SPECIAL ARTICLE

International Adoption: Issues in Infectious Diseases

Dana D. Staat, Pharm.D., and Michael E. Klepser, Pharm.D., FCCP

International adoptions have become increasingly common in the United States. Children awaiting international adoption and families traveling to adopt these children can be exposed to a variety of infectious diseases. Compared with the United States, foreign countries often have different immunization practices and methods of diagnosing, treating, and monitoring disease. Reporting of medical conditions can also differ from that of the United States. The prevalence of infectious diseases varies from country to country and may or may not be common among adopted children. The transmission of tuberculosis, hepatitis B, and measles from adopted children to family members has been documented. Furthermore, infectious organisms (e.g., intestinal parasites), bacterial pathogens (e.g., *Bordetella pertussis* and *Treponema pallidum*), and viruses (e.g., human immunodeficiency virus and hepatitis viruses) may cause clinically significant morbidity and mortality among infected children. Diseases such as severe acute respiratory syndrome or avian influenza have not been reported among international adoptees, but transmission is possible if infection is present. Family members may be infected by others during travel or by their adopted child after returning home. Families preparing to adopt a child from abroad should pay special attention to the infectious diseases they may encounter and to the precautions they should take on returning home.

Key Words: avian flu, hepatitis A, hepatitis B, hepatitis C, HIV, infectious disease, international adoption, intestinal parasites, lice, measles, mumps, pertussis, travel preparation, travel follow-up, rubella, SARS, scabies, syphilis, tuberculosis.

(Pharmacotherapy 2006;26(9):1207–1220)

OUTLINE

Medical Records of Internationally Adopted Children
Immunization Status
Communicable Diseases
 Tuberculosis
 Hepatitis B
 Hepatitis A
 Hepatitis C
 Pertussis

Measles, Mumps, and Rubella
Human Immunodeficiency Virus
Syphilis
Intestinal Parasites
Scabies and Lice
Severe Acute Respiratory Syndrome
Avian Influenza
Travel Preparation
Pre-Entry Medical Examination
Posttravel Medical Examination
Conclusion

From the College of Pharmacy, Ferris State University, Big Rapids, Michigan (both authors); and the Inpatient Pharmacy, St. Mary's Health Care, Grand Rapids, Michigan (Dr. Staat).

Address reprint requests to Dana D. Staat, Pharm.D., Inpatient Pharmacy, St. Mary's Health Care, 200 Jefferson Street Southeast, Grand Rapids, MI 49503; e-mail: danastaat@ferris.edu.

Each year, thousands of families across the United States reach out to children in foreign countries and welcome them into their families through adoption. In 2004, 22,884 immigrant visas were issued to children adopted by United

States citizens. If this number does not seem impressive, families in the United States adopted more than 210,000 children of foreign origin since 1989. Also striking is that, since 1990, the number of international adoptions in the United States has increased by more than 320% (Figure 1).¹

Internationally adopted children originate from countries that unfortunately are often poor, developing, or war torn. Their governments are often poorly equipped to manage the number of orphaned or abandoned children. As a result, they allow individuals from foreign countries to adopt these children. Owing to changing economic, political, and social climates around the world, policies pertaining to foreign adoption in these countries are constantly changing. As a result, a country may have a liberal foreign adoption policy or high quota one year, but it may close its doors to adoption the next. Figure 2 highlights the effect of these changes on the origins of adopted children who were brought into the United States over the past decade. At present, more than 70% of internationally adopted children brought to the United States are from China, Russia, and Guatemala.¹

The emergence of a disease or a medical condition sometimes overshadows the joy of bringing a new child into a family. Family members traveling to a foreign country to complete an adoption are at risk for acquiring infectious diseases in that country. All too often, travelers, nontraveling family members, and other contacts are at risk for acquiring an infectious process because appropriate safeguards are not followed or considered. Two published reports highlight the potential health risks associated with international adoption.^{2, 3} Because of the devastation these diseases can

cause and because of the ease with which many can be spread, health care practitioners must be familiar with medical obstacles associated with international adoptions. In addition, since many of these diseases can easily be prevented with vaccination, prophylaxis, and/or education, the pharmacist can play an integral part in minimizing the health risks of the families involved in these adoptions.

Medical Records of Internationally Adopted Children

Internationally adopted children often enter the United States without a caregiver who is familiar with their medical history, vaccination status, or social experiences. This situation is in stark contrast to immigrant or refugee children, who often arrive with parents or other guardians. The absence of a parent or guardian is one reason why medical records of international adoptees are often incomplete. Information regarding their family history, prenatal health, and birthing conditions are generally not available. Even their exact date of birth is often unknown.

Adding to the confusion for adopting families is that medical terminology and medical practices vary widely depending on the country of origin.⁴ For example, a case-series review of preadoptive medical records showed that more than 90% of 56 children from the former Soviet Union and eastern Europe had several diagnoses suggestive of severe neurologic impairment.⁵ Of interest, postadoptive evaluation in the United States failed to confirm the diagnoses in any of the children. In contrast, documentation of medical records is excellent for children from Korea because of government-controlled adoption agencies.⁶ Documentation from other countries, such as China or Russia, is highly variable.⁶

Figure 1. The increasing rate of international adoptions by families in the United States. (From reference 1.)

Figure 2. Countries of origin of children adopted by families in the United States. (From reference 1.)

In addition to confusion and uncertainty pertaining to diagnostic and medical terminology, adoptive parents and their medical consultants must be vigilant for errors in medical diagnoses and vaccination schedules in the medical records. Examples of such errors are vaccinations that were apparently administered before the birth date of the adopted child. Records that appear perfect, such as vaccinations given exactly 1–2 months apart, are often modified to align with current immunization schedules in the United States.⁶ In addition, descriptions of child development should be accepted cautiously. Under close scrutiny, developmental milestones are often found not to match the child's estimated age, or they are found to be virtually identical to those of other children from the same orphanage. The old adage applies: if it seems too good to be true, it probably is.

Immunization Status

Immunization records for internationally adopted children are often unclear, incomplete, or even missing altogether. A retrospective analysis of 504 internationally adopted children showed that 65% had no written records of immunizations given before their adoption.⁷ Adopted children may have received vaccines of differing potencies or at different ages, or they may have been given a number of doses other than what is recommended in the United States. Furthermore, in some countries, various vaccinations may be given at minimum intervals of 4 weeks, as opposed to the 6 weeks required in the United States.^{8,9} As a result of these discrepancies in administration schedules, U.S. immigration officials may not accept documentation of previous vaccinations.

Another concern is that children adopted from orphanages or other large institutions are frequently severely malnourished or chronically ill. Under these conditions, even if vaccines are administered appropriately, adequate immunity may not be observed owing to the child's inability to mount an immune response.^{6,8}

For children who arrive in the United States with an unclear or questionable immunization status, serologic titers may need to be drawn to test their immunity. Serologic titers were drawn in 98 children adopted from China who had documented immunizations against tetanus, diphtheria, and poliomyelitis.¹⁰ The titers revealed that only 60% of the children were fully protected against each disease. Although titers

for diseases such as diphtheria or type-specific polio can be drawn, they are not routinely obtained. The infrequency with which these tests are performed may cause substantial expense and a delay in obtaining results.

Even if a child is reported to have had a specific primary disease that generally affords immunity, vaccinating the child may still be prudent because he or she might not have mounted an immune response or because the disease might have been misdiagnosed. Furthermore, if no written documentation of vaccinations is available, appropriate vaccination series should be begun as soon as possible.¹¹ Also, vaccination should be considered missing if the documentation is only partial. Examples are if names of the vaccine or if the vaccination dates are missing, if the vaccination record appears too good to be true, if the vaccinations are self-reported, or if the records appear questionable in any way. Finally, vaccinations given at intervals of less than 6 weeks should not be counted because this schedule may elicit suboptimal immune responses.⁹ In most instances, administering or readministering the vaccine series is easier than attempting to assess the child's immune status.

Because other countries may focus on required vaccinations for diseases endemic to their region, clinicians should ensure that all vaccinations that the Centers for Disease Control and Prevention (CDC) and the Advisory Committee on Immunization Practices recommend are given to newly adopted children. Vaccines most commonly omitted from foreign vaccination programs include those for *Haemophilus influenzae* type b, hepatitis B, varicella, and measles, mumps, and rubella. Catch-up or initial vaccination series should be given as soon as possible, unless the adopted child is acutely ill and has a high temperature.⁹ Figures 3 and 4 show the CDC primary immunization schedule for 2006 and the catch-up schedule, respectively.^{12,13}

A good general rule is to revaccinate when in doubt. The risk of not vaccinating is generally greater than the risk of revaccinating. Table 1 illustrates the approach of the Advisory Committee on Immunization Practices and the American Academy of Family Physicians to the evaluation and revaccination of internationally adopted children.¹⁴

Communicable Diseases

Tuberculosis

In the United States, the occurrence of tuber-

Table 1. Guidelines to the Vaccination and Evaluation of Internationally Adopted Children

Vaccine	Recommended Approach	Alternative Approach
MMR	Revaccinate	Serologic testing, then revaccinate if indicated
Hib	Revaccinate according to age	None
Hepatitis B	Serologic testing	None
IPV	Revaccinate	Serologic testing, or revaccinate then serologic testing
DTaP	Revaccinate, serologic testing if severe local reaction after revaccination	Children with records of ≥ 3 doses: serologic testing, or administer booster dose then serologic testing
Varicella	Revaccinate according to age	None
Pneumococcal	Revaccinate according to age	None

MMR = measles, mumps, and rubella; Hib = *Haemophilus influenzae* type b; IPV = inactivated poliovirus vaccine; DTaP = diphtheria, tetanus, and pertussis.

culosis has been steadily declining; however, this is not the case in many developing countries,¹⁵ where tuberculosis continues to be among the leading causes of death.¹⁶ Many countries from which children are adopted, such as China, Russia, Korea, and Vietnam, have a high rate of tuberculosis.¹⁷ As a region, Southeast Asia has the second highest incidence of tuberculosis in the world after Africa. The incidence in Africa is 345 cases of tuberculosis/100,000 people, whereas in Southeast Asia it is 190 cases/100,000. In contrast, the incidence of tuberculosis in the Americas is approximately 43 cases/100,000

people.¹⁸

Another consideration is that the worldwide occurrence of drug-resistant tuberculosis is increasing. According to the World Health Organization, more than 300,000 cases of multidrug-resistant tuberculosis have been reported.¹⁹ Between 1994 and 2000, almost every country the World Health Organization surveyed had documented cases.²⁰ Of all cases of tuberculosis in the United States, multidrug-resistant *Mycobacterium tuberculosis* caused 1.2%. Multidrug-resistant tuberculosis is most problematic in China, eastern Europe, and Russia. Rates of

DEPARTMENT OF HEALTH AND HUMAN SERVICES • CENTERS FOR DISEASE CONTROL AND PREVENTION

Recommended Childhood and Adolescent Immunization Schedule UNITED STATES • 2006

Vaccine ▼	Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	24 months	4–6 years	11–12 years	13–14 years	15 years	16–18 years
Hepatitis B ¹		HepB	HepB	HepB ¹	HepB	HepB	HepB	HepB	HepB	HepB	HepB	HepB Series			
Diphtheria, Tetanus, Pertussis ²			DTaP	DTaP	DTaP	DTaP	DTaP	DTaP	DTaP	DTaP	DTaP	Tdap	Tdap		
<i>Haemophilus influenzae</i> type b ³			Hib	Hib	Hib ³	Hib	Hib	Hib	Hib	Hib	Hib	Hib	Hib	Hib	Hib
Inactivated Poliovirus			IPV	IPV	IPV	IPV	IPV	IPV	IPV	IPV	IPV	IPV	IPV	IPV	IPV
Measles, Mumps, Rubella ⁴							MMR	MMR	MMR	MMR	MMR	MMR	MMR	MMR	MMR
Varicella ⁵							Varicella	Varicella	Varicella	Varicella	Varicella	Varicella	Varicella	Varicella	Varicella
Meningococcal ⁶												MCV4	MCV4	MCV4	MCV4
Pneumococcal ⁷				PCV	PCV	PCV	PCV	PCV	PCV	PCV	PCV	PPV	PPV	PPV	PPV
Influenza ⁸							Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)	Influenza (Yearly)
Hepatitis A ⁹												HepA Series	HepA Series	HepA Series	HepA Series

Vaccines within broken line are for selected populations

Figure 3. Recommended childhood and adolescent immunization schedule for the United States in 2006. HepB = hepatitis B; DTaP = diphtheria, tetanus, and pertussis; Tdap = tetanus, diphtheria toxoids, and acellular pertussis-adolescent preparation; Hib = *Haemophilus influenzae* type b conjugate vaccine; IPV = inactivated poliovirus; MMR = measles, mumps, and rubella; MCV4 = meningococcal conjugate vaccine; MPSV4 = meningococcal polysaccharide vaccine; PCV = pneumococcal conjugate vaccine; PPV = pneumococcal polysaccharide vaccine; HepA = hepatitis A. (From reference 12 with permission.)

resistance in Russia and eastern Europe are 6.5–14%, whereas rates in China range from 1.4% in Hong Kong to 10.8% in the Henan province.²¹

In 1999, a report described a 9-year-old child adopted from the Marshall Islands who had a diagnosis of extensive, bilateral, cavitary pulmonary tuberculosis.²² This child was not screened for tuberculosis before entering the United States. As a result, he transmitted *M. tuberculosis* to 20% of his direct contacts in rural North Dakota. Although active tuberculosis is infrequently reported among immigrant children, internationally adopted children are more likely than domestically adopted children to have active tuberculosis. The rate of tuberculosis among internationally adopted children is 50–150 times that among the general population of the United States.⁶

Latent tuberculosis is more common among internationally adopted children than active tuberculosis. Tuberculosis skin tests were positive in approximately 0.6–5% of internationally adopted children.^{17, 23} Children who resided in orphanages had rates of latent tuberculosis higher than those of children who were raised in foster homes.²³ A study of 404

international adoptees revealed that 75 (19%) who were screened with tuberculin skin testing were given a diagnosis of latent tuberculosis.²⁴ Of note, the high rate of positive results among internationally adopted children may be due to not only exposure to active cases of tuberculosis in their countries of origin but also vaccination with the bacillus Calmette-Guérin (BCG) vaccine, which is more common in developing countries than in the United States.

Routine screening for tuberculosis in internationally adopted children should include a tuberculin skin test administered by using the Mantoux method.^{6, 9, 22, 25} Testing should be performed regardless of the child's history of receiving the BCG vaccine.²² Although the reaction to a tuberculin skin test due to the BCG vaccine cannot be distinguished from the reaction due to latent tuberculosis, immunity secondary to the BCG vaccine wanes over time. A health care professional should review the results 48–72 hours after the tuberculin skin test is performed. Indurations of at least 10 mm should be considered positive in a healthy child. In a child infected with human immunodeficiency virus (HIV), indurations of 5 mm or larger require further evaluation.⁶ Skin testing

The tables below give catch-up schedules and minimum intervals between doses for children who have delayed immunizations. There is no need to restart a vaccine series regardless of the time that has elapsed between doses. Use the chart appropriate for the child's age.

CATCH-UP SCHEDULE FOR CHILDREN AGED 4 MONTHS THROUGH 6 YEARS					
Vaccine	Minimum Age for Dose 1	Minimum Interval Between Doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Diphtheria, Tetanus, Pertussis	6 wks	4 weeks	4 weeks	6 months	6 months ¹
Inactivated Poliovirus	6 wks	4 weeks	4 weeks	4 weeks ²	
Hepatitis B ³	Birth	4 weeks	8 weeks (and 16 weeks after first dose)		
Measles, Mumps, Rubella	12 mo	4 weeks ⁴			
Varicella	12 mo				
<i>Haemophilus influenzae</i> type b ⁵	6 wks	4 weeks if first dose given at age <12 months 8 weeks (as final dose) if first dose given at age 12–14 months No further doses needed if first dose given at age ≥15 months	4 weeks ⁵ if current age <12 months 8 weeks (as final dose) ⁶ if current age ≥12 months and second dose given at age <15 months No further doses needed if previous dose given at age ≥15 mo	8 weeks (as final dose) This dose only necessary for children aged 12 months–5 years who received 3 doses before age 12 months	
Pneumococcal ⁷	6 wks	4 weeks if first dose given at age <12 months and current age <24 months 8 weeks (as final dose) if first dose given at age ≥12 months or current age 24–59 months No further doses needed for healthy children if first dose given at age ≥24 months	4 weeks if current age <12 months 8 weeks (as final dose) if current age ≥12 months No further doses needed for healthy children if previous dose given at age ≥24 months	8 weeks (as final dose) This dose only necessary for children aged 12 months–5 years who received 3 doses before age 12 months

Figure 4. Recommended immunization schedule for children and adolescents who start vaccination late or who are more than 1 month behind. Guidelines for the United States in 2006. (From reference 13 with permission.)

Table 2. Commonly Prescribed Drug Therapy for Tuberculosis Infections in Children

Drug	Dosage Form	Dose (mg/kg)		Maximum Dose	Adverse Events
		Once/Day	Twice/Week		
Ethambutol	100- or 400-mg tablet	5–25	50	2.5 g	Optic neuritis, gastrointestinal discomfort, hypersensitivity
Isoniazid	100-mg tablet or 10-mg/ml oral solution	10–15	20–30 ^a	300 mg	Mild AST and/or ALT level elevation, hepatitis, peripheral neuritis, hypersensitivity
Pyrazinamide	500-mg tablet	20–40	50	2 g	Hepatotoxicity, hyperuricemia
Rifampin	150- or 300-mg capsule, or syrup formulated from capsule	10–20	10–20	600 mg	Orange discoloration of urine and/or secretions, vomiting, hepatitis, influenza-like syndrome, thrombocytopenia

AST = aspartate aminotransferase; ALT = alanine aminotransferase.

From reference 25.

^aDose/day.

Table 3. Treatment Regimens for Tuberculosis in Children

Type of Disease	Drug Regimen
Latent tuberculosis	
Isoniazid susceptible	Isoniazid 10–15 mg/kg/day x 9 mo
Isoniazid resistant	Rifampin 10–20 mg/kg/day x 6 mo
Active tuberculosis	Isoniazid + rifampin + pyrazinamide x 2 mo, then isoniazid + rifampin x 4 mo ^a

^aIf drug resistance is a concern, a third drug (ethambutol or an aminoglycoside) may be added to the 4-month, isoniazid-rifampin regimen.

should be repeated after 6 months in children in whom an induration of smaller than 10 mm is elicited. This recommendation is based on the fact that children may not respond to the test because of other illness, malnutrition, or recent infection with tuberculosis without time to mount an adequate immune response.^{9, 26} In children with a positive tuberculin skin-test result, chest radiography and full physical examination should be performed to determine if they have active tuberculosis. Also, in newborns with a recent history of BCG immunization, chest radiography and a tuberculin skin test should be done 1 year after vaccination.^{6, 9}

For the treatment of a child with active tuberculosis, physicians should select an antituberculosis regimen based on resistance patterns from the adopted child's country of origin. Recommended treatment for active tuberculosis includes 6 months of therapy: isoniazid, rifampin, and pyrazinamide given for 2 months, then isoniazid and rifampin given for

the last 4 months. Table 2 shows common drugs and dosages used to treat tuberculosis.²⁵

In the case of latent tuberculosis, children should be treated with a 9-month course of isoniazid 10–15 mg/kg/day (Table 3). If a patient cannot tolerate isoniazid or if he or she was exposed to a documented isoniazid-resistant strain of *M. tuberculosis*, rifampin 10–20 mg/kg/day for 6 months is an acceptable alternative (Table 3).^{23, 25} Close contacts and family members of internationally adopted children who have active tuberculosis should also undergo tuberculin skin testing performed with the Mantoux method.

Hepatitis B

Hepatitis B is the most common chronic viral illness worldwide.²⁷ Although some patients infected with hepatitis B may never have symptoms, as many as 25% of children who acquire chronic hepatitis B eventually develop hepatocellular carcinoma or cirrhosis.²⁸ Children adopted from impoverished orphanages are at high risk of being infected with hepatitis B.²⁷ Hepatitis B is endemic in China and Southeast Asia, as well as in eastern Europe (especially Romania), most of the Middle East, Africa, and the Amazon basin, among other regions.²⁸ More than 50% of children adopted from Romania have serologic evidence of past or present hepatitis B infection.²⁹

Institutionalized children usually acquire hepatitis B from vertical transmission (transmission at birth) or from the transmission of body fluids when living in close quarters with other infected individuals. Overall, about 5% of international adoptees to the United States have a

diagnosis of active hepatitis B infection.²⁷ Although immunization campaigns have dramatically decreased the rate of hepatitis B in some nations, such as Korea and Taiwan, immune status is still important to evaluate because vaccination may not elicit a full immune response in ill and/or malnourished children.

Infection with the hepatitis B virus is often asymptomatic in children. As a result, the initial medical screen for all internationally adopted children should include hepatitis B serologic testing.^{11, 26, 28} This panel of tests should include assessments for hepatitis B surface antigen (HBsAg, a positive surface antigen indicating an active hepatitis B infection), hepatitis B surface antibody (indicates a resolving hepatitis B infection or previous vaccination), and hepatitis B core antibody (indicates acute or previous hepatitis B infection). Misinterpretation of hepatitis B serologic results is a serious problem because they are used to determine which patients should receive treatment. For example, patients who were vaccinated for hepatitis B have positive antibodies for HBsAg. Misinterpretation of the HBsAg-antibody result causes inappropriate treatment of a patient already immune to hepatitis B. Table 4 provides information to guide the interpretation of serologic results.³⁰

Hepatitis B virus may incubate for as long as 180 days; therefore, internationally adopted children should have their initial hepatitis B panel repeated approximately 6 months after arriving in the United States. This testing may be deferred in children who are clearly immune or clearly infected. When the history of hepatitis vaccination is questionable or missing, children should receive the three-dose hepatitis B vaccination series. Immunization does not harm a child with an active hepatitis B infection and may help a child with incubating disease avoid chronic disease.⁹

The risk of transmitting hepatitis B to household members is well documented, albeit low.^{17, 31–33} Families of children adopted from Asia with documented hepatitis B infection had a 9% occurrence of subsequent hepatitis B infection compared with a 2% risk in a control population.³¹ Household members of any child with a positive HBsAg result should be vaccinated if they have not completed the vaccination series.⁹

Specific recommendations to guide therapy for children with acute hepatitis B infection are not readily available.²⁸ Lamivudine decreased serum DNA levels of hepatitis B virus to below the limit

Table 4. Common Hepatitis B Serologic Results

HBsAg	AntiHBsAg	AntiHBcAg	Interpretation
+	–	+	Acute or chronic hepatitis B infection
–	+	+	Resolving or previous hepatitis B infection
–	+	–	Resolving or recovered hepatitis B infection, or previous vaccination

HBsAg = hepatitis B surface antigen; AntiHBsAg = antibody to hepatitis B surface antigen; AntiHBcAg = antibody to hepatitis B core antigen.

From reference 30.

of the research assay at the end of a 52-week trial (23% vs 13% with placebo) in children with chronic hepatitis B.³⁴ Interferon-alfa was relatively ineffective for chronic infections acquired during childhood. Adefovir dipivoxil has yet to be studied in children. Other promising treatments for hepatitis B, such as entecavir, tenofovir, clevudine, telbivudine, and pegylated interferon alfa-2a, are in various stages of development and approval by the U.S. Food and Drug Administration. Efficacy and safety data for new agents to treat chronic hepatitis B infection in children have yet to be published, but these agents may be alternative treatments for hepatitis B in the future.

Hepatitis A

As with hepatitis B, hepatitis A is endemic in many areas, such as Southeast Asia, China, and Latin America.³⁵ Because hepatitis A is transmitted by means of the fecal-oral route, hepatitis A is commonly associated with areas that have poor sanitation and/or crowded living conditions. Infection with hepatitis A is worrisome and may lead to fulminant hepatitis and death.

Hepatitis A is observed relatively infrequently among adopted children. Owing to the low occurrence of infection, internationally adopted children generally do not have serology for hepatitis A tested unless they have symptoms suggestive of hepatitis. Symptoms of hepatitis A, if manifested, may include jaundice and/or fever.

No treatment for hepatitis A is available, and only supportive care is recommended. However, all individuals traveling to areas with high rates of hepatitis A should be given the hepatitis A vaccine, which consists of an inactivated virus. Two doses of the vaccine should be administered at least 6 months apart. One month after receiving the first dose of the vaccine, 94–100%

of adults develop protective antibodies. If an unvaccinated individual is exposed to hepatitis A, postexposure prophylaxis with immunoglobulin may be warranted. Immunoglobulin should be given no more than 2 weeks after exposure.³⁶

Hepatitis C

Among the general population, hepatitis C has a worldwide prevalence comparable to that of hepatitis B. However, among internationally adopted children, the prevalence of hepatitis C infection is not well documented but believed to be considerably lower than that of hepatitis B. According to limited serologic data, hepatitis C infection appears to be present in less than 1% of internationally adopted children.^{24, 37} Therefore, routine screening of asymptomatic children for hepatitis C is usually not warranted. However, screening may be appropriate for children who have symptoms consistent with hepatitis, those whose mothers have a history of drug abuse, and those who come from areas with high frequency of hepatitis C. According to the World Health Organization, areas with the highest prevalence of hepatitis C are Africa (rate of 5.3%), the eastern Mediterranean (4.6%), and the Western Pacific (3.9%).³⁸

Pertussis

Pertussis, or whooping cough, is a disease that clinicians in developed countries tend to overlook. Pertussis appears to be mounting a comeback in both developed and developing countries. Although the disease commonly occurs in unvaccinated individuals, its occurrence is also described among those who received the vaccine while they were malnourished or immunocompromised. In addition, data suggest that even those who were appropriately vaccinated may be at risk for acquiring infection with *Bordetella pertussis* secondary to waning of their protective immunity.^{39, 40}

In the United States, children receive a four-dose pertussis vaccination series as part of combined vaccination that includes diphtheria and tetanus. In contrast, foreign-born children may not receive vaccination against pertussis. In the absence of appropriate vaccination, these children are at increased risk for developing active disease. A 10-month-old infant adopted from Russia had no record of being vaccinated against the disease.⁴¹ As a result, close contacts during travel and family members were all exposed to the disease.

The CDC recommends that antimicrobial prophylaxis with erythromycin be given to any person who was exposed to an active case of pertussis, regardless of their immunization status.⁴² If an individual is thought to have pertussis and if the cough has lasted less than 3 weeks, antimicrobial therapy is indicated. The drug of choice for pertussis is erythromycin. However, most data pertaining to the treatment of pertussis are decades old; therefore, most agents newer and better tolerated than erythromycin have not been thoroughly evaluated for this indication. Despite the completion of only a few well-controlled clinical studies, azithromycin, clarithromycin, and trimethoprim-sulfamethoxazole appear to be appropriate treatment alternatives.^{43, 44} Clinical data about fluoroquinolones and ketolides are lacking.

Measles, Mumps, and Rubella

Although uncommon in the United States, the measles virus is common in countries from which children are adopted. In April 2004, adoptions from an orphanage in China were temporarily suspended because of an outbreak of measles among adoptees from the Hunan Province.³ In 2001, 14 cases of measles were identified in children recently adopted from China and in their close contacts.² Measles was diagnosed in 10 adopted children, along with two adoptive mothers who were born in the United States, a caregiver who lived with the adoptive family for 1 week, and a sibling of a child adopted from China who never contracted the disease. Based on the dates of infection, the measles exposure was determined to occur in China. This exposure was most likely from the orphanage, but it could have occurred during the screening period or during travel. The CDC launched a measles vaccination campaign at the infected orphanage, and adoptions resumed 3 weeks after the last case of measles was reported.

Because measles is a major medical concern, children in the United States are routinely vaccinated against the disease, generally along with mumps and rubella in a combination vaccine. However, combination vaccines are not universally used. Many countries immunize children with vaccines for only measles or for a combination of measles and rubella.¹⁷ As a result, adopted children may lack coverage against mumps, rubella, or both. Therefore, information regarding the types and content of vaccines administered to the child should be

obtained. Also, because the child may lack immunoprotection and have active disease, family members of an internationally adopted child must have up-to-date immunization against measles, mumps, and rubella. The CDC recommends that adults born after 1957 receive at least one dose of the measles, mumps, and rubella vaccine unless they had a documented case of the measles. Because of their high risk of acquiring measles, college students, international travelers, and health care workers should receive two doses of the vaccine given at least 1 month apart. Of note, pregnant women should not receive the measles, mumps, and rubella vaccine, and women should avoid pregnancy for 3 months after receiving the vaccine.⁴⁵

Human Immunodeficiency Virus

Although the rate of infection with HIV in many developing countries is rising, HIV infection is infrequently noted among international adoptees. Investigators reported that two (0.4%) of 490 internationally adopted children screened had HIV antibodies.²⁴ Of interest, both children subsequently had negative results for HIV with a polymerase chain reaction test. Other investigators did not identify any internationally adopted children infected with HIV.^{5, 29, 37} One potential reason for the lack of HIV infections among adoptees is that preadoption screening has become widespread in eastern Europe and in countries such as China.⁴⁶ As a result, HIV-infected children may be removed from the pool of children available for adoption. Regardless of the results of preadoption screening, all children should be tested for HIV on their arrival to the United States, and they should be retested 6 months later to determine if seroconversion occurred secondary to a recent HIV infection.

Syphilis

Syphilis, which is caused by the spirochete *Treponema pallidum*, can be transmitted to children by means of sexual abuse or maternal transmission. Eastern European nations have documented increases in the occurrence of congenital syphilis. In Russia alone, the occurrence of congenital syphilis has doubled every year from 1992–1997 and reached a total of 714 cases in 1997.⁴⁷ In contrast, less than 1.7% of international adoptees test positive for syphilis.^{24, 29, 37} Syphilis serology is required in the medical examination for United States visas, but regardless of the test results, internationally

adopted children should be retested for syphilis on their arrival to the United States.⁴⁸ Treatment of syphilis may often be accomplished with one dose of benzathine penicillin.

Intestinal Parasites

Experts in the field of adoption medicine listed parasites second only to hepatitis B virus for their propensity to cause long-term problems in children.⁶ Parasites may cause severe diarrhea, dehydration, and malnutrition in addition to chronic starvation. Protozoa may be present in drinking water in undeveloped countries. Institutions such as orphanages promote the transmission of parasites because of close contact, diminished immunity secondary to malnutrition, and inadequate treatment. Although transmission of intestinal parasites from adopted children to families and other contacts is not reported, it is possible. In addition, appropriate diagnosis is essential for the well-being of the child.

Intestinal parasites can be found in 9–51% of internationally adopted children.^{17, 37} The risk of being infected with intestinal parasites is higher in older children and children from eastern Europe than in younger children and children from other areas of the world, such as China, Korea, or Guatemala.^{24, 26, 29} According to one group of investigators, 58% of Romanian children older than 18 months who were screened for intestinal parasites had evidence of infection.²⁹ This rate was in contrast to 0% of infants aged 17 months or younger.

Giardia lamblia is the intestinal parasite most frequently encountered among internationally adopted children; however, it is not uncommon for infected children to have more than five organisms.^{24, 29} Symptoms are not reliable indicators of parasitic infection. Other diseases, such as lactose intolerance or refeeding syndrome after starvation, may mimic infection with intestinal parasites. In all children, at least three fresh fecal specimens should be examined for parasites at intervals of no less than 1 week.^{8, 11, 26, 46} Rates of detection increase with the use of several specimens. If parasites are detected and treatment started, stools should be reexamined after each course of therapy because of the high prevalence of several infecting parasites.^{8, 11}

Scabies and Lice

Scabies (*Sarcoptes scabiei*) and lice (*Pediculus* species) are common among internationally adopted children. A major risk factor for scabies

and lice infestations is residence in an orphanage. Investigators reported a greater than 10% rate of scabies or lice in adopted children, but documentation is limited.⁴⁶ Scabies is often difficult to identify among internationally adopted children, especially if they were partially treated or if they have numerous insect bites.⁴⁴ Some experts recommend treating any rash as if it were a scabies infection. General treatment with topical permethrin cream or shampoo is appropriate.⁹

Severe Acute Respiratory Syndrome

An unusual pneumonia was first reported in the Guangdong province of China in November 2002 and has since been referred to as severe acute respiratory syndrome (SARS). The SARS virus spread to more than 8000 people in 29 countries and killed 774.⁴⁹ The cause of the disease was determined to be a novel coronavirus similar to a virus seen in some animals consumed in China. The only other known coronaviruses cause the common cold.⁴⁹ Aggressive health measures have limited the occurrence of SARS.⁴⁶ Since July 2003, the end of the pandemic, 21 additional cases of SARS have been reported.⁵⁰

Although person-to-person transmission is possible, other sources of infection have been identified. Transmission of the SARS virus from an internationally adopted child to a prospective parent or other family member is possible; however, such a case has not been reported. Children with SARS typically have a minor respiratory illness compared with infected adults. During the initial SARS outbreak, children accounted for a small number of reported cases.⁵¹ For prevention, the CDC recommends that travelers avoid areas where transmission is most likely to occur. These areas include hospitals treating patients with SARS and live animal markets. Frequent hand washing is also recommended.

Avian Influenza

Avian influenza involves a large number of influenza viruses that primarily affect birds and not humans. Avian influenza type A/H5N1 is a virulent form that can cause disease in humans. Avian H5N1 is believed to be primarily transmitted from direct bird-to-human contact and not from human-to-human contact. The concern is that the strain will mutate to a virulent strain that is easily transmitted from human to human.

According to the World Health Organization, 130 confirmed cases of avian influenza in humans have been documented from 1997–November

2005.⁵² Countries that have had confirmed cases are Vietnam (92 cases, 42 deaths), Thailand (21 cases, 13 deaths), Indonesia (11 cases, seven deaths), Cambodia (four cases, four deaths), and China (two cases, one death).⁵² To our knowledge, no internationally adopted children have yet to contract the virus. Symptoms range from typical flu symptoms of fever, cough, sore throat, and muscle aches to eye infections, pneumonia, and respiratory distress. The antiviral drugs oseltamivir and zanamivir are expected to be used to treat avian influenza A, but their effectiveness is unclear. Analysis of some strains of H5N1 in 2004 revealed resistance to rimantadine and amantadine.⁵³ A vaccine to prevent this virus is not yet available, but clinical trials to test a newly developed vaccine began in April 2005.

Travel Preparation

Although requirements vary from country to country, most individuals considering an international adoption can plan to stay in their child's home country for several days to weeks. During this time, travelers may be exposed to a number of potential pathogens from a variety of sources, including water, food, children, and the environment. All people who plan to travel for the adoption should seek medical advice regarding immunizations and preventive therapy at least 4–6 weeks before traveling. In addition to consulting a travel medicine specialist, they may also seek advice from a physician specializing in adoption. Many institutions now have an adoption medicine physician or clinic that is familiar with issues encountered when an international child is adopted.

During the trip, travelers must follow general travel guidelines. For example, they should avoid ingesting tap water directly by drinking it or indirectly by eating uncooked foods that may have been cleaned with tap water or drinking beverages with ice. In addition, food parasites and bacteria may contaminate a variety of foods. Therefore, it is prudent for them to avoid foods that were not properly cooked. The CDC recommends avoiding uncooked meat, fruits and vegetables, and milk products.⁵⁴

Mosquitoes and ticks may carry infectious diseases, such as malaria, yellow fever, and Japanese encephalitis.^{11, 55} Travelers to Central America, South America, eastern Europe, Asia, and other areas of the world are at risk for contracting malaria.⁵⁶ Protective clothing (long pants, long-sleeved shirts) should be worn, and topical insect

Table 5. Prevention Options for Malaria

Drug	Indication	Adult Dosage
Atovaquone-proguanil	Primary prophylaxis for chloroquine- or mefloquine-resistant <i>Plasmodium falciparum</i> infection	250–100 mg/day p.o.; begin 1–2 days before travel and continue for 7 days after leaving malarious area
Chloroquine phosphate	Primary prophylaxis in areas with chloroquine-sensitive <i>P. falciparum</i>	300-mg base (500-mg salt)/wk p.o.; begin 1–2 wks before travel and continue for 4 wks after leaving malarious area
Doxycycline	Primary prophylaxis for chloroquine- or mefloquine-resistant <i>P. falciparum</i>	100 mg/day p.o.; begin 1–2 days before travel and continue for 4 wks after leaving malarious area
Hydroxychloroquine sulfate	Alternative to chloroquine phosphate for primary prophylaxis in areas with chloroquine-sensitive <i>P. falciparum</i>	310-mg base (400-mg salt)/wk p.o.; begin 1–2 wks before travel and continue for 4 wks after leaving malarious area
Mefloquine	Primary prophylaxis in chloroquine-resistant <i>P. falciparum</i>	228-mg base (250-mg salt)/wk p.o.; begin 1–2 wks before travel and continue for 4 wks after leaving malarious area

repellents containing diethyltoluamide, or DEET, should be used. Prescription drugs may also be used to prevent malaria. Most drugs should be started before the person travels and be continued after he or she returns to the United States. Table 5 presents malaria prevention options.

Because of concerns related to resistance, specific antimalarial treatment should be based on the country being visited. Travelers should be familiar with the signs and symptoms of malaria, which may include chills, headache, fatigue, and muscle aches. Immediate treatment should be sought at onset of these symptoms and continued for as long as 1 year after travel to an endemic area.⁵⁶ Questions about malaria can be directed to the CDC Web site (available from <http://www.cdc.gov>) or the CDC Malaria Hotline (telephone number 1-770-488-7788).

Routine vaccinations and boosters should be current for all travelers and nontraveling family members. The recommended adult immunization schedule can be accessed through the CDC Web site. Vaccines usually administered in the United States, often in childhood, are directed against tetanus, diphtheria, pertussis, varicella, polio, hepatitis B, *H. influenzae* type b, pneumococcal disease, and measles, mumps, and rubella. A tetanus-diphtheria booster is recommended every 10 years.⁵⁷ Table 6 shows recommendations for specific vaccinations. Suggestions for vaccination vary depending on the destination country. At this point, the only required vaccination is the yellow fever vaccination for travel to certain countries in sub-Saharan Africa and tropical South America.

Pre-Entry Medical Examination

The U.S. government requires internationally

adopted children to undergo physical examination before entering the country. This examination is not intended to ensure that the adopted child is completely healthy; rather, it is designed to ensure that the child will not harm residents of the United States. Therefore, clinicians usually do not test for infectious diseases that are common in the United States or that are not transmitted by casual contact. Table 7 lists the components of the medical examination.⁵⁸ Parents should not rely on the medical examination to reveal all potential infections, and they should still seek medical care for their adopted child after they enter the United States.

Posttravel Medical Examination

A physician should immediately examine acutely ill children or children who have serious chronic diseases on their arrival to the United States. Children who appear healthy should see their physician within 2–4 weeks of their arrival for a comprehensive medical examination.^{9, 48} For screening, the American Academy of Pediatrics recommends hepatitis B serology, syphilis serology, HIV serology, Mantoux intradermal skin testing for tuberculosis, stool examination for ova and parasites, and a complete blood cell count with red blood cell indexes. Other age-appropriate tests may be indicated, depending on the country of origin and on the specific medical concerns associated with a particular child.

Conclusion

The adoption of a child should be a joyous occasion. However, the detection of an illness in the adopted child or the acquisition of an

Table 6. Adult Vaccination Preparation for Families Adopting Internationally

Type, Vaccine	Dose and Route	No. of Doses	Traveler	Home Contact
Routine				
Hepatitis B	1 ml i.m.	Three (0, 1, and 6 mo)	X	X
Influenza	0.5 ml i.m.	According to influenza season	X	X
Measles, mumps, and rubella	0.5 ml s.c.	Two, given > 1 mo apart	X	X
Pneumococcal	0.5 ml s.c.	One	X	X
Polio	0.5 ml s.c.	One	X	X
Tetanus-diphtheria	0.5 ml i.m.	One	X	X
Varicella	0.5 ml s.c.	Two, given 1–2 mo apart	X	X
Special for high-risk areas				
Hepatitis A	1 ml i.m.	Two (0 and 6 mo)	X	X
Typhoid	0.5 ml i.m. or 4 capsules p.o. for 1 dose	One	X	
Japanese encephalitis	1 ml s.c.	Three (0, 7, and 30 days)	X	
Meningococcal	0.5 ml s.c.	One	X	
Rabies	1 ml i.m.	Three (0, 7, and 21 or 28 days)	X	
Yellow fever	0.5 ml s.c.	One	X	

Adapted from reference 17.

Table 7. Components of the Pre-Entry Medical Examination

Component	Diseases or Conditions
Sexually transmitted diseases	Chancroid, gonorrhea, granuloma inguinale, lymphogranuloma venereum, syphilis, ^a human immunodeficiency virus infection ^a
Infectious diseases	Active leprosy, active tuberculosis ^a
Physical	Alcohol and/or narcotic addiction, mental retardation, insanity, sexual deviation

From reference 58.

^aChildren and adolescents younger than 15 years are not required to undergo blood testing for syphilis and human immunodeficiency virus infection or chest radiography for tuberculosis unless the examining physician believes that they are likely to have been exposed.

infection by a parent or family member can unfortunately mar this otherwise happy event. For the safety and well-being of all those involved, the adoptive parents should be well informed about the potential infectious complications associated with international adoption. Many infections can be avoided altogether, or the effect of disease can be minimized with proper travel planning and follow-up. Despite the travel advice that adoptive parents receive from adoption agencies, simple measures, such as reviewing the child's vaccination status, are often overlooked. In addition, adoption agencies may not be helpful in interpreting preadoption medical reports. As

health care providers, we can help these families prepare for their travel and homecoming by providing counseling and information about potential infectious diseases that they may encounter.

References

1. U.S. Department of State. Immigrant visas issued to orphans coming to the U.S. Available from http://www.travel.state.gov/family/adoption/stats/stats_451.html. Accessed February 2, 2005.
2. Centers for Disease Control and Prevention. Measles outbreak among internationally adopted children arriving in the United States, February–March 2001. *MMWR Morb Mortal Wkly Rep* 2002;51(49):1115–16.
3. Centers for Disease Control and Prevention. Update: measles among adoptees from China—April 14, 2004. *MMWR Morb Mortal Wkly Rep* 2004;53(14):309.
4. Bledsoe JM, Johnston BD. Preparing families for international adoption. *Pediatr Rev* 2004;25(7):242–50.
5. Albers LH, Johnson DE, Hostetter MK, Iverson S, Miller LC. Health of children adopted from the former Soviet Union and eastern Europe: comparison with preadoptive medical records. *JAMA* 1997;278(11):922–4.
6. Jenista JA. Infectious disease and the internationally adopted child. *Curr Opin Infect Dis* 1993;6:576–84.
7. Schulte JM, Maloney S, Aronson J, San Gabriel P, Zhou J, Saiman L. Evaluating acceptability and completeness of overseas immunization records of internationally adopted children [online exclusive article]. *Pediatrics* 2002;109(2):E22. Available from <http://www.pediatrics.org/cgi/content/full/109/2/e22>.
8. Jenista JA. The immigrant, refugee, or internationally adopted child. *Pediatr Rev* 2001;22(12):419–29.
9. Mitchell MA, Jenista JA. Health care of the internationally adopted child part 1. Before and at arrival into the adoptive home. *J Pediatr Health Care* 1997;11(2):51–60.
10. Schulpen TW, van Seventer AH, Rumke HC, van Loon AM. Immunisation status of children adopted from China. *Lancet* 2001;358(9299):2131–2.

11. Petersen K. Preparing to meet foreign bugs. Travel, immigration, and international adoptions require special precautions. *Postgrad Med* 2001;110(1):67–70, 73–4, 77.
12. Centers for Disease Control and Prevention. Recommended childhood and adolescent immunization schedule—United States 2006. Available from <http://www.cdc.gov/nip/recs/child-schedule.htm>. Accessed November 30, 2005.
13. Centers for Disease Control and Prevention. Recommended immunization schedule for children and adolescents who start late or who are more than 1 month behind—United States 2006. Available from <http://www.cdc.gov/nip/recs/child-schedule.htm>. Accessed November 30, 2005.
14. Atkinson WL, Pickering LK, Schwartz B, Weniger BG, Iskander JK, Watson JC. General recommendations on immunization. Recommendations of the advisory committee on immunization practices (ACIP) and the American Academy of Family Physicians (AAFP). *MMWR Recomm Rep* 2002;51(RR-2):1–35.
15. Centers for Disease Control and Prevention. Reported tuberculosis in the United States, 2004. Table 1. Tuberculosis cases, case rates per 100,000 population, deaths, and death rates per 100,000 population, and percent change: United States, 1953–2004. Available from <http://www.cdc.gov/nchstp/tb/surv/surv2004/PDF/Table1.pdf>. Accessed November 30, 2005.
16. World Health Organization. The world health report 2004. Available from http://www.who.int/whr/2004/annex/topic/en/annex_2_en.pdf. Accessed November 30, 2005.
17. Chen LH, Barnett ED, Wilson ME. Preventing infectious diseases during and after international adoption. *Ann Intern Med* 2003;139(5 pt 1):371–8.
18. World Health Organization. Tuberculosis. Available from <http://www.who.int/mediacentre/factsheets/fs104/en/>. Accessed October 11, 2005.
19. World Health Organization. Drug resistance: tuberculosis. Available from <http://www.who.int/drugresistance/tb/en/TBguidelines2.pdf>. Accessed August 19, 2005.
20. Gupta R, Espinal M. A prioritised research agenda for DOTS-Plus for multidrug-resistant tuberculosis (MDR-TB). *Int J Tuberc Lung Dis* 2003;7(5):410–14.
21. Espinal MA, Laszlo A, Simonsen L, et al. Global trends in resistance to antituberculosis drugs. World Health Organization—international union against tuberculosis and lung disease working group on anti-tuberculosis drug resistance surveillance. *N Engl J Med* 2001;344(17):1294–303.
22. Curtis AB, Ridzon R, Vogel R, et al. Extensive transmission of *Mycobacterium tuberculosis* from a child. *N Engl J Med* 1999;341(20):1491–5.
23. Pediatric Tuberculosis Collaborative Group. Targeted tuberculin skin testing and treatment of latent tuberculosis infection in children and adolescents. *Pediatrics* 2004;114:1175–201.
24. Saiman L, Aronson J, Zhou J, et al. Prevalence of infectious diseases among internationally adopted children. *Pediatrics* 2001;108(3):608–12.
25. Pickering L, ed. *Mycobacterium tuberculosis*. In: Red book: report of the committee on infectious diseases, 26th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2003:642–60.
26. Staat MA. Infectious disease issues in internationally adopted children. *Pediatr Infect Dis J* 2002;21(3):257–8.
27. Jenista JA, Johnson DE, Miller LC, Murray DL. Hepatitis B: no guarantee [families with children from China Web site]. Available from <http://www.fwcc.org/hepatitisb.html>. Accessed May 24, 2005.
28. Pickering L, ed. Hepatitis B. In: Red book: report of the committee on infectious diseases, 26th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2003:318–36.
29. Johnson DE, Miller LC, Iverson S, et al. The health of children adopted from Romania. *JAMA* 1992;268(24):3446–51.
30. Farkas P, Hyde D. Type B hepatitis. In: Traub SL, ed. Basic skill in interpreting lab data, 2nd ed. Bethesda, MD: American Society of Health-System Pharmacists, 1996:227–9.
31. Friede A, Harris JR, Kobayashi JM, Shaw FE Jr, Shoemaker-Nawas PC, Kane MA. Transmission of hepatitis B virus from adopted Asian children to their American families. *Am J Public Health* 1988;78(1):26–9.
32. Vernon TM, Wright RA, Kohler PF, Merrill DA. Hepatitis A and B in the family unit: nonparenteral transmission by asymptomatic children. *JAMA* 1976;235(26):2829–31.
33. Hershow RC, Hadler SC, Kane MA. Adoption of children from countries with endemic hepatitis B: transmission risks and medical issues. *Pediatr Infect Dis J* 1987;6(5):431–7.
34. GlaxoSmithKline. EPVIR-HBV (lamivudine) package insert. Research Triangle Park, NC; 2004.
35. World Health Organization, Department of Communicable Disease Surveillance and Response. Hepatitis A. Available from http://www.who.int/csr/disease/hepatitis/HepatitisA_whodcsredc2000_7.pdf. Accessed July 22, 2005.
36. Modlin JF, Snider DE, Clover RD, et al. Prevention of hepatitis A through active or passive immunization: recommendations of the advisory committee on immunization practices (ACIP). *MMWR* 1999;48(RR12):1–37.
37. Miller LC, Hendrie NW. Health of children adopted from China [online exclusive article]. *Pediatrics* 2000;105(6):E76. Available from <http://www.pediatrics.org/cgi/content/full/105/6/e76>.
38. World Health Organization. Hepatitis C. Available from <http://www.who.int/mediacentre/factsheets/fs164/en/print.html>. Accessed October 23, 2005.
39. Guris D, Strebel PM, Bardenheier B, et al. Changing epidemiology of pertussis in the United States: increasing reported incidence among adolescents and adults, 1990–1996. *Clin Infect Dis* 1999;28(6):1230–7.
40. Hopkins RS, Jajosky RA, Hall PA, et al. Summary of notifiable diseases—United States, 2003. *MMWR Morb Mortal Wkly Rep* 2005;52(54):1–85.
41. Centers for Disease Control and Prevention. Pertussis in an infant adopted from Russia—May 2002. *MMWR Morb Mortal Wkly Rep* 2002;51(18):394–5.
42. Gürfil D for the Centers for Disease Control and Prevention. Guidelines for the control of pertussis outbreaks: treatment and chemoprophylaxis. Available from http://www.cdc.gov/nip/publications/pertussis/chapter3_amened.pdf. Accessed August 19, 2005.
43. Aoyama T, Sunakawa K, Iwata S, Takeuchi Y, Fujii R. Efficacy of short-term treatment of pertussis with clarithromycin and azithromycin. *J Pediatr* 1996;129(5):761–4.
44. Langley JM, Halperin SA, Boucher FD, Smith B. Azithromycin is as effective as and better tolerated than erythromycin estolate for the treatment of pertussis [online exclusive article]. *Pediatrics* 2004;114(1):e96–101. Available from <http://www.pediatrics.org/cgi/content/full/114/1/e96>.
45. Centers for Disease Control and Prevention. Measles: recommendations for prevention. Available from <http://www.cdc.gov/nip/diseases/measles/detail-rec.htm?#Adults>. Accessed October 24, 2005.
46. Murray TS, Groth ME, Weitzman C, Cappello M. Epidemiology and management of infectious diseases in international adoptees. *Clin Microbiol Rev* 2005;18(3):510–20.
47. Riedner G, Dehne KL, Gromyko A. Recent declines in reported syphilis rates in eastern Europe and central Asia: are the epidemics over? *Sex Transm Infect* 2000;76(5):363–5.
48. Centers for Disease Control and Prevention. International adoptions. Travelers' health: yellow book, 2005–2006. Available from <http://www2.ncid.cdc.gov/travel/yb/utills/ybGet.asp?section=children&obj=adoption.htm>. Accessed July 18, 2005.
49. Peiris JS, Yuen KY, Osterhaus AD, Stohr K. The severe acute respiratory syndrome. *N Engl J Med* 2003;349(25):2431–41.
50. Centers for Disease Control and Prevention. Severe acute respiratory syndrome. Travelers' health: yellow book, 2005–2006. Available from <http://www2.ncid.cdc.gov/travel/yb/utills/ybGet.asp?section=dis&obj=sars.htm&cssNav=browseoyb>. Accessed September 2, 2005.
51. Leung CW, Kwan YW, Ko PW, et al. Severe acute respiratory

- syndrome among children [online exclusive article]. *Pediatrics* 2004;113(6):e535–43. Available from <http://www.pediatrics.org/cgi/content/full/113/6/e535>.
52. **World Health Organization.** Cumulative number of confirmed human cases of avian influenza A/(H5N1) reported to WHO. Available from http://www.who.int/csr/disease/avian_influenza/country/cases_table_2005_11_17/en/print.html. Accessed November 21, 2005.
53. **Centers for Disease Control and Prevention.** Avian influenza infection in humans. Available from <http://www.cdc.gov/flu/avian/gen-info/avian-flu-humans.htm>. Accessed November 21, 2005.
54. **Centers for Disease Control and Prevention.** Risks from food and water. Travelers' health: yellow book, 2005–2006. Available from <http://www2.ncid.cdc.gov/travel/yb/utills/ybGet.asp?section=recs&obj=food-drink-risks.htm&cssNav=browsecyb>. Accessed August 19, 2005.
55. **Centers for Disease Control and Prevention.** Protection against mosquitoes and other arthropods. Travelers' health: yellow book, 2005–2006. Available from <http://www2.ncid.cdc.gov/travel/yb/utills/ybGet.asp?section=recs&obj=bugs.htm&cssNav=browsecyb>. Accessed August 19, 2005.
56. **Centers for Disease Control and Prevention.** Malaria and travelers. Available from <http://www.cdc.gov/malaria/travel/index.htm#protectyourself>. Accessed August 19, 2005.
57. **Centers for Disease Control and Prevention.** General recommendations for vaccination and immunoprophylaxis. Travelers' health: yellow book, 2005–2006. Available from <http://www2.ncid.cdc.gov/travel/yb/utills/ybGet.asp?section=intro&obj=cert-requirements1.htm&cssNav=browsecyb>. Accessed August 19, 2005.
58. **Jenista JA.** The visa medical examination: the facts [families with children from China Web site]. Available from <http://fwcc.org/visamedical.html>. Accessed May 25, 2005.