	Live-attenuated virus	Contraindicated
Yellow fever	Live-attenuated virus	Administer if indicated

Breast feeding is desirable during travel and should be continued as long as possible because of its safety and its lower incidence of infant diarrhea. A nursing mother with TD should not stop breast feeding but should increase her fluid intake.

Air Travel During Pregnancy

Commercial air travel poses no special risks to a healthy pregnant woman or her fetus. The lowered cabin pressures (kept at the equivalent of 5,000–8,000 feet or 1,524–2,438 meters) affect fetal oxygenation minimally because of the fetal hemoglobin dissociation curve. Severe anemia (Hgb 0.5 g/dL), sickle-cell disease or trait, a history of thrombophlebitis, or placental problems are relative contraindications to flying; however, supplemental oxygen may be ordered in advance. Each airline has policies regarding pregnancy and flying; it is always safest to check with the airline when booking reservations, as some will require medical forms to be completed. Domestic travel is usually permitted until 36 weeks gestation, and international travel may be curtailed after the 32nd week. Pregnant women should always carry documentation stating their expected date of delivery.

An aisle seat at the bulkhead will provide the most space and comfort, but a seat over the wing in the midplane region will give the smoothest ride. A pregnant woman should walk every half hour during a smooth flight and flex and extend the ankles frequently to prevent phlebitis. The seat belt should always be fastened at the pelvic level. Fluids should be taken liberally because of the dehydrating effect of the low humidity in aircraft cabins.

Women traveling with infants should keep in mind that newborns (< 6 weeks old) should not fly because their alveoli are not completely functional. Infants are particularly susceptible to pain with eustachian tube collapse during pressure changes, and breast-feeding during ascent and descent relieves this discomfort.

The Travel Health Kit During Pregnancy

Additions and substitutions to the usual travel health kit need to be made during pregnancy and nursing. Talcum powder, a thermometer, oral rehydration packets, multivitamins, an antifungal agent for vaginal yeast, acetaminophen, insect repellent containing a low percentage of DEET, and sunscreen with a high SPF should be carried. Women in their third trimesters may want to carry a blood pressure cuff and urine dipsticks to check for proteinuria and glucosuria, both of which would require attention. Antimalarial and antidiarrheal self-treatment medications should be evaluated individually, depending on the traveler, her trimester, the itinerary, and her health history. Most medications should be avoided, if possible.

Disabled Travelers

The U.S. Architectural and Transportation Barriers Compliance Board (Access Board) produces and/or distributes a variety of publications, at no cost. U.S. air carriers must comply with the U.S. laws or regulations regarding access. Up-to-date information regarding access abroad is more difficult to ascertain. U.S. companies or entities conducting programs or tours on cruise ships also have obligations for access, even if the ship itself has a foreign flag. Write or call Access Board, Suite 1000, 1331 F Street, N.W., Washington, D.C. 20004-1111, 1-800-USA-ABLE (voice/TTY) for a list of its publications.

Definitions

Active immunization—The production of immunity in response to the administration of a vaccine or a toxoid.

Antigen(s)—Substances inducing the formation of an immune response.

Antitoxin—A solution of antibodies derived from the serum of animals immunized with specific antigens used to achieve passive immunity or to effect a treatment.

"Blue Sheet"—Summary of Health Information for International Travel, published biweekly by CDC.

CDC—Centers for Disease Control and Prevention.

DEET—N,N,diethylmetatoluamide—the principal ingredient of most insect repellents.

Direct transit area—A special area established in an airport, approved and supervised directly by the health administration concerned, for segregating passengers and crews breaking their air voyage without leaving the airport.

Diseases subject to International Health Regulations—Cholera, yellow fever, and plague.

Endemic—The usual frequency of occurrence of a disease, including possible seasonal variations, in a human population.

Enteric—Pertaining to the small intestine.

Enzootic—The usual frequency of occurrence of a disease, including possible seasonal variations, in an animal population.

Epidemic—More than the expected number of cases of disease which would occur in a community or region during a given time period.

Epizootic—The occurrence of a disease in a defined animal population at a higher than expected rate.

Etiology—The study of the factors that cause disease.

Immune globulin (IG)—A sterile solution containing antibody from human blood. It is primarily indicated for routine maintenance of certain immunodeficient persons and for passive immunization against measles and hepatitis A.

Immunization—The process of inducing or providing immunity artificially by administering an immunobiologic. Immunization can be active or passive.

Imported case—Illness or infection acquired outside of a specified area.

Infected area—An area which harbors a particular agent of infection and which because of population characteristics, density, and mobility, and/or vector and animal reservoir potential

could support transmission of disease(s) identified there. It is defined on epidemiologic principles by the health administration reporting the disease and need not correspond to administrative boundaries.

International Certificate of Vaccination—The official certificate used to document the vaccinations a traveler has received, when and where received, and who administered them.

Isolation—The separation of a person or group of persons from others (except the health staff on duty) to prevent the spread of infection.

Motion sickness—A functional disorder thought to be brought on by repetitive motion and characterized by nausea or vomiting.

MMWR—Morbidity and Mortality Weekly Report, published by CDC.

Parasitic disease—A disease caused by an organism that lives in or on another organism.

Passive immunization—The provision of temporary immunity by the administration of preformed antitoxin or antibodies.

Pathogen—Any disease-producing microorganism or material.

Quarantine—That state or condition during which measures are applied by a health administration to a ship, an aircraft, a train, road vehicle, other means of transport or container, or individuals to prevent the spread of disease from the object of quarantine to reservoirs, vectors of disease, or other individuals.

Quarantinable diseases—The diseases designated by International Health Regulations as quarantinable are cholera, yellow fever, and plague.

Recommended vaccination—Vaccination not required by International Health Regulations but suggested for travelers visiting or living in certain countries.

Required vaccination—Vaccination the traveler must have for entry into or exit from a country. The traveler must present a validated International Certificate of Vaccination which documents the vaccination(s) received.

Specific immune globulin—Special preparations obtained from donor pools preselected for a high antibody content against a specific disease.

Toxoid—A modified bacterial toxin that has been rendered nontoxic but that retains the ability to stimulate the formation of antitoxin.

Travelers' diarrhea—A syndrome characterized by a twofold or greater increase in the frequency of unformed bowel movements. Commonly associated symptoms include abdominal cramps, nausea, bloating, urgency, fever, and malaise. Episodes of travelers' diarrhea usually begin abruptly, occur during travel or soon after returning home, and are generally self-limited.

Uniform Stamp—An official validation stamp which may be issued in the United States by the state health departments to local health departments and physicians licensed by the state.

Vaccination—The administration of any vaccine or toxoid. Does not imply that the recipient is successfully made immune.

Vaccine—A suspension of attentuated live or killed microorganisms, or fractions thereof administered to induce immunity and thereby prevent infectious disease.

Validation—Application of an official stamp or seal to the International Certificate of Vaccination by the health department or other appropriate agency. Approved validation stamps and seals in the United States are: (1) The Department of Defense Stamp, (2) the Department of State Seal, (3) the Public Health Service Seal, (4) the National Aeronautics and Space Administration Stamp, and (5) the Uniform Stamp.

Valid certificate—An International Certificate of Vaccination that has been fully completed, signed, and validated with an official stamp or seal. A model of a correctly completed certificate appears on page 12.

WHO—World Health Organization.

Yellow Fever Vaccination Center—A center designated under the authority of the health administration of a country to administer yellow fever vaccine.

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