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Traveling Safely with Infants & Children

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OVERVIEW

The number of children who travel or live outside their home countries has increased dramatically. In 2016, an estimated 2.81 million international travelers from the United States were children or adults traveling with children. Although data about the incidence of pediatric illnesses associated with international travel are limited, the risks that children face while traveling are likely similar to those their parents face. However, children are less likely to receive pretravel advice. In a review of children with posttravel illnesses seen at clinics in the GeoSentinel Global Surveillance Network, only 51% of all children and 32% of the children visiting friends and relatives (VFRs) had received pretravel medical advice, compared with 59% of adults. The most commonly reported health problems among child travelers are as follows:

- Diarrheal illnesses
- Dermatologic conditions, including animal and arthropod bites, cutaneous larva migrans, and sunburn
- Systemic febrile illnesses, especially malaria
- Respiratory disorders

Motor vehicle and water-related injuries, including drowning, are also major health and safety concerns for child travelers.

In assessing a child who is planning international travel, clinicians should:

- Review routine childhood and travel-related vaccinations. The pretravel visit is an opportunity to ensure that children are up-to-date on routine vaccinations.
- Assess all anticipated travel-related activities.
- Provide preventive counseling and interventions tailored to specific risks, including special travel preparations and treatment that may be required for infants and children with underlying conditions, chronic diseases, or immunocompromising conditions. Adolescents traveling in a student group or program may require counseling about disease prevention and the risks of sexually transmitted infections, empiric treatment and management of common travel-related illnesses, sexual assault, and drug and alcohol use during international travel (see Chapter 9, Study Abroad & Other International Student Travel).
- Give special consideration to the risks of children who are VFR travelers in developing countries. Conditions may include increased risk of malaria, intestinal parasites, and tuberculosis.
- Consider counseling adults traveling with children and older children to take a course in basic first aid before travel.

DIARRHEA

Diarrhea and associated gastrointestinal illness are among the most common travel-related problems affecting children. Infants and children with diarrhea can become dehydrated more quickly than adults. The etiology of travelers' diarrhea (TD) in children is similar to that in adults (see Chapter 2, Travelers' Diarrhea).

Prevention

For infants, breastfeeding is the best way to reduce the risk of foodborne and waterborne illness. Infant formulas available abroad may not have the same nutritional composition or be held to the same safety standards as in the United States; parents feeding their child formula should consider whether they need to bring formula from home.

Water served to young children, including water used to prepare infant formula, should be disinfected (see Chapter 2, Water Disinfection). In some parts of the world, bottled water may also be contaminated and should be disinfected before consumption.

Similarly, food precautions should be followed diligently. Foods served to children should be cooked thoroughly and eaten while still hot; fruits eaten raw should be peeled by the caregiver immediately before consumption. Additionally, caution should be used with fresh dairy products, which may not be pasteurized and/or diluted with untreated water. For short trips, parents may want to bring a supply of safe snacks from home for times when children are hungry and available food may not be appealing or safe. See Chapter 2, Food & Water Precautions, for more information.

Scrupulous attention should be paid to handwashing and cleaning bottles, pacifiers, teething rings, and toys that fall to the floor or are handled by others; water used to clean these items should be potable. After diaper changes, parents should be particularly careful to wash hands well, especially for infants with diarrhea, to avoid spreading infection to themselves and other family members. When proper handwashing facilities are not available, an alcohol-based hand sanitizer (containing ≥60% alcohol) can be used as a disinfecting agent. However, because alcohol-based hand sanitizers are not effective against certain pathogens, hands should be washed with soap and water as soon as possible. Additionally, alcohol does not remove organic material; visibly soiled hands should be washed with soap and water.

Chemoprophylaxis with antibiotics is not generally used in children.

Treatment

ANTIEMETICS AND ANTIMOTILITY DRUGS

Because of potential side effects, antiemetics are generally not recommended for self- or family-administered treatment of children with vomiting and TD. Because of the association between salicylates and Reye syndrome, bismuth subsalicylate (BSS), the active ingredient in both Pepto-Bismol and Kaopectate, is not generally recommended to treat diarrhea in children aged <12 years. However, some clinicians use it off-label with caution in certain circumstances. Caution should be taken in administering BSS to children with viral infections, such as varicella or influenza, because of the risk for Reye syndrome. BSS is not recommended for children aged <3 years.

A Cochrane Collaboration Review of the use of antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents showed some benefits with ondansetron, metoclopramide, or dimenhydrinate. Recent guidelines from the Infectious Disease Society of America suggest that an antinausea and antiemetic medication (such as ondansetron) may be given to facilitate tolerance of oral rehydration in children >4 years of age and in adolescents with acute gastroenteritis. However, the routine use of these medications as part of self-treatment for emesis associated with TD in children has not yet been determined and is not generally recommended.

Antimotility drugs, such as loperamide and diphenoxylate, should generally not be given to children <18 years of age with acute diarrhea. Loperamide is not recommended for children aged <6 years. Diphenoxylate and atropine combination tablets are not recommended for children aged <2 years. These drugs should be used with caution in children because of potential side effects (see Chapter 2, Travelers' Diarrhea).

ANTIBIOTICS

Few data are available regarding empiric treatment of TD in children. The antimicrobial options for empiric treatment of TD in children are limited. In practice, when an antibiotic is indicated for moderate to severe diarrhea, some clinicians prescribe azithromycin as a single daily dose (10 mg/kg) for 3 days. Clinicians can prescribe unreconstituted azithromycin powder before travel, with instructions from the pharmacist for mixing it into an oral suspension if it becomes necessary to use it. Although resistance breakpoints have not yet been determined, elevated minimum inhibitory concentrations for azithromycin have been reported for some gastrointestinal pathogens. Therefore,

parents should be counseled to seek medical attention for their children if they do not improve after empiric treatment. Clinicians should review possible contraindications, such as QT prolongation and cardiac arrhythmias with azithromycin, before prescribing medications for empiric treatment of TD.

Although fluoroquinolones are frequently used for the empiric treatment of TD in adults, they are not approved by the Food and Drug Administration for this purpose among children aged <18 years because of cartilage damage seen in animal studies. The American Academy of Pediatrics suggests that fluoroquinolones be considered for the treatment of children with severe infections caused by multidrug-resistant strains of *Shigella* species, *Salmonella* species, *Vibrio cholerae*, or *Campylobacter jejuni*. Clinicians should be aware that fluoroquinolone resistance in gastrointestinal organisms has been reported from some countries, particularly in Asia. The use of fluoroquinolones has been associated with tendinopathies, development of *Clostridium difficil*e infection, and central nervous system side effects including confusion and hallucinations. Routine use of fluoroquinolones for prophylaxis or empiric treatment for TD among children is not recommended.

Rifaximin is approved for use in children aged ≥12 years but has limited use for empiric treatment since it is only approved to treat noninvasive strains of *Escherichia coli*. Children with bloody diarrhea should be advised to seek medical care since antibiotic treatment of enterohemorrhagic *E. coli*, a cause of bloody diarrhea, has been associated with increased risk of hemolytic uremic syndrome.

Fluid and Nutrition Management

The biggest threat to the infant with diarrhea and vomiting is dehydration. Fever or increased ambient temperature increases fluid loss and speeds dehydration. Adults traveling with children should be counseled about the signs and symptoms of dehydration and the proper use of oral rehydration salts (ORS). Medical attention may be required for an infant or young child with diarrhea who has the following:

- Signs of moderate to severe dehydration
- Bloody diarrhea
- Temperature >101.5°F (38.6°C)
- Persistent vomiting (unable to maintain oral hydration)

The mainstay of management of TD is adequate hydration.

ORS USE AND AVAILABILITY

Parents should be advised that dehydration is best prevented and treated by use of ORS in addition to the infant's usual food. ORS should be provided to the infant by bottle, cup, oral syringe (often available in pharmacies), or spoon while medical attention is being obtained. Low-osmolarity ORS is the most effective in preventing dehydration, although other formulations are available and may be used if they are more acceptable to young children. Homemade sugar-salt solutions are not recommended. Adults traveling with children should be counseled that sports drinks, which are designed to replace water and electrolytes lost through sweat, do not contain the same proportions of electrolytes as the solution recommended by the World Health Organization for rehydration during diarrheal illness. However, if ORS is not readily available, children should be offered whatever safe, palatable liquid they will take until ORS is obtained. Breastfed infants should continue to be breastfed.

ORS packets are available at stores or pharmacies in almost all developing countries. ORS is prepared by adding 1 packet to boiled or treated water (see Chapter 2, Water Disinfection for Travelers). Travelers should be advised to check packet instructions 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. A dehydrated child will usually drink ORS avidly; travelers should be advised to give it to the child as long as the dehydration persists. As dehydration lessens, the child may refuse the salty-tasting ORS solution, and another safe liquid can be offered. An infant or child who has been vomiting will usually keep ORS down if it is offered by spoon or oral syringe in small sips; these small amounts must be offered frequently, however, so the child can receive an adequate volume of ORS. Older children will often drink well by sipping through a straw. Severely dehydrated children, however, often will be unable to drink adequately. Severe dehydration is a medical emergency that usually requires administration of fluids by intravenous or intraosseous routes.

In general, children weighing <22 lb (10 kg) who have mild to moderate dehydration should be administered 2–4 oz (60–120 mL) ORS for each diarrheal stool or vomiting episode. Children who weigh ≥22 lb (10 kg) should receive 4–8 oz (120–240 mL) of ORS for each diarrheal stool or vomiting episode. The American Academy of Pediatrics provides detailed guidance on rehydration for vomiting and diarrhea; see www.healthychildren.org/English/health-issues/conditions/abdominal/Pages/Treating-Dehydration-with-Electrolyte-Solution.aspx. ORS packets are available in the United States from Jianas Brothers Packaging Company (816-421-2880; http://rehydrate.org/resources/jianas.htm). ORS packets may also be available at stores that sell outdoor recreation and camping supplies. In addition, Cera Products (843-842-2600 or 706-221-1542; www.ceraproductsinc.com) markets a rice-based, rather than glucose-based, product.

DIETARY MODIFICATION

Breastfed infants should continue nursing on demand. Formula-fed infants should continue their usual formula during rehydration. They should receive a volume sufficient to satisfy energy and nutrient requirements. Lactose-free or lactose-reduced formulas are usually unnecessary. Diluting formula may slow resolution of diarrhea and is not recommended. Older infants and children receiving semisolid or solid foods should continue to receive their usual diet during the illness. Recommended foods include starches, cereals, pasteurized yogurt, fruits, and vegetables. Foods high in simple sugars, such as soft drinks, undiluted apple juice, gelatins, and presweetened cereals, can exacerbate diarrhea by osmotic effects and should be avoided. In addition, foods high in fat may not be tolerated because of their tendency to delay gastric emptying.

The practice of withholding food for ≥24 hours is not recommended. Early feeding can decrease changes in intestinal permeability caused by infection, reduce illness duration, and improve nutritional outcome. Highly specific diets (such as the BRAT [bananas, rice, applesauce, and toast] diet) have been commonly recommended; however, similar to juice-based and clear fluid diets, such severely restrictive diets have no scientific basis and should be avoided.

MALARIA

Malaria is among the most serious and life-threatening infections that can be acquired by pediatric international travelers. Pediatric VFR travelers are at particularly high risk for acquiring malaria if they do not receive prophylaxis.

Children with malaria can rapidly develop high levels of parasitemia. They are at increased risk for severe complications of malaria, including shock, seizures, coma, and death. Initial symptoms of malaria in children may mimic many other common causes of pediatric febrile illness and therefore may result in delayed diagnosis and treatment. Among 33 children with imported malaria diagnosed at 11 medical centers in New York City, 11 (32%) had severe malaria and 14 (43%) were initially misdiagnosed. Clinicians should counsel adults traveling with children in malaria-endemic areas to use preventive measures, be aware of the signs and symptoms of malaria, and seek prompt medical attention if they develop.

Antimalarial Drugs

Pediatric doses for malaria prophylaxis are provided in Table 4-10. All dosing should be calculated on the basis of body weight. Medications used for infants and young children are the same as those recommended for adults, except under the following circumstances:

- Doxycycline should not be recommended for malaria prophylaxis for children aged <8 years. Although doxycycline has not been associated with dental staining when given as a routine treatment for some infections, other tetracyclines may cause teeth staining.
- Atovaquone-proguanil should not be used for prophylaxis in children weighing <11 lb (<5 kg) because of lack of data on safety and efficacy.

Chloroquine, mefloquine, and atovaquone-proguanil have a bitter taste. Pharmacists can be asked to pulverize tablets and prepare gelatin capsules with calculated pediatric doses. Mixing the powder in a small amount of food or drink can facilitate the administration of antimalarial drugs to infants and children. Additionally, any compounding pharmacy can alter the flavoring of malaria medication tablets so that children are more willing to take them. Assistance with finding a compounding pharmacy is available on the Compounder Connect section of the International Academy of Compounding Pharmacists' website (www.iacprx.org; 800-927-4227). Because overdose of antimalarial drugs, particularly chloroquine, can be fatal, medication should be stored in childproof containers and kept out of the reach of infants and children.

Personal Protective Measures and Repellent Use

Children should sleep in rooms with air conditioning or screened windows, or sleep under bed nets when air conditioning or screens are not available. Mosquito netting should be used over infant carriers. Children can reduce skin exposed to mosquitoes by wearing long pants and long sleeves while outdoors in areas where malaria is transmitted. Clothing and mosquito nets can be treated with insect repellents such as permethrin, a repellent and insecticide that repels and kills ticks, mosquitoes, and other arthropods. Permethrin remains effective through multiple washings. Clothing and bed nets should be retreated according to the product label. Permethrin should not be applied to the skin.

Although permethrin provides longer duration of protection, recommended repellents that can be applied to skin can also be used on clothing and mosquito nets. See Chapter 3, Mosquitoes, Ticks & Other Arthropods for more details about these protective measures. CDC recommends the use of Environmental Protection Agency (EPA)–registered repellents containing one of the following active ingredients: DEET (*N,N*-diethyl-*m*-toluamide), picaridin, oil of lemon eucalyptus (OLE) or PMD (para-menthane-3,8-diol), IR3535, and 2-undecanone (methyl nonyl ketone) (www.epa.gov/insect-repellents/find-repellent-right-you). Most of the EPA-registered repellents can be used on children aged >2 months, with the following considerations:

- Products containing OLE or PMD specify that they should not be used on children aged <3 years.
- Repellent products must state any age restriction. If none is stated, the EPA has not required a restriction on the use of the product.

Many repellents contain DEET as the active ingredient. The concentration of DEET varies considerably among products. The duration of protection varies with the DEET concentration; higher concentrations protect longer. Products with DEET concentration >50% do not offer a marked increase in protection time. The American Academy of Pediatrics recommends that ≤30% DEET should be used on children aged >2 months.

Repellents can be applied to exposed skin and clothing; however, they should not be applied under clothing. Repellents should never be used over cuts, wounds, or irritated skin. Young children should not be allowed to handle the product. When using repellent on a child, an adult should apply it to his or her own hands and then rub them on the child, with the following considerations:

- Avoid the child's eyes and mouth, and apply sparingly around the ears.
- Do not apply repellent to children's hands, since children tend to put their hands in their mouths.
- Heavy application and saturation are generally unnecessary for effectiveness. If biting insects are not repelled by a thin film of repellent, then apply a bit more.
- After returning indoors, wash treated skin with soap and water or bathe. This is particularly important when repellents are used repeatedly in a day or on consecutive days.

Combination products containing repellents and sunscreen are generally not recommended, because instructions for use are different and sunscreen may need to be reapplied more often and in larger amounts than repellent. In general, apply sunscreen first, and then apply repellent.

Mosquito coils should be used with caution in the presence of children to avoid burns and inadvertent ingestion. For more information about repellent use and other protective measures, see Chapter 3, Mosquitoes, Ticks & Other Arthropods.

DENGUE AND OTHER ARBOVIRUSES

Pediatric VFR travelers with frequent or prolonged travel to areas where dengue or other arboviruses (such as chikungunya, Japanese encephalitis, yellow fever, or Zika viruses) are endemic or epidemic may be at increased risk for severe infection. Dengue can cause mild to severe illness. Most infections are asymptomatic, but some people with dengue virus infection can develop life-threatening illness. Among 8 children who were diagnosed with acute dengue virus infection after visiting friends and relatives in the Caribbean, 3 developed severe dengue.

Children traveling to areas with dengue or other arboviruses should use the same mosquito protection measures described for malaria. However, families should be counseled that, unlike the mosquitoes that transmit malaria, the *Aedes* mosquitoes that transmit dengue, chikungunya, yellow fever, and Zika are aggressive daytime biters and can

also bite at night. Clinicians should consider dengue or other arboviral infections in children with fever if they have recently been in the tropics.

INFECTION AND INFESTATION FROM SOIL CONTACT

Children are more likely than adults to have contact with soil or sand and therefore may be exposed to diseases caused by infectious stages of parasites present in soil, including ascariasis, hookworm, cutaneous or visceral larva migrans, trichuriasis, and strongyloidiasis. Children and infants should wear protective footwear and play on a sheet or towel rather than directly on the ground. Clothing should not be dried on the ground. In countries with a tropical climate, clothing or diapers dried in the open air should be ironed before use to prevent infestation with fly larvae.

ANIMAL EXPOSURES AND RABIES

Worldwide, rabies is more common in children than adults. In addition to the potential for increased contact with animals, children are also more likely to be bitten on the head or neck, leading to more severe injuries. Children and their families should be counseled to avoid all stray or unfamiliar animals and to inform adults of any contact or bites. Bats throughout the world are considered to have the potential to transmit rabies virus. Animal bites and scratches should be washed thoroughly with water and soap (and povidone iodine if available); for mammal bites and scratches, the child should be evaluated promptly to assess the need for rabies postexposure prophylaxis. Because rabies vaccine and rabies immune globulin may not be available in certain destinations, families traveling to areas with high risk of rabies should seriously consider purchasing medical evacuation insurance.

AIR TRAVEL

Although air travel is safe for most newborns, infants, and children, a few issues should be considered in preparation for travel. Children with chronic heart or lung problems may be at risk for hypoxia during flight, and a clinician should be consulted before travel. Making sure that children can be safely restrained during a flight is a safety consideration. Severe turbulence or a crash can create enough momentum that a parent cannot hold onto a child. The safest place for a child on an airplane is in a government-approved child safety restraint system/device (CRS). The Federal Aviation Administration (FAA) strongly urges that children be secured in a CRS for the duration of the flight. Car seats cannot be used in all seats or on all planes, and some airlines may have limited safety equipment available. Travelers should check with the airline about specific restrictions and approved child restraint options. FAA provides additional information at www.faa.gov/travelers/fly_children.

Ear pain can be troublesome for infants and children during descent. Pressure in the middle ear can be equalized by swallowing or chewing:

- Infants should nurse or suck on a bottle.
- Older children can try chewing gum.
- Antihistamines and decongestants have not been shown to be of benefit.

There is no evidence that air travel exacerbates the symptoms or complications associated with otitis media. Travel to different time zones, jet lag, and schedule disruptions can disturb sleep patterns in infants and children, as well as in adults (Chapter 8, Jet Lag).

INJURIES

Motor Vehicle-Related

Vehicle-related injuries are the leading cause of death in children who travel. While traveling in automobiles and other vehicles, children should be properly restrained in a car seat, booster seat, or with a seat belt, as appropriate for their weight, height, and age. Information about child passenger safety is available at www.healthychildren.org/English/safety-prevention/on-the-go/Pages/Car-Safety-Seats-Information-for-Families.aspx. Car/booster seats often must be carried from home, since availability of well-maintained and approved seats may be limited abroad.

In general, children ≤12 years of age are safest traveling properly buckled in the rear seat; no one should ever travel in the bed of a pickup truck. Families should be counseled that in many developing countries, cars may lack front or rear seatbelts. They should attempt to arrange transportation in vehicles or rent vehicles with seatbelts and other safety features. Helmets should be used when riding bicycles, scooters, or motorcycles. Pedestrians should take caution when crossing streets, particularly in those countries where cars drive on the left, as children may not be used to looking in that direction before crossing.

Drowning and Water-Related Illness and Other Injuries

Drowning is the second leading cause of death in young travelers. Children may not be familiar with hazards in the ocean or in rivers. Swimming pools may not have protective fencing to keep toddlers from falling into the pool. Close supervision of children around water is essential. Because drowning occurs quickly and quietly, adults should not be involved in any other distracting activity while supervising children around water. Water safety devices such as life vests may not be available abroad, and families should consider bringing these from home. Protective footwear is important to avoid injury in many marine environments. Schistosomiasis is a risk to children and adults in endemic areas. While in schistosomiasis endemic areas (Map 4-11), children should not swim in fresh, unchlorinated water such as lakes or ponds.

Accommodations

Conditions at hotels and other lodging may not be as safe as those in the United States, and accommodations should be carefully inspected for exposed wiring, pest poisons, paint chips, or inadequate stairway or balcony railings.

Planning ahead can better equip caregivers to provide a safe sleeping environment for their infant during international travel. General recommendations from the American Academy of Pediatrics task force on preventing SIDS and other sleep-related causes of infant death are important to take into consideration during travel (http://pediatrics.aappublications.org/content/early/2016/10/20/peds.2016-2938). Cribs in some locations may not meet US safety standards. Additional information about crib safety is available from the US Consumer Product Safety Commission (www.cpsc.gov/en/Safety-Education/Safety-Education-Centers/cribs).

ALTITUDE

Children are as susceptible to altitude illness as adults (see Chapter 3, High-Altitude Travel & Altitude Illness). Young children who cannot talk can show nonspecific symptoms, such as loss of appetite and irritability. They may have unexplained fussiness and changes in sleep and activity patterns. Older children may complain of headache or shortness of breath. If children demonstrate unexplained symptoms after an ascent, it may be necessary to descend to see if they improve. Acetazolamide is not approved for pediatric use for altitude illness, but it is generally safe in children when used for other indications.

SUN EXPOSURE

Sun exposure, and particularly sunburn before age 15 years, is strongly associated with melanoma and other forms of skin cancer (see Chapter 3, Sun Exposure). Exposure to UV light is highest near the equator, at high altitudes, during midday (10 am–4 pm), and where light is reflected off water or snow. Sunscreens are generally recommended for use in children aged >6 months. Sunscreens (or sun blocks), either physical (such as titanium or zinc oxides) or chemical (sun protection factor [SPF] ≥15 and providing protection from both UVA and UVB), should be applied as directed, and reapplied as needed after sweating and water exposure. Babies aged <6 months require extra protection from the sun because of their thinner and more sensitive skin; severe sunburn for this age group is considered a medical emergency. Babies should be kept in the shade and wear clothing that covers the entire body. A minimal amount of sunscreen can be applied to small exposed areas, including the infant's face and hands. Sun-blocking shirts are available that are made for swimming and preclude having to rub sunscreen over the entire trunk. Hats and sunglasses also reduce sun injury to skin and eyes. If both sunscreen and a DEET-containing insect repellent are applied, the level of protection provided by the sunscreen may be diminished by as much as one-third, and covering clothing should be worn, sunscreen reapplied, or time in the sun decreased accordingly.

OTHER CONSIDERATIONS

Travel Stress

Changes in schedule, activities, and environment can be stressful for children. Including children in planning for the trip and bringing along familiar toys or other objects can decrease these stresses. For children with chronic illnesses, decisions regarding timing and itinerary should be made in consultation with the child's health care providers.

Insurance

As for any traveler, insurance coverage for illnesses and injuries while abroad should be verified before departure. Consideration should be given to purchasing special medical evacuation insurance for airlifting or air ambulance to an area with adequate medical care (see Chapter 6, Travel Insurance, Travel Health Insurance & Medical Evacuation Insurance).

Identification

In case family members become separated, each infant or child should carry identifying information and contact numbers in his or her own clothing or pockets. Because of concerns about illegal transport of children across international borders, if only 1 parent is traveling with the child, he or she may need to carry relevant custody papers or a notarized permission letter from the other parent.

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Page last reviewed: June 24, 2019
Content source: National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)
Division of Global Migration and Quarantine (DGMQ)