

## CHAPTER 14

# Advice for Women Travelers

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Travel health issues for women will vary according to the life stage and lifestyle of the women. Issues differ depending on whether the woman is in her second trimester of pregnancy or about to go on her first solo journey at age 80. To adapt the standard pre-travel health recommendations to the needs of a female traveler, one needs to consider potential gender- and age-related issues with regard to susceptibility and long-term sequelae of parasitic and other infectious diseases, safety of immunizations during pregnancy, and adaptation of the medical kit for health concerns relevant to the life stage of the woman. Other gender-related issues that may be important relate to environmental risks, such as altitude or climate, and sports-related concerns.

Gender-related issues in travel and tropical and wilderness medicine are important to consider when we counsel female travelers regarding possible risks of disease before travel. For example, are the immunizations and medications recommended for a specific itinerary contraindicated in pregnancy? Can a woman on estrogen replacement trek safely over an 18,000-ft pass? What is a woman's risk of female genital schistosomiasis and future infertility if she is a Peace Corps volunteer working on a water conservation project for 2 years in a country endemic for schistosomiasis?

## GENDER-BASED MEDICINE

In 2001, the Institutes of Medicine released a landmark report that studied the basic biochemical differences in the cells of males and females as well as the health variability between the sexes from conception throughout life. The report confirmed the differences between the sexes in the prevalence and severity of a broad range of diseases, disorders, and conditions. In 2004, the Society for Women's Health Research persuaded the US Congress to include language in a 2005 appropriations bill demanding the National Institutes of Health to "include sex-based biology as an integral part" of all medical research.

## GENDER-RELATED ISSUES IN TROPICAL DISEASE

Although there is a growing body of research in developed countries with regard to the interrelationships between gender and health, few studies in developing countries have focused on gender differences with regard to the biomedical, social, or economic impact of tropical diseases, much less their impact at the personal level. For this reason, the World Health Organization (WHO) section of Tropical Diseases Research formed the Gender and Tropical Disease Task Force to stimulate research on gender determinants and consequences of tropical disease. The focus of WHO is on women living in endemic countries. We also need to consider the possible gender-related effects of tropical disease on female travelers living in endemic areas for extended periods and/or female adventure travelers involved in high-risk activities.

For many diseases endemic to the developing world, differences between female and male prevalence rates in indigenous people are difficult to measure, as cases in women are more likely to be undetected. When incidence rates in women and men are equal, there are still significant differences between the sexes in both the susceptibility and impact of tropical disease. Even when tropical diseases are shared by both sexes, they may have different manifestations, natural histories, or severity. For example, exposure to malaria is similar in women and men, with a slightly higher incidence in men. Biologically, however, a woman's immunity is compromised during pregnancy, making her more likely to become infected and implying a different severity of the consequences. Malaria during pregnancy is an important cause of maternal mortality, spontaneous abortion, and stillbirths.

Similarly, both sexes are susceptible to schistosomiasis, but genital schistosomiasis in women has been associated with a wide range of pathobiologic manifestations such as infertility, abortion, and preterm delivery. Thus physicians may be confronted more often with parasitic infections causing infertility, not only in patients originating in tropical countries but also in Western women as a result of a tendency to travel and work in exotic and subtropical countries.

Further research is needed to clarify the general question of sex differences in susceptibility and differential severity of the sequelae of tropical infectious diseases. These issues are important when we advise women on pre-travel issues, especially the long-term or adventure traveler. Knowledge of gender-specific risks for tropical disease is also important when we evaluate returned female travelers and recent female immigrants for health problems related to their history of travel and/or living in countries endemic for tropical diseases.

## GENERAL HEALTH ISSUES OF WOMEN TRAVELERS

Basic questions related to health include the following: What is the woman's reproductive stage of life? Is she using contraception? Is her contraceptive method appropriate for her travel itinerary? Does she have emergency contraception? Is she prepared to treat the usual women's health problems, such as urinary tract infections (UTIs), vaginitis, and menstrual cramps? Is she pregnant, planning to get pregnant, or breast feeding? If menopausal, does she have estrogen replacement therapy or herbal medications for symptoms? A format for obtaining a pre-travel health history for women is given in [Table 14.1](#).

### Women's Travel Medicine Kit

Women travelers, especially those embarking on adventure travel itineraries or planning extensive travel abroad, may find it beneficial to augment the basic travel medical kit (see Chapter 1) with supplies and medications specific to a given woman's life stage and reproductive health. [Table 14.2](#) lists items that might be included in a travel medical kit for women, and [Table 14.3](#) provides some Internet resources for further information on health issues of women travelers.

### Menstruation

Women between 12 and 55 years old menstruate, on average, once a month, with a high degree of variability among women. During travel, a woman should be prepared for either the worst menstrual period of her life with more cramping and more bleeding than usual or for her periods to actually cease. Menses may cease or become irregular during travel for a number of reasons other than pregnancy. For example, the mere stress of traveling, including changes in sleep patterns, diet, activity, illness, and time zones, can easily disrupt a woman's menstrual cycle. Recommendations can be made regarding measures to take depending on whether she uses oral contraceptives, her previous history, and the result of a self-pregnancy test. A woman should be warned that just because she is not menstruating while traveling does not mean she is not ovulating. She still needs a method of contraception to prevent unplanned pregnancy. Self-pregnancy tests are also important in the evaluation of a sexually active woman of reproductive age to help determine whether her abdominal pain and/or abnormal vaginal bleeding could be related to a pregnancy.

**TABLE 14.1 Pre-Travel History for Women**

Current age
Menstrual history
Date of last menstrual period
Irregular menses/dysfunctional uterine bleeding
Menstrual products: tampons, pads, alternative options
Premenstrual syndrome
Postmenopause
Symptoms
Issues regarding hormonal vs. nonhormonal prescription drugs
Reproductive history
Previous pregnancies, births, abortions
Need for contraception/emergency contraception
Pregnancy issues during travel
Lactation
Sexually transmitted infections
Male partners
Female partners
Both
Diagnosis and treatment card
HIV post-exposure prophylaxis for high-risk encounters
Health maintenance
Vital signs: blood pressure, heart rate, and respiration
Breast self-examination
Mammogram
Pap smear
Bone density
Electrocardiogram

*HIV*, Human immunodeficiency virus.

It is important to carry sufficient disposable sanitary napkins or tampons, since they are not available in many countries. Menstrual cups are another option. There are also reusable tampons made out of sea sponges and a variety of washable pads. Reusable products are ideal for the environmentally concerned backpacker and the long-term traveler. Pre-moistened towelettes for personal hygiene and plastic bags to dispose of sanitary supplies are also useful.

Some women prefer not to have a menstrual cycle while traveling. One option to control the menstrual cycle is through the use of a hormonal contraceptive method, such as the combined oral contraceptive pill, patch, or vaginal ring. By skipping the “hormone free” week and continuing the active hormone component (pill, patch, or ring) as directed, no withdrawal bleeding occurs, until the woman is ready to stop the active hormone and get withdrawal bleeding.

Medication for menstrual cramping and other symptoms of premenstrual syndrome should also be carried in the medical kit (Table 14.2).

### Urinary Tract Infections

Women are prone to UTIs during travel as a result of multiple factors, including dehydration, less frequent urination because of a lack of convenient toilets, fewer available facilities

**TABLE 14.2 Medical Kit for Women**

Menstrual supplies
Calendar to keep track of menses
Supplies/devices
Pads, tampons, menstrual cups (disposable vs. reusable)
Towelettes/plastic disposal bags
Premenstrual syndrome
Ibuprofen, other
Dysfunctional uterine bleeding
Premarin, estradiol
Oral contraceptive pills
Ibuprofen, other
Urinary tract infections
Ciprofloxacin
Macrobid
Pyridium
Optional: urinary dipstick to check for leukocytes and nitrites
Urinary voiding
Toilet tissue, towelettes
Funnels, paper or plastic
Disposable personal urinal bag ("portable john")
Vaginitis caused by <i>Candida</i>
pH paper: pH <4.5
Acidophilus dietary supplements
Vaginal creams: miconazole vaginal cream
Vaginal suppositories: Mycostatin
Oral medication: fluconazole
Mild soaps
Hydrocortisone cream for pruritus
Loose-fitting clothes
Bacterial vaginosis
pH paper: pH >4.7
Vaginal creams: metronidazole, clindamycin
Oral: metronidazole, clindamycin
Trichomoniasis
Metronidazole
Contraception
Chart to keep track of pills if using them, menstrual periods
Timer: special wrist watch alarm or smartphone app to use for oral contraceptive dosing when changing time zones
Male/female condoms
Diaphragm/cap/sponge
Spermicides/contraceptive creams, jellies, films
Emergency contraception
Review options in country of destination
Ulipristal acetate (Ella)
Levonorgestrel and combined pill regimens
Anti-emetic tablets or rectal suppositories

Continued

**TABLE 14.2 Medical Kit for Women—cont'd**

Emergency post-exposure HIV prophylaxis for high-risk unprotected sexual encounter
Pregnancy tests
Carry extras, depending on length of trip
Sexually transmitted infections
Preventive measures: condoms, dental dams, Saran wrap, gloves, barrier methods
Magnifying glass
Chart for identifying basic lesions, symptoms, recommendations for treatment
Medications for treatment
Perimenopausal/menopausal issues
Vaginal dryness: vaginal moisturizers, estrogen: creams, pill, or ring
Menstrual cycle irregularity: consider low-dose oral contraceptive
Stress incontinence: vaginal moisturizers and lubricants, Kegel exercises
Hot flashes and night sweats
Estrogen replacement therapy (ERT)
SSRIs, progestins, gabapentin
Insomnia
Avoid stimulants (caffeine, other), exercise, eat food with tryptophan
Irritability/moodiness: exercise, ERT vs. antidepressants
Osteoporosis: weight-bearing exercise, calcium, vitamin D, medications
Headaches: may be triggered by changes in hormones
Pregnancy supplies
Blood pressure cuff
Urine protein/glucose strips
Leukocyte esterase strips
Personal safety
Alarms
Pepper spray
Lessons in self-defense before trip

*SSRI*, Selective serotonin re-uptake inhibitor.

for hygiene, an increase in sexual activity, and other changes in exercise, diet, and clothing. Preventive measures include instructions for female travelers to stay well hydrated and to urinate wherever there is convenient access to a public toilet whether or not the bladder is full.

A number of plastic and paper funnel devices have been designed so that a woman may urinate in the standing position. Another option to try for a cold night in a tent or when there is no bathroom facility is a “portable john.” This is a unisex funnel that empties into a biodegradable plastic bag with biodegradable filler that turns the urine into a solid so it will not spill. The personal urinal bags can be used until full (800 cc or 28 oz), then disposed of.

To maintain hygiene, it is important to carry a supply of paper tissues or toilet paper and some packets of pre-moistened towelettes in a fanny pack or backpack. If an older woman is experiencing vaginal dryness and urinary frequency or urgency without dysuria, recent data suggest that estrogen vaginal creams, a vaginal ring, or even an oral contraceptive pill intravaginally once a week may decrease urogenital dryness and frequency symptoms. Vaginal moisturizers (e.g., Replens) can also be used. If a woman experiences increased frequency, urgency, and dysuria, she should be advised how to diagnose and treat herself for a UTI with an antibiotic and an analgesic.

**TABLE 14.3 Internet Resources for Women Travelers**

Website		
Contraception		
International Consortium for Emergency Contraception	<a href="http://www.cecinfo.org/">www.cecinfo.org/</a> <a href="http://www.cecinfo.org/country-by-country-information/status-availability-database/">www.cecinfo.org/country-by-country-information/status-availability-database/</a>	Emergency contraception options worldwide
Emergency contraception options	<a href="http://ec.princeton.edu/worldwide/">http://ec.princeton.edu/worldwide/</a>	Information about emergency contraception and what is available worldwide, searchable by country
International Planned Parenthood	<a href="http://www.ippf.org/">http://www.ippf.org/</a> <a href="http://www.ippf.org/www.contraceptive.ippf.org/">www.ippf.org/www.contraceptive.ippf.org/</a>	Information on contraceptive methods available worldwide, searchable by composition, brand name, type, manufacturer
Contraceptive technology	<a href="http://www.contraceptivetechnology.org/">www.contraceptivetechnology.org/</a>	Resource on contraceptive technology
Sexual health	<a href="http://www.cdc.gov/sexualhealth/">http://www.cdc.gov/sexualhealth/</a>	Information for women travelers on issues related to sexual health and contraceptive options worldwide
HIV post-exposure prophylaxis	<a href="http://nccc.ucsf.edu/">http://nccc.ucsf.edu/</a> <a href="http://nccc.ucsf.edu/clinician-consultation/pep-post-exposure-prophylaxis/">http://nccc.ucsf.edu/clinician-consultation/pep-post-exposure-prophylaxis/</a> <a href="http://nccc.ucsf.edu/clinical-resources/pep-resources/pep-quick-guide/">http://nccc.ucsf.edu/clinical-resources/pep-resources/pep-quick-guide/</a>	Non-occupational PEP guidelines; PEP hotline 888-448-4911
Pregnancy		
Pregnant traveler	<a href="http://www.pregnanttraveler.com">www.pregnanttraveler.com</a>	Resource for clinicians and pregnant travelers
Lactation		
Thomas Hale	<a href="http://neonatal.ttuhsf.edu/lact/">http://neonatal.ttuhsf.edu/lact/</a>	Resource on issues relating to breast feeding and medication use
International Lactation Association	<a href="http://gotwww.net/ilca/">http://gotwww.net/ilca/</a>	Resource for an international lactation consultant for women
Evacuation insurance		
International SOS	<a href="http://www.internationalsos.com">www.internationalsos.com</a>	
MEDEX	<a href="http://www.medexassist.com">www.medexassist.com</a>	
Travel kit		
Female urinary directors	<a href="http://www.freshette.com">www.freshette.com</a> <a href="http://www.travelmateinfo.com">www.travelmateinfo.com</a> <a href="http://www.traveljohn.com">www.traveljohn.com</a>	Options for female urinary directors
Menstrual supplies	<a href="http://www.divacup.com/www.keeper.com/">www.divacup.com/www.keeper.com/</a> <a href="http://www.softcup.com/www.gladrags.com/">www.softcup.com/www.gladrags.com/</a>	Reusable menstrual products for travel
Travel guide for women	<a href="http://travel.gc.ca/travelling/publications/her-own-way">http://travel.gc.ca/travelling/publications/her-own-way</a>	Travel information for women travelers throughout the lifespan

If an older woman has a problem with stress incontinence or bladder control, she should consult with a physician specializing in female urinary tract problems in advance of the anticipated trip. For minor problems, a woman can be taught to do Kegel exercises and should bring a supply of panty liners.

### Vaginitis

Women are at risk for vaginitis during travel, secondary to many of the same reasons as for UTI. One of the most common causes of vaginitis is *Candida albicans*. This organism usually causes a thick cottage cheese-like white discharge with vulvar and vaginal itching. The risk of yeast vaginitis may be greater if doxycycline is used for malaria chemoprophylaxis or if other broad-spectrum antibiotics are used for the treatment of traveler's diarrhea or other medical problems.

Several topical preparations against yeast are available over the counter, including nystatin, miconazole, and clotrimazole vaginal creams or troches. Prescriptions for resistant cases can be recommended, such as tetrazole vaginal cream (3 days) or fluconazole (150 mg as a single oral dose). Many women prefer to use the oral medication, as the vaginal creams can be messy during travel. Other women feel the vaginal creams help with the symptoms of itching. A hydrocortisone cream may also be used if needed for vulvar itching. Any persistent symptoms should be evaluated by a gynecologist when returning home. Even if a woman has never had vaginitis, it is important to prepare her for the possibility, especially for extended travel.

Another common cause of vaginal discharge is bacterial vaginosis. This is caused by overgrowth of the bacteria in the vagina, which can be due to many of the same causes listed previously. The discharge is usually more of a grayish color with a fishy odor. Bacterial vaginosis is treated with metronidazole tablets taken orally or clindamycin vaginal cream applied topically. If a female traveler develops a discharge and pelvic pain after a new sexual encounter, she may have a sexually transmitted disease and should follow the recommendations discussed in Chapters 41-44.

### Contraception

Contraceptive advice should be included in the pre-travel counseling for all women of reproductive age at risk for pregnancy. It should also be included in the pre-travel counseling for men who might put women at risk for pregnancy. This is especially important if the man's partner might be in a country where she might not have easy access to contraception.

Women may become pregnant as a result of a lack or misuse of contraception, and women travelers are no exception. In the United States, over 50% of pregnancies are unplanned. If a woman is already using contraception, the method should be evaluated for its ease of use and reliability during travel along with any special recommendations concerning its use during travel. If a woman wishes to try a new contraceptive method, ideally she should begin months before travel, especially if she is planning to be overseas long-term or will be living in a remote area. Back-up plans for what the woman should do if she loses her present method should be discussed. The International Planned Parenthood Federation (IPPF) keeps a worldwide guide to contraceptives and an address list of family planning agencies available on the Web ([Table 14.3](#)).

#### *Special Considerations for Women on Oral Contraceptives*

Women should be advised to take extra supplies of their oral contraceptives with them, since it may be difficult to find the identical brand in another country. It may be difficult to remember to take an oral contraceptive pill when traveling because of changes in time zones and schedule. However, keeping on schedule is especially important for women taking the low-dose combined and progestin-only pills. It is advised that women on such regimens consider wearing a special wristwatch with alarm, dedicated to signaling when the 24-hour scheduled oral contraceptive dose is due, or to download one of the smartphone apps available to help remember medication dosing.

Another problem is pill absorption during illness. Nausea and vomiting and/or diarrhea may cause decreased pill absorption. If vomiting occurs within 3 hours of taking a pill, the woman should take another one. If nausea and vomiting and/or diarrhea are persistent, the woman should consider using another contraceptive method for the rest of the month. Another option might be to insert the oral contraceptive pill in her vagina for absorption. A number of studies have demonstrated vaginal absorption of hormones in either the pill or the ring form as a method of contraception or estrogen replacement. A woman might choose the contraceptive patch or vaginal ring as a good alternative contraceptive method for travel.

### *Drug Interactions That May Affect Oral Contraceptive Efficacy*

A big concern among women travelers taking oral contraceptives is whether antibiotics affect oral contraceptive efficacy. Antibiotics have been shown in animal studies to kill intestinal bacteria responsible for the deconjugation of oral contraceptive steroids in the colon. Without such deconjugation and subsequent reabsorption, decreased hormone levels may result, leading to a decrease in hormone efficacy. Despite numerous case reports of penicillins, tetracyclines, metronidazole, and nitrofurantoin causing contraceptive failure in humans, no large studies have demonstrated that antibiotics other than rifampin lower steroid blood concentrations.

To date, there are no known drug interactions between oral contraceptives and malaria chemoprophylaxis such as atovaquone/proguanil and mefloquine. Doxycycline and other broad-spectrum antibiotics temporarily reduce colonic bacteria, thus inhibiting the enterohepatic circulation of ethinyl estradiol. The importance of this effect on the enterohepatic circulation varies from woman to woman. This is not thought to be clinically significant, and a back-up method of contraception is not routinely recommended. A more conservative approach would be to recommend a back-up method of contraception for the first 3 weeks a woman is taking both doxycycline and oral contraceptives. If the hormone-free week occurs during this time, she should continue her contraception with a new package of hormonally active pills so as not to let her blood levels fall. After 3 weeks, the enterohepatic circulation should be restored and the back-up method of contraception stopped.

### *Contraceptive Failure: Emergency Contraception*

The potential for being or becoming a pregnant traveler exists for most women of reproductive age. Contraceptive failures are common. Condoms break, diaphragms slip, oral contraceptives may be missed due to changes in time zones, or malabsorption of the pill may occur as a result of vomiting and diarrhea. The contraceptive method could also be lost or stolen. A woman may experience a rape or assault.

Emergency contraception (EC) is defined as a method of contraception that a woman can use after unprotected intercourse to prevent pregnancy. For maximum effectiveness EC treatment should be started as soon as possible after unprotected intercourse. Treatment is most effective if initiated within the first 12-24 hours and definitely within 120 hours. Thus it is important for the travel medicine clinician to include a recommendation for emergency contraception for all women who may be at risk for pregnancy and/or how to access EC.

Ulipristal acetate (Ella) was approved by the US Food and Drug Administration (FDA) in 2010 and is the most effective EC pill. It is a progesterone receptor modulator and is effective for up to 5 days after unprotected intercourse. It is available by prescription or on the Web. In Europe it is known as ellaOne.

The easiest method for a female traveler to obtain is Plan B, consisting of two tablets of levonorgestrel (750 µg). Plan B is approved by the FDA for over-the-counter sale. Other options for EC include regimens using progestin-only mini- or low-dose pills to provide a dose comparable to the branded Plan B product or using regular oral contraceptives containing ethinyl estradiol and either norgestrel or levonorgestrel (Table 14.4). Recent data suggest that the progestin-only EC treatment (two tablets of 750 µg levonorgestrel taken together as one dose) is more effective and causes less vomiting than does treatment with



**TABLE 14.4 Emergency Contraceptive Methods**

Brand	First Dose	Second Dose (12 h later)	Ulipristal Acetate per Dose (mg)	Ethinyl Estradiol per Dose ( $\mu\text{g}$ )	Levonorgestrel per Dose (mg)
Ella	Ulipristal Acetate Pills		30		
	1 white pill	None			
Levonorgestrel	Progestin-only pills				1.5
	2 white pills	none			
Plan B one step	1 white pill	none		0	1.5
	Combined estrogen and progestin pills				
Levora	4 white pills	4 white pills		120	0.60
Lo/Ovral	4 white pills	4 white pills		120	0.60
Nordette	4 light orange	4 light orange		120	0.60
Seasonal	4 pink pills	4 pink pills		120	0.60

Adapted from <<http://ec.princeton.edu/>>; more options on the Web.

combined estrogen-progestin tablets (100–120  $\mu\text{g}$  ethinyl estradiol and 500–600  $\mu\text{g}$  levonorgestrel in each dose). Nausea and vomiting are common with the combined pill regimen, so antiemetic tablets may be prescribed to be taken 30 min before the second dose of oral contraceptive. Mifepristone (RU-486) is an antiprogestone drug that can be used for EC in lower doses than used for medical abortion. It prevents the release of an egg from the ovary and makes the uterine lining inhospitable to implantation. Studies have shown it to be more effective, safer, and with fewer side effects than either levonorgestrel or the combined pill regimen. It is available in Europe and China.

Worldwide, there is great variability in the availability of EC. If a woman loses her prescription or it is stolen, it would be important to advise her of the methods that might be available in the areas she is traveling. The Emergency Contraception Website (<http://ec.princeton.edu/>) has information on EC methods and a searchable database for options available worldwide. There also is an Emergency Contraception 24-hour hotline (1-888-NOT-2-LATE). If a traveler becomes pregnant and wishes to terminate the pregnancy, it may be best for her to return home. More than half of the 128 countries listed by the IPPF prohibit abortion except in extreme circumstances, such as rape and life-threatening illness.

### Sexually Transmitted Infections

Sexually transmitted infections (STIs) are of special importance to women due to gender-related pathophysiology that leads to an increased rate of transmission from an infected male to an uninfected female. In addition, women suffer more serious sequelae from a sexually transmitted disease, such as pelvic inflammatory disease or infertility, than do men.

To prevent STIs, one should avoid casual sex or practice safe sex by using condoms, regardless of concomitant use of another method of birth control. High-quality latex condoms are an essential part of the personal medical kit of adult travelers, regardless of gender and whether or not sexual activity during travel is planned or unplanned. A female condom made out of polyurethane is an effective alternative for persons allergic to latex. Travelers may be provided with an information card or sheet summarizing STI signs and symptoms for use in self-diagnosis and possible treatment if remote from professional medical care. One resource is the sexual health website at the Centers for Disease Control and

Prevention (CDC; [www.cdc.gov/sexualhealth/](http://www.cdc.gov/sexualhealth/)). Women travelers should be informed about the availability of antiretroviral drugs and their use in post-exposure human immunodeficiency virus (HIV) prophylaxis (termed non-occupational post-exposure prophylaxis [NPEP]) following a high-risk sexual exposure or sexual assault. The rate of HIV transmission from an infected male to an uninfected female is estimated to be equivalent to a high-risk needle stick. Thus, NPEP should be started preferably within 1 hour and no later than 72 hours after a high-risk exposure.

In certain cases, a woman traveler may be given an NPEP “starter kit” of a 3- to 5-day supply of antiviral drugs. This can be used in an emergency until the situation can be further evaluated and/or more medication can be obtained. As the drugs can be associated with significant adverse effects, ongoing NPEP treatment should be administered under medical supervision. These medications are not available in most developing countries.

### Gynecologic Concerns at Altitude

Women taking oral contraceptives may continue them at moderate altitudes (<3600 m, or 12,000 ft), since the risk of pregnancy may be greater than the risk of thrombosis. Women on oral contraceptives have a higher risk of deep vein thrombosis (DVT)/pulmonary embolism (PE) at any altitude, estimated to be about 5/100,000. Pregnancy increases the risk of DVT/PE 12-fold to about 60/100,000. Women on oral contraceptives should be advised to consider other contraceptives for extended stays at very high altitudes (>5500 m), because of a theoretical increased risk of thrombosis and PE.

### TRAVEL DURING PREGNANCY

Pregnant women of all ages and at all stages of pregnancy travel for business, professional, and personal reasons. First, the past medical and obstetric history should be reviewed with the woman in conjunction with her obstetrician (Table 14.5). Travel during the last month of pregnancy and travel that may pose a serious risk to the mother or the fetus should be avoided. Possible risk factors and potential contraindications to travel are listed in Table 14.6. If a woman has had a previous adverse pregnancy outcome or has had a difficult time becoming pregnant and is in her late 30s or 40s, she should weigh the possible risks with particular caution.

The complete itinerary should be evaluated with attention to the quality of medical care possible both during transit and at the final destination. Access to high-quality care during travel is essential in case of pre-term labor or an unexpected complication of pregnancy. The itinerary should also be reviewed for possible risks of exposure to certain infections, for example, chloroquine-resistant *Plasmodium falciparum* malaria, hepatitis E, typhoid, amebiasis, influenza, polio, and yellow fever, as these travel-associated diseases may have more severe or even fatal complications in a pregnant woman because of her altered immune status during pregnancy compared with a nonpregnant individual. In addition, there are special considerations concerning the use of malaria chemoprophylactic drugs and certain immunizations during pregnancy. The potential exposure to specific health risks may be improved by adjusting certain destinations and activities on the trip route.

It is important for a woman to check her health insurance plan regarding coverage. Many plans do not cover pregnant women overseas, and many have gestation cutoff dates for travel beyond which they will not cover delivery out of the area. She may have to buy additional coverage and emergency evacuation insurance. All pregnant travelers should carry a copy of their medical records (including current gestational age, expected date of delivery, blood type and Rh, and a copy of fetal ultrasound report) in case of emergency.

### Basic Questions to Answer When Counseling Pregnant Women

Pregnant women anticipating travel to remote places need to have the following questions answered before confirming their itinerary:

1. What medical, obstetric, social, and demographic risks are associated with travel?
2. Are the required and recommended immunizations for the itinerary safe in pregnancy?

**TABLE 14.5 Pre-Travel Evaluation for Pregnant Woman**

Step	Content
History	Review past medical and past obstetric and gynecologic history
Physical examination	Obstetrician to assess gestational age, fetal growth performance, coexistent medical, obstetric, social, and demographic risks
Laboratory tests	Ultrasound Serology for hepatitis A and B, E, CMV, measles, rubella, varicella, and toxoplasmosis, depending on history
Review planned itinerary	Access to care OB/GYN care during transit and at destination Health insurance coverage Evacuation insurance Risk/benefit analysis for mother and fetus for exposure to: Infectious disease: usual and exotic Recommended immunizations Recommended chemoprophylaxis against malaria Risk of treatment if acquire the disease along itinerary Environmental risks Water/food Transportation Insects Altitude Scuba diving Pollution Heat Sports activity Other
Specific recommendations	Immunizations Environmental risks Transportation Insects Water/food Altitude Self-treatment measures for minor complaints (nausea, bloating, reflux, urinary frequency, hemorrhoids, pedal edema, other) Review emergency signs and symptoms Medical kit: see <a href="#">Chapter 1</a> Carry copy of medical history including blood type and Rh factor, ultrasound results, and other pertinent data

CMV, Cytomegalovirus; OB/GYN, obstetric/gynecologic.

3. What drugs against malaria and other parasitic illnesses are safe in pregnancy?
4. What prophylactic or therapeutic measures against traveler's diarrhea are safe in pregnancy?
5. What medical services are available in the area(s) of destination?
6. What does her health insurance cover if she is out of area for delivery or pregnancy-related complications?
7. What are signs of serious pregnancy-related illness for which emergency medical help should be sought?

**TABLE 14.6 Potential Contraindications for Travel during Pregnancy**

Absolute contraindications	Relative contraindications
Abruptio placentae	Abnormal presentation
Active labor	Fetal growth restriction
Incompetent cervix	History of infertility
Premature labor	History of miscarriage or ectopic pregnancy
Premature rupture of membranes	Maternal age <15 or >35
Suspected ectopic pregnancy	Multiple gestation
Threatened abortion, vaginal bleeding	Placenta previa or other placental abnormality
Toxemia, past or present	Medical conditions: heart disease, diabetes, lung disease, thrombosis, kidney disease, other systemic illnesses
<b>Destination risk considerations</b>	Postpone travel if risks outweigh benefits.
Malaria	
Outbreak of disease requiring live vaccine	
Outbreak of a disease for which no vaccine is available but there is a high risk of fetal and maternal morbidity	
Medical services during transit and at destination	
Environmental risk considerations: altitude, heat, water, other	

Adapted from: Centers for Disease Control and Prevention. CDC Health Information for International Travel 2016. New York: Oxford University Press; 2016.

8. What are some general guidelines to follow for the medical management of illness that will safeguard the pregnant woman and her fetus?

Cultural aspects of traveling while pregnant or nursing should also be researched prior to travel. Customs vary in different cultures. Breast feeding an infant in public areas may not be allowed in some cultures.

## Transportation Risks during Pregnancy

### Airlines

Airline policies regarding pregnancy and flying vary, so it is best to check with them when booking a flight. Some may require medical forms to be completed. Most airlines do not allow pregnant women to travel if they are at more than 35–36 weeks' gestation without a letter from a physician. Commercial aircraft cruising at high altitudes are able to pressurize only to 5000–8000 ft (1524–2438 m) above sea level. Women with moderate anemia (Hgb <8.5 g/dL) or with a compromised oxygen saturation may need oxygen supplementation. The fetal circulation and fetal hemoglobin protects the fetus against desaturation during air flight (see Chapter 4).

Certain precautions should be taken by pregnant women during flight. During pregnancy, alterations in clotting factors and venous dilation predispose these women to superficial and deep thrombophlebitis, or "economy class syndrome." Pregnant women have a rate of acute iliofemoral venous thrombosis that is six times more frequent than that of nonpregnant women. Contributing factors to this risk may be (1) compression on the inferior vena cava and iliac veins by the enlarged uterus and/or (2) an increase in the coagulation factors and fibrinolysis inhibitors. The pregnant traveler should request an aisle seat and should walk in the aisles at least once every 30 min during long airplane flights, whenever it is safe to do so, to increase the circulation. General stretching and isometric leg exercises should be encouraged on long flights.

The low humidity of pressurized flights leads to significant insensible water loss. The humidity in cabins is low. Hydration is crucial for placental blood flow. Women should be encouraged to drink non-alcoholic beverages. Seat belts should be worn low around the pelvis and should be worn throughout the flight.

Intestinal gas expansion can be particularly uncomfortable for the pregnant traveler. She should avoid gas-producing foods and airline food. Women should bring their own healthy snacks and bottled water.

Jet lag is an important phenomenon for travelers heading eastward over several time zones. Pharmacologic therapy for jet lag is not recommended during pregnancy. Pregnant women should get enough fluids, food, and rest whether or not they use planned schedules to avoid jet lag. A program of daily exercise and alteration of sleep pattern that can minimize disturbances in circadian rhythm and mentation that occur as a result of jet lag are recommended. Melatonin has not been found to cause toxicity during pregnancy, but it has not been well studied.

Radiation exposure during airport security is minimal and has not been found to increase adverse outcomes. These are magnetometers and are not harmful to the fetus.

### *Automobile Travel*

A pregnant woman should not sit for prolonged periods when traveling in an automobile or bus because of the risk of venous stasis and thromboembolism. Varicose veins of the perineum and legs are also common pregnancy-related problems exacerbated by prolonged sitting or a supine posture. Thus, pregnant women should wear elastic hose and avoid prolonged periods of immobilization. The usual recommendation is driving for a maximum of 6 hours/day, stopping at least every 1-2 hours for 10 minutes, to walk and increase venous return from the legs.

Motor vehicle accidents account for most severe blunt trauma to pregnant women. The American College of Obstetricians and Gynecologists (ACOG) has recommended that pregnant women wear three-point restraints when riding in automobiles. Travelers should be warned that in many parts of the world, taxicabs and other automobiles and buses do not have safety restraints.

### *Sea Travel*

Most cruise liners will carry pregnant women up to the seventh month of pregnancy and have reasonably well-equipped medical facilities aboard. A woman should research the availability of medical care, equipment, and trained personnel on board. Lack of access to medical care may be an issue on sailboats operated by smaller tour companies or on self-designed tours. One of the main health risks during sea travel is the exacerbation of nausea and vomiting associated with pregnancy. Caution must be observed when walking on deck to avoid accidents caused by the motion of the ship and the general imbalance imposed by pregnancy.

### **FDA Use-in-Pregnancy Ratings**

The FDA has established a system that classifies drugs on the basis of data from humans and animals, ranging from class A drugs, which are designed as safe during pregnancy, to class X drugs, which are contraindicated in pregnancy because of proven teratogenicity. The system has resulted in ambiguous statements that not only may be difficult for physicians to interpret and use for counseling but may cause anxiety among women. It is also been found that the classification is not updated when new data are available.

Category A	Adequate and well-controlled studies in women show no risk to the fetus.
Category B	No evidence of risk in humans. Either studies in animals show risk but human findings do not or, in the absence of human studies, animal findings are negative.

- Category C Risk cannot be ruled out. No adequate and well-controlled studies in humans, or animal studies are either positive for fetal risk or lacking as well. Drugs should be given only if the potential benefit justifies the potential risk to the fetus.
- Category D There is positive evidence of human fetal risk. Nevertheless, potential benefits may outweigh potential risks.
- Category X Contraindicated in pregnancy. Studies in animals or humans or investigations or post-marketing reports have shown fetal risk that far outweighs any potential benefit to the patient.

The Teratology Society has proposed that the FDA abandon the current classification in terms of more meaningful, evidence-based narrative statements. Other countries, such as Sweden, Australia, the Netherlands, Switzerland, and Denmark, have different classification systems based on a hierarchy of estimated fetal risk.

All clinicians advising pregnant travelers should have access to references such as *Drugs in Pregnancy and Lactation* by Briggs et al. (2011) and online sources such as the Organization of Teratology Information Services (<http://otispregnancy.org/>) and the Teratogen Information Service (<http://depts.washington.edu/~terisweb/teris/>). The clinician must help the pregnant woman to weigh the risk to benefit ratio of travel on both the developing fetus and maternal health. This includes evaluating the risks for the woman or her fetus with regard to the recommended immunizations, need for chemoprophylaxis, and exposure to malaria, traveler's diarrhea, or other parasitic and infectious diseases and environmental concerns. If the women must travel, physicians and other health practitioners involved in travel advice should be aware of the following guidelines and precautions that will help to ensure the safety of the mother and her unborn traveler.

### Travel Vaccines for Women

Recommendations, cautions, and contraindications regarding vaccines may change depending on a woman's life stage. Ideally, women who are planning pregnancy should consider pre-conceptual immunization to prevent disease in their offspring. It is estimated that over 50% of all pregnancies are unplanned, so it makes sense to update the travel and routine immunization status of all women on a regular basis. If a woman receives a live virus vaccine, she should defer pregnancy for at least 4 weeks due to the theoretical risk of transmission to the fetus. If a woman receives a live virus vaccine and later finds out she is pregnant, it is not an indication to terminate the pregnancy. Vaccine registries collecting post-exposure data have found no increase in fetal anomalies in pregnant women inadvertently vaccinated with a live virus vaccine to date. Breast feeding is not a contraindication to vaccination. Post partum is an ideal time to update any vaccinations a woman may need.

### Vaccination during Pregnancy

The risk to benefit ratio of each immunization should be carefully reviewed with regard to its potential effect on the fetus versus risk of contacting the actual disease and its subsequent effect on the mother or fetus. Vaccination during pregnancy usually outweighs any theoretical risk of the vaccine when the risk of exposure to the disease is high. Ideally, vaccination should be avoided in women during the first trimester, owing to uncertain effects on the developing fetus. The presence of protective serum antibodies against hepatitis A, hepatitis B, varicella, measles, and rubella could be checked to assess the traveler's susceptibility ([www.cdc.gov/vaccines/adults/rec-vac/pregnant.html](http://www.cdc.gov/vaccines/adults/rec-vac/pregnant.html)).

Toxoid vaccines, such as tetanus, diphtheria, and pertussis vaccines; inactivated vaccines, such as inactivated polio vaccine, inactivated typhoid vaccine, hepatitis A and hepatitis B vaccines, viral influenza vaccine, and rabies vaccine; and polysaccharide vaccines such as meningococcal and pneumococcal vaccines are all probably safe in pregnancy, as well as immune globulin or specific globulin preparations. These vaccines are classified as Pregnancy

Category B or C because there are insufficient scientific data to evaluate the safety and use of these vaccines in pregnancy. Indications for vaccination during pregnancy are listed in **Table 14.5**.

Live, attenuated-virus vaccines are generally contraindicated in pregnant women or those likely to become pregnant within the next month after receiving vaccine(s). Measles, mumps, rubella and varicella vaccines are absolutely contraindicated during pregnancy. Yellow fever and Japanese encephalitis vaccine may be given if high-risk exposure is unavoidable, because the theoretical risks of the vaccine are outweighed by the potential risks of the actual disease on the mother and/or fetus.

Certain travel vaccines are discussed next in the context of the pregnant traveler. The reader should consult Chapter 5 for a detailed review of vaccines for travelers.

### *Cholera*

Two oral vaccines are available outside the United States: Dukoral ([www.crucell.com](http://www.crucell.com)) and Shancol ([www.shanhbiotect.com](http://www.shanhbiotect.com)). Because cholera during pregnancy is a serious illness due to the effects of dehydration, exposure during pregnancy should be minimized whenever possible.

### *Hepatitis A Vaccine*

Hepatitis A virus (HAV) infection of the mother is not associated with perinatal transmission; however, placental abruption and premature delivery of an infected infant have been reported during acute HAV infection. The safety and efficacy of the inactivated hepatitis A vaccines in pregnant women have not been established, and the vaccine is classified as FDA pregnancy category C by the manufacturer. Because this is not a live virus vaccine, the main concern is a febrile response. If a high-risk itinerary is planned, hepatitis A vaccine or immune globulin should be given. Serology should be checked before travel if the patient has lived in or was born in a developing country.

### *Hepatitis B Vaccine*

Hepatitis B virus (HBV) vaccine is recommended for a pregnant woman if she is a long-term traveler planning delivery overseas, if there is a possibility she will be sexually active with a new partner, or if she is working in a healthcare clinic, refugee camp, or similar setting. HBV vaccine should be considered in all sexually active women including pregnant women visiting areas where blood is not routinely screened for hepatitis B. Hemorrhage after miscarriage or delivery could require transfusion with possibly infected blood. If the mother carries the hepatitis B surface antigen or e-antigen, the newborn should receive the HBV vaccine and hyperimmune globulin at birth. The recombinant (inactivated) HBV vaccine series can be administered to pregnant women who are at risk, preferably after the first trimester. Immunization for HBV also prevents hepatitis D.

### *Hepatitis A/B Combination Vaccine*

No data in pregnancy. May be considered if indicated.

### *HPV Vaccine*

Human papilloma virus (HPV) lesions in the genital area can proliferate during pregnancy and may be transmitted to the fetus during delivery. Data on the quadrivalent HPV vaccine are limited, and it is not recommended during pregnancy. Women should be encouraged to get vaccinated prior to pregnancy. Lactating women may receive HPV vaccine.

### *Japanese Encephalitis Vaccine*

Relatively little is known about the risk of Japanese encephalitis (JE) virus acquired in pregnancy and the consequences of intrauterine infection; however, infection acquired during the first two trimesters has resulted in miscarriage. The safety of the currently available JE vaccines in pregnant women has not been determined. If travel to an at-risk area is not mandatory, travel should be delayed. The natural reservoirs for JE include pigs and aquatic birds; infections are transmitted by mosquitoes. Precautions for all travelers to

JE-endemic areas include prevention of mosquito bites and avoiding travel to rural agricultural areas where pig farming and rice paddies are present.

### *Meningococcal Vaccines*

Immunization against meningococcal disease is required for travelers to Saudi Arabia during the Hajj and is recommended for travelers to high-risk areas, including the sub-Saharan African epidemic belt for meningococcal disease from December through June, or to epidemic foci such as Kenya, Uganda, Tanzania, Nepal, and India year round. Pregnancy is not a contraindication. The quadrivalent meningococcal conjugate vaccine (MCV4) against serogroups A, C, Y, and W-135 is safe and immunogenic among nonpregnant women 11-55 years of age, but no data are yet available on the safety of MCV4 during pregnancy. It may be used if clearly indicated. If a pregnant woman received MCV4, she should be registered with the pregnancy registry (800-822-2463). Studies of vaccination during pregnancy with the quadrivalent (A, C, Y, W-135) meningococcal polysaccharide vaccines (MPSV4) have not documented adverse effects. In a number of other countries, a bivalent meningococcal vaccine against serogroups A and C is commonly used. An A/C bivalent vaccine has been evaluated in pregnant women and infants during an epidemic of meningitis in Brazil and appeared to be safe. Meningitis B vaccines may be used in pregnancy and breast feeding if clearly indicated in outbreak situations

### *Polio*

The pregnant traveler needs adequate protection against polio. Paralytic disease may occur with greater frequency when infection develops during pregnancy. Anoxic fetal damage with maternal poliomyelitis has been reported. There is a 50% mortality rate in neonatal disease contracted transplacentally during the third trimester. If the traveler has received the primary immunization and the last dose was within 10 years, she is considered protected (although some experts would recommend a booster within 5 years of traveling to a highly endemic area). The inactivated polio vaccine is recommended for adult travelers including pregnant women who need primary immunization or a booster dose for travel to endemic areas. Oral polio vaccine may be administered if inactivated polio vaccine is not available in a high-risk situation. Several thousand pregnant women in Finland received the oral polio immunization during a nationwide immunization campaign, and there was no increase in the occurrence of congenital malformations.

### *Rabies Vaccines (Diploid Cell Culture)*

Rabies vaccine may be given during pregnancy for pre-exposure or post-exposure prophylaxis. A recent review of the literature found 24 cases of pregnant women exposed to rabid animal bites. The exposures occurred during all trimesters. The women received equine rabies immune globulin and Vero cell vaccine or duck embryo vaccine. Among the infants, two were born prematurely and there was one spontaneous abortion. There were no physical or mental abnormalities except in a case described where the child did well after surgical repair of transposition of the great vessels. In this case, the bite occurred after the heart would have been formed embryologically, so the congenital malformation was not thought to be vaccine related.

Vaccination pre-exposure or post-exposure to rabies is considered safe with modern tissue culture-derived rabies vaccine products. If a woman is at high risk or visiting an endemic country for >30 days, she can receive pre-exposure vaccination. Post-exposure vaccination should be administered as soon as possible after a scratch or bite of an infected mammal, including monkeys and bats. In a mother with rabies, a viable infant should be delivered as soon as possible and given rabies hyperimmune globulin and the post-exposure vaccine regimen.

### *Tetanus, Diphtheria (Td) and Tetanus, Diphtheria, and Pertussis (Tdap) Vaccines*

Immunization with Td and Tdap is safe in pregnant women. Tdap allows high levels of antibody to be transferred to newborns during the first 2 months of life when the morbidity



and mortality from pertussis infection in infants is the highest. Pregnant women at 26 weeks of pregnancy or later should be encouraged to receive a dose of pertussis-containing vaccine such as Tdap.

### *Typhoid Vaccines*

Two vaccines are available for the prevention of typhoid. Information is not available on the safety of either of these vaccines during pregnancy. The Vi capsular polysaccharide parenteral vaccine is recommended during pregnancy only if clearly indicated. The live-attenuated Ty21A bacterial oral vaccine is not recommended on theoretical grounds.

### *Varicella*

Varicella during pregnancy can lead to severe maternal illness, and it appears to be five times more likely to be fatal than in nonpregnant women. Varicella infection during pregnancy usually leads to birth of a healthy infant; however, in utero infection may lead to congenital abnormalities or severe varicella of the newborn.

Post-exposure prophylaxis of varicella is indicated for pregnant women with a history of varicella exposure. VariZIG is a purified immune globulin made from plasma containing high levels of antiviral antibodies (immunoglobulin class G [IgG]). If a woman is given VariZIG prophylaxis, she should also receive the varicella vaccine 5 months later, to assure immunity. If a pregnant woman exposed to varicella cannot receive VariZIG or immune globulin within 96 hours, treatment with acyclovir could be considered. VariZIG may be obtained by calling 800-843-7477 or online at <http://www.ffenterprises.com>.

### *Yellow Fever*

YF vaccine is a live virus vaccine and should not be given routinely to pregnant women. If a pregnant woman is traveling to an endemic area of very low risk and a certificate of yellow fever vaccination is required by the destination country, an official letter of waiver will meet the requirement (in lieu of actual vaccination) according to WHO regulations. If travel to a YF high-risk endemic area is necessary, the benefits of the vaccine are thought to outweigh the small theoretical risk to the fetus and the mother, and the vaccine should be given.

There are some conflicting data on the immunogenicity of the YF vaccine during pregnancy. The YF vaccine (17d vaccine) was administered to 101 pregnant women during the 1986-1987 outbreaks in Nigeria without any untoward effects to the fetus or the mother. Antibody responses of pregnant women and mothers who were vaccinated mainly during the last trimester were much lower than those of nonpregnant women vaccinated with YF in a comparable control group.

A more recent study has demonstrated a better immune response to the YF vaccine during pregnancy. The YF vaccine was given to 480 pregnant women at a mean of 5.7 weeks' gestation during a mass campaign in Brazil 2000. After a minimum of 6 weeks, 98.2% were IgG positive. Thus, the seroconversion rate for pregnant women to the YF vaccine was found to be 98% (425/433 pregnant women immunized early in pregnancy). Maternal seroconversion to the YF vaccine given during the first trimester did not appear to cause malformations.

There are a number of registries that are collecting outcome data on women exposed to certain vaccines during pregnancy. Thus, women who receive vaccination during pregnancy should be registered with the appropriate registry in order to develop more data on the safety of a vaccination during pregnancy.

### **Vector-Borne Diseases during Pregnancy**

Personal protection measures to prevent vector-borne diseases are important during pregnancy, because some of these illnesses may have a more accelerated course during pregnancy. Mosquitoes have been found to be more attracted to pregnant women. Thus, it is imperative that pregnant travelers wear clothing that covers most of their body, apply permethrin to clothes and bed nets, and be meticulous about applying DEET-containing repellents to exposed skin. Use of insect repellents is reviewed in Chapter 6.

### Malaria Chemoprophylaxis in Pregnancy

Prevention of malaria in travelers, including pregnant women, is discussed in detail in Chapter 6. In brief, the weekly doses of chloroquine phosphate used for chemoprophylaxis of chloroquine-sensitive strains of malaria appear to be safe during pregnancy. Chorioretinitis has been reported in newborns of mothers given daily doses of chloroquine and is a theoretical risk.

The chemoprophylaxis of malaria in areas where chloroquine-resistant malaria is present is more of a problem for the pregnant traveler, because of concerns about the safety of the other antimalarial drugs with regard to fetal growth and development. The CDC has issued a statement that mefloquine can be used in all trimesters for malaria prophylaxis and for treatment of malaria. Doxycycline is contraindicated due to teratogenic effects on the fetus. Primaquine is contraindicated as the fetus cannot be screened for glucose 6-phosphate dehydrogenase deficiency. Atovaquone-proguanil is not recommended because of the lack of safety data. (See Chapter 6 for a detailed consideration of alternative chemoprophylactic regimens for chloroquine-resistant *P. falciparum* malaria.)

Treatment of diagnosed malaria during pregnancy is indicated because the potential adverse effects of the antimalarial drugs to the mother and fetus are far outweighed by the potential morbidity and mortality of untreated malaria. Maternal malaria can cause profound anemia, predispose to serious intercurrent illness, cause intrauterine infection and placental insufficiency, and contribute to intrauterine growth retardation, prematurity, low-birth weight, abortion, and stillbirth. (The treatment of malaria is discussed in detail in Chapter 6.)

### Prevention of Traveler's Diarrhea during Pregnancy

Antimicrobial prophylactic therapy is not recommended for prevention of traveler's diarrhea. Preventive measures include boiling water or purifying it chemically, drinking only bottled carbonated water, bottled or canned fruit juices or soft drinks, and hot liquids; and avoiding ice, salads, and raw vegetables. The iodine-based methods of chemical water purification (Chapter 7) by a pregnant woman could result in adverse effects on the fetal thyroid gland and are not recommended.

Treatment of traveler's diarrhea is challenging. The typical illness causes 4-5 days of watery diarrhea and is self-limited but can lead to significant weakness and malaise in both the pregnant and nonpregnant traveler. Bismuth subsalicylate (Pepto-Bismol) is not recommended during pregnancy. Bismuth in large doses is a known teratogen in sheep, and in humans salicylates have been both teratogenic and the cause of fetal bleeds throughout pregnancy. The antiperistaltic medications loperamide and diphenoxylate have been used without complication in pregnant women and are not known teratogens. Diphenoxylate has a known narcotic-like effect, and loperamide a theoretical one, which could cause respiratory depression if given to the mother in high doses toward term. Both these antiperistaltic agents should be used with caution for control of frequent watery diarrhea and intestinal cramps in the traveler.

The usual antibiotic of choice for treatment of traveler's diarrhea is one of the fluoroquinolones; however, these have been contraindicated during pregnancy because of an association with fetal cartilage abnormalities in animal studies. The FDA has approved ciprofloxacin for use in pregnant and lactating women for anthrax prophylaxis. More data are needed. Some travel medicine clinicians will consider the use of ciprofloxacin for pregnant women for short-term use if indicated in the second or third trimester.

The best option for use in pregnancy for the treatment of enteric pathogens is azithromycin (Zithromax). Third-generation cephalosporins may also be considered. Doxycycline is thought to stain both fetal teeth and bones and is contraindicated in pregnant women and neonates. Rifaximin is non-absorbed; however, there are insufficient data to make an assessment regarding its safety during pregnancy.

In summary, it appears that the safest course for pregnant women is to take all preventive measures possible, and if diarrhea occurs, to have with them a supply of loperamide, oral

rehydration solution (see Chapter 8), azithromycin, and a cephalosporin. If fever or bloody diarrhea occurs, immediate medical care should be sought.

### Other Parasitic Diseases

All travelers can decrease the risk of acquiring parasitic infections in tropical areas by following general insect precautions (Chapter 6), by selecting safe food and water, and by wearing shoes in rural areas (Chapters 7 and 45).

The effects of parasitic disease, including protozoan, nematode, trematode, and cestode infections, on pregnancy and the fetus are summarized in **Table 14.7**. There are no absolutely safe antiparasitic drugs for use during pregnancy. Decisions for medical intervention must be made on the basis of serious risk to either fetal or maternal health by the disease itself. It is important to note that in the case of mild infection (light parasite loads), it is best to delay treatment until the postpartum period.

### Other Infections

Hepatitis E virus (HEV) is a major cause of hepatitis in Nepal, India, Burma, Pakistan, China, and Africa. Transmission of the virus occurs through fecal–oral exposure. HEV acquired during pregnancy has a particularly high fatality rate of 15–30%. The reasons why

**TABLE 14.7 Potential Effects of Parasitic Infections on Reproduction<sup>a</sup>**

Parasitic Infections	Impaired Fertility	Failure to Carry to Term	Fetal Infection
Protozoans			
<i>Entamoeba histolytica</i>	X	X	X
<i>Giardia lamblia</i>	X	X	X
<i>Leishmania</i> species	X	X	X
<i>Plasmodium</i> species (malaria)	X	X	X
<i>Trypanosoma</i> species	X	X	X
<i>Toxoplasma gondii</i>		X	X
<i>Pneumocystis carinii</i>		X	X
Intestinal nematodes			
<i>Ascaris lumbricoides</i>	X	X	X
<i>Enterobius vermicularis</i> (pinworm)	X		
<i>Trichuris trichiura</i> (whipworm)			
Hookworm species	X	X	X
Extraintestinal nematodes			
<i>Strongyloides stercoralis</i>	X	X	
<i>Trichinella spiralis</i>	X	X	X
<i>Filaria</i> species	X	X	X
Trematodes			
<i>Schistosoma</i> species	X	X	
<i>Clonorchis sinensis</i>	X	X	
<i>Paragonimus westermani</i>	X	X	
Cestodes			
<i>Echinococcus</i> species	X	X	
<i>Taenia</i> species	X	X	

<sup>a</sup>See text for discussion.

Adapted from MacLeod, C.L., Lee, R.V., 1988. In: Burrow, G.N., Ferris, T.F. (Eds.), 2013. Medical Complications during Pregnancy, second ed. Saunders, Philadelphia.

the infection is more severe in pregnancy are not known. Prevention of HEV is dependent on strict food and water precautions. Pregnant women should avoid travel to areas with known outbreaks of HEV (Chapter 22).

*Toxoplasma gondii* is an intracellular coccidian parasite found throughout the world. Infection is spread through the ingestion of oocysts in undercooked meat, exposure through handling cat litter, and consumption of foodstuffs contaminated with oocysts. The most important factor is eating raw or undercooked meat. Cats excrete up to 10 million oocytes a day post-infection. Oocytes become infective 1-5 days after excretion and are spread by surface water. Oocytes can survive up to 1 year. Thus, contact with soil and water and eating undercooked meat are greater risk factors than exposure to cats. Fetal infection occurs as a result of primary maternal infection. Infection acquired prior to conception is not a risk to the fetus. The risk during pregnancy is that the infection will cross the placenta and cause spontaneous abortion, stillbirth, hydrops fetalis, or congenital infection. Preventative measures are important: pregnant women should avoid contact with cat feces, wear gloves when gardening, avoid eating raw or undercooked meat, and wash vegetables and salads thoroughly.

### Exercise

For a woman with a normal pregnancy, there are no known contraindications to exercise. Pregnant women may plan to trek at altitude, ski, or go on extended bicycle trips. The ACOG guidelines state that pregnant women should tailor their exercise to their needs and abilities. The woman should exercise within a comfort zone. If the woman is healthy and accustomed to vigorous exercise, there is no reason that she cannot exceed the ACOG guidelines as long as she does not become hyperthermic, hypoglycemic, or dehydrated. In general, a pregnant woman should avoid any vigorous physical activities that she did not regularly participate in before pregnancy. Limitations and/or contraindications to an exercise program during pregnancy would include any of the following: a history of spontaneous abortion or miscarriage, premature labor, multiple gestation, incompetent cervix, unusual bleeding, placenta previa, and severe cardiac or pulmonary disease.

Temperature control is important. In general, a pregnant woman should avoid extreme exercise in hot and humid climates because of the possible effect of raising the maternal and fetal temperature. The concern is an increase in neural tube defects. Hot tubs and saunas should be avoided for the same reason.

The effects of altitude are discussed in Chapter 10. A medical commission from the International Climbing and Mountaineering Federation (UIAA) reviewed the research to date on women and altitude and in 2008 published a consensus paper as well as official recommendations at their website ([www.theuiaa.org](http://www.theuiaa.org)). There are limited studies on short-term exposure to altitude during pregnancy. Altitude-associated effects such as fetal growth retardation, pregnancy-induced hypertension, and neonatal hyperbilirubinemia have been documented in studies on permanent residents at altitude. Women with risk factors for pre-eclampsia or placental abruption or whose babies are at risk for intrauterine growth retardation should not go to high altitude. A healthy, non-acclimatized, sedentary pregnant woman should not exceed an altitude of 2500 m (8250 ft) during the first few days of a short-altitude exposure and should allow a few days to acclimatize before exercising. A woman with a normal pregnancy may have no contraindication to short-term moderate exercise at 2500-3600 m (8000-12,000 ft) after acclimatizing for 2-3 days. Exercise may cause fetal hypoxia or pre-term labor at high altitude if competition occurs for blood supply between the skeletal muscles and the already compromised uteroplacental junction. Elite athletes, skiers, and mountain climbers should discuss their risk with their personal physicians. Pregnancy may increase a woman's risk of injury during sport-related activities due to a change in the center of gravity and joint laxity. Access to emergency care should also be considered when planning skiing or hiking activities in mountain areas.

There is no difference in the incidence of acute mountain sickness (AMS) between pregnant and nonpregnant women. There are few data on the treatment of AMS during

pregnancy. Strict guidelines for acclimatization should be followed to prevent AMS. Acetazolamide and other sulfonamides are contraindicated during the first trimester due to animal studies demonstrating teratogenicity and, after 36 weeks, due to a risk of neonatal jaundice. If a pregnant woman has symptoms of AMS, the risks of the medication must be weighed against the symptoms. Descent and oxygen are preferred treatment. Use of acetazolamide or dexamethasone may be considered on an individual basis.

Scuba diving during pregnancy is absolutely contraindicated, since the fetus is at risk from nitrogen bubbles and gas embolism in the fetal placental circulation during decompression on ascent. If a woman inadvertently completes a dive before she knows she is pregnant, the present evidence is not to recommend an abortion, since normal pregnancies have been documented. Snorkeling can be practiced during pregnancy. Water skiing or other water sports that might force water and air in the vagina or injure the uterus are contraindicated for all pregnant women.

### Medical Service Available in the Area of Destination

Travel during the last 4 weeks of pregnancy should be limited to travel that is absolutely necessary, to avoid delivery in an unfamiliar hospital without medical records. Domestic airline regulations stipulate that no travel at >36 weeks' gestation is allowed, and most foreign airlines have a cut-off point of 35 weeks' gestation. In addition, a note signed by the patient's physician specifying the expected date of confinement is required by most airlines. Pregnant travelers should ask their doctors for referral to colleagues in the destination countries. Listings of medical services available can be obtained from some travel agencies and airlines. A list of English-speaking physicians around the world is available from the International Association of Medical Assistance to Travelers.

### Health Insurance Coverage When Out of Area

Each health insurance company has different stipulations about coverage when out of area. Many have gestational-date cut-offs for travel, beyond which they will not cover delivery out of area, and this information should be ascertained during trip planning, a long way in advance of departure.

### Signs of Serious Pregnancy-Related Illness for Which Emergency Medical Help Should be Sought

These signs and symptoms should be learned before departure. Travel should be avoided, particularly in the last trimester, if multiple births are expected or if there is a history of pregnancy-induced hypertension or bleeding. Home blood-pressure cuffs and urine dipsticks for urine sugar and protein should be carried by pregnant women traveling to remote places during the third trimester. Signs of serious pregnancy-related illness for which medical attention should be sought include:

1. Vaginal bleeding
2. Severe abdominal pain
3. Contractions
4. Hypertension
5. Proteinuria
6. Severe headache or visual complaints
7. Severe edema or accelerated weight gain
8. Suspected rupture of membranes.

### TRAVEL ISSUES AND BREAST FEEDING

A woman should be encouraged to travel with her nursing infant. Nursing reduces the risk of many enteric diseases in the infant. Resource information to facilitate travel with a nursing infant can be found in [Table 14.3](#).

Women who are breast feeding may safely receive all vaccinations. With the exception of attenuated rubella virus, strains of live virus are not known to be transmitted in breast

milk. Breast feeding is a precaution for the administration of YF vaccine due to at least three cases of YF vaccine neurologic disease in breast-fed infants.

There have been no large-scale, randomized clinical trials on the use of various medications during breast feeding. Most routinely prescribed medications are safe for use during breast feeding, but the clinician should check current sources on medication safety during pregnancy and breast feeding for new information.

The American Academy of Pediatrics publishes a list of drugs and chemicals that transfer into human milk ([www.aap.org](http://www.aap.org)). “Medications and Breastfeeding Mothers” (Thomas Hale; <http://neonatal.ttuhscc.edu/lact/>) reviews the basic physiology of lactation and the current data on the degree of transfer of medications into human milk, the effect on mother and infant, and the relative risks to the infant.

Drugs used for malaria chemoprophylaxis are all excreted into human milk in small amounts. The amount of these drugs is insufficient to protect the nursing infant, therefore the infant must be adequately protected with antimalarial medications (see Chapter 6).

Meticulous breast hygiene should be practiced by the nursing mother while traveling. The signs and symptoms of mastitis and methods of self-treatment should be reviewed, such as more frequent nursing and/or pumping, warm compresses, and an antistaphylococcal antibiotic, such as cephalexin, for self-treatment. She should be warned about the possibility of a drug-resistant infection such as methicillin-resistant *Staphylococcus aureus* and the need for further assessment if there is no prompt improvement of her symptoms with her self-treatment measures.

A woman traveling without her nursing infant will need to take measures to maintain her milk supply while she is traveling. This would include using an electric or a manual pump to express the milk on a schedule similar to her nursing infant and a consideration of the supplies needed for milk storage during travel and at destination. Milk may be pumped and discarded if adequate refrigeration is not available. Milk may be stored and transported in refrigeration or frozen in dry ice. Freshly expressed milk is safe for infant consumption for up to 6–8 hours at room temperature, or up to 72 hours if refrigerated.

## OLDER WOMEN TRAVELERS

Women are living longer, appear to look younger, and have more energy than their chronological age suggests, in spite of background medical problems. Breast cancer survivors have scaled major mountain peaks. Many octogenarians have free time and disposable income to trek in the Himalayas, kayak in the South Pacific, or volunteer in a refugee camp in Africa. There are data to support regular exercise and travel as being important to psychological health, well-being, and aging gracefully. Aging can also lead to a change in the response to immunizations, a change in metabolism of certain medications, and changes in response to environmental extremes.

Practical issues important to address with an older woman would be a history of osteoporosis and a risk for hip or other fractures. Risks for STIs and the need for hepatitis B (and A) vaccines and/or other health educational materials related to STIs should be discussed. Studies have shown that women over 50 do not always practice safe sex strategies and can be naïve about their risk for an STI. Symptoms related to the urinary tract, such as urgency, frequency, incontinence, dysuria, and more frequent UTIs, should be reviewed along with self-treatment measures and recommendations for helpful paraphernalia, such as female urinary directors, portable johns, and pads that could be included in the travel medical kit (Table 14.2).

Postmenopausal vaginal symptoms of vaginal dryness, discomfort, itchiness, and dyspareunia occur in 50% of older women. These symptoms can be treated with a vaginal moisturizer (Replens) and/or an estrogen preparation (cream, tablet, or ring). Pre-travel evaluations with an electrocardiogram, mammogram, and Pap smear are important prior to extended travel. Arranging medical and evacuation insurance is imperative.

Although there has not been much evidence-based research on travel medicine issues related to older women travelers, as the baby boomers age more data will be obtained.

**PERSONAL SECURITY AND SAFETY ISSUES**

All women should learn basic self-defense techniques before travel. Other advice might include the following: assess risks in new areas carefully, dress moderately and respect local customs, talk to other travelers, use common sense, and avoid walking in unknown areas at night. Individuals may carry pepper spray or a personal alarm to scare an assailant, depending on regulations at a destination.

**SUMMARY**

Pre-travel and post-travel evaluation of women should consider the life stage and lifestyle of the woman along with possible gender and age-related issues regarding the risks, prevention, and treatment of travel and tropical diseases. More research and data are needed in this area.