

International Adoption: Infectious Diseases Issues

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Nearly 220,000 children have been adopted from other countries by American parents since 1986. Approximately 65,000 children have arrived from China and Russia, mostly in the past 6 years. Most of these children reside in orphanages before adoption, where they may experience malnutrition, environmental deprivation, neglect, and exposure to infectious diseases. After arrival to the United States, international adoptees should undergo specialized screening evaluation for infectious diseases and other conditions. Infectious conditions of special concern include hepatitis B and C, syphilis, human immunodeficiency virus infection, tuberculosis, and presence of intestinal parasites. Before the adoption occurs, the infectious disease consultant may be asked to assist the primary care provider and the adoptive family with advice about travel and review of preadoptive medical records. After the adoption, the infectious diseases consultant may be asked to assess the adequacy of the child's vaccination record from the birth country and to assist in screening, evaluation, and management of infectious diseases.

Since 1986, nearly 220,000 children from other countries have been adopted by American families. More than 21,600 children have arrived in 2003; all indications suggest that this number will continue to increase [1]. Since 1995, the top 4 birth countries have consistently been Russia, China, South Korea, and Guatemala. Kazakhstan, Ukraine, Romania, and Vietnam have also been frequent birth countries in the past decade.

The living circumstances of children before adoption vary greatly. Most such children reside in orphanages, where they may experience malnutrition, emotional and physical neglect, environmental deprivation, and exposure to infectious diseases. Children in South Korea, and sometimes those in Guatemala, are notable exceptions, because most reside in foster care before adoption. Regardless of country of origin, internationally adopted children have often experienced many perinatal complications, including low birth weight, prematurity, no prenatal care, and prenatal exposure to drugs and alcohol.

International adoption medicine, a relatively new specialty in pediatrics, has emerged to address the specific health care needs of these children after arrival in the United States (and of their prospective parents before the adoption) [2]. One of

the primary concerns of international adoption medicine is the evaluation of international adoptees for infectious diseases, as for other immigrant children [3–14]. Although “exotic” infectious diseases are sometimes detected, these are exceptional. Rather, the list of infectious diseases identified in international adoptees is relatively short and is consistent from country to country. It includes tuberculosis, hepatitis B and C, HIV infection, syphilis, intestinal infections (with parasites, enteric bacteria, or *Helicobacter pylori*), skin infections (especially scabies), and the occasional vaccine-preventable disease.

The infectious diseases consultant contributes greatly to the care of international adoptees, both before and after arrival in the United States, by interpreting preadoptive medical and vaccine records, offering travel advice, and providing care for infectious diseases after arrival.

This review will discuss these topics; details about specific infections and their management can be found in standard references. Other concerns of international adoption medicine, including growth and developmental delays, microcephaly, rickets, anemia, lead poisoning, emotional and behavioral issues, school problems, and precocious puberty, have been recently reviewed elsewhere [10, 15].

PREADOPTIVE MEDICAL RECORDS

Infectious diseases. All children placed for international adoption undergo medical evaluations in their birth countries. Prospective parents often consult a physician for assistance in

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interpreting the sometimes arcane terminology in these reports (e.g., the frequent diagnosis of “perinatal encephalopathy” on medical reports from Russia) [6, 16]. Infectious diseases are rarely mentioned except in reports from countries of the former Soviet Union, which may list diagnoses such as “ARVI” (acute respiratory viral infection) or “dysbacteriosis” (dysentery or other diarrheal diseases). These diagnoses rarely denote the presence of chronic or worrisome conditions. Some children have had multiple hospitalizations for infections; frequently, this is done to minimize the spread of contagious diseases rather than because the child was seriously ill.

Laboratory testing for infectious diseases. Before adoption, virtually all children are tested for HIV infection, hepatitis B, and syphilis (designated “RW” or “WR” in eastern European countries and “TRUST” in China). Occasionally, hepatitis C test results are also provided. The timing and accuracy of these results are questionable: tests may be done months or even years before adoptive placement, and the laboratory where the tests are done may not be reliable. Maternal history and other risk factors are rarely noted. Adoptive parents should therefore be cautioned that negative test results do not guarantee the absence of these conditions. It is rarely advisable to repeat these tests in the birth country: an additional concern is the risk of exposure to a possibly contaminated needle when the blood sample is collected [17]. These tests, along with other recommended screening tests (table 1), should therefore be repeated when the child arrives in the United States.

Occasionally, more sophisticated blood tests (e.g., PCR tests) are performed in specialized commercial laboratories in the birth country. Unfortunately, the accuracy and validity of such results are also uncertain.

INTERNATIONAL ADOPTION AND TRAVEL MEDICINE

Most adoptive parents travel to receive their child; in some countries (notably Russia), parents must travel twice to complete legal formalities. Occasionally, parents bring older children or other family members on these trips. The infectious diseases consultant may be asked to provide travel medicine advice for these individuals. Traveling adults should have updated vaccinations for polio; tetanus; measles, mumps, and rubella; varicella; hepatitis B (accelerated schedule, if needed); and others, as needed [18–20]. Child travelers should receive all age-appropriate vaccines; for some destinations, an accelerated vaccine schedule is suggested [3]. Receipt of destination-specific vaccines (such as typhoid and hepatitis A vaccines) may sometimes be advisable. Basic advice regarding hygiene, traveler’s diarrhea, malaria prophylaxis (if needed), and travel safety are also helpful, especially for inexperienced travelers.

The health risks for accompanying children should be carefully discussed with parents, including hygiene, contact with

street dogs, and traffic [3, 21]. It is often advisable to bring another adult to supervise accompanying children, because the adoptive parent(s) may be preoccupied with legal and/or medical issues related to their new child.

Helpful, up-to-date, country-specific vaccine and other recommendations for travelers are available at Web sites for the Centers for Disease Control and Prevention (<http://www.cdc.gov/travel/yb/>) and World Health Organization (WHO; <http://www.who.int/ith/>) [19, 20].

Adoptive families sometimes encounter difficult situations related to infectious diseases. For example, the recent severe acute respiratory syndrome (SARS) epidemic in Asia affected many adopting families. In the initial phases of the SARS outbreak, some adoptive parents ignored the WHO warnings about travel to China in their eagerness to receive their children; several adoptive parents and children were hospitalized with suspected SARS upon return to the United States (none of the cases were proven).

Adoptive parents frequently request recommendations for medications to bring on their trip for the newly adopted child. Parents should be reassured that most illnesses can be satisfactorily managed by the child’s local physicians using available medications. A few items may be useful, however, if the child becomes ill while in transit, such as antibiotics (e.g., amoxicillin and azithromycin), antipyretics, and other supplies (e.g., a thermometer and oral rehydration salts) [22]. It may also reassure traveling parent(s) to have appropriately-sized sterile needles and syringes on hand (and a physician’s letter to minimize problems at border crossings), although these are widely available at low cost and without a prescription in most birth countries.

INFECTIOUS DISEASES AFTER ARRIVAL IN THE UNITED STATES

HIV Infection. One of the chief concerns of prospective parents is that their newly adopted child will be infected with HIV. Some of the clinical features of HIV infection, institutionalization, and malnutrition overlap. For example, developmental delay, failure to thrive, opportunistic infections (e.g., *Pneumocystis jiroveci* [also known as “*P. carinii*”] pneumonia), recurrent infections, anemia, skin conditions (e.g., molluscum contagiosum and scabies), or delayed dentition may occur in any of these 3 conditions or situations. HIV infection may thus mistakenly be attributed to environmental causes if appropriate testing is not done [15].

Despite widespread concern about HIV infection in international adoptees, the actual risk is low. In 7 studies that described a total of 1089 children adopted by persons in the United States, Australia, and France, no child with HIV infection was identified, although 3 had transient antibodies to HIV [4, 8, 13, 16, 23–25]. Moreover, of 7299 children adopted dur-

Table 1. Recommended screening tests for newly arriving adoptees.

Infectious disease screening
Screening for hepatitis B surface antigen, surface antibody, and core antibody ^a
Screening for hepatitis C virus ^a
HIV ELISA (also consider PCR if the child is <6 months of age) ^a
Mantoux test ^a
Rapid plasma reagin (consider <i>Treponema pallidum</i> particle agglutination or fluorescent treponemal antibody absorption also)
Stool culture for ova, parasites, and <i>Giardia</i> antigen; repeat if later symptoms warrant
Assess presence of antibodies to verify immunity from administered vaccines (if necessary)
Other screening tests
Complete blood cell count
Determination of lead levels
Urinalysis
Thyroxine and thyroid-stimulating hormone
Determination of aspartate aminotransferase, alanine aminotransferase, bilirubin, and alkaline phosphatase levels
Vision and hearing screening
Developmental testing
Other screening tests to consider based on clinical findings and age of the child
Detection of <i>Helicobacter pylori</i> antibody or ¹³ C-urea breath test
Stool cultures for bacterial pathogens
Newborn screen to State Board of Health (usually includes hemoglobin electrophoresis)
Glucose-6-phosphate dehydrogenase deficiency screening

^a One should consider repeating the test ≥ 6 months after the adopted child arrives in the United States.

ing the period of 1990–2002 who were evaluated in 17 international adoption clinics, only 12 children (0.16%; from Panama, Russia, Cambodia, Romania, and Vietnam) were infected with HIV [26]. The actual proportion of HIV-infected adoptees is likely to be less than this, because this survey included only children who were evaluated in specialized clinics.

All international adoptees should be screened for HIV infection (both HIV-1 and HIV-2) on arrival, and consideration should be given to repeated testing ≥ 6 months after arrival for detection of seroconversion, if infection occurred just before travel to the United States [14]. Some [27] but not all [3] experts recommend that children <6 months of age at arrival should undergo PCR testing for HIV DNA.

Hepatitis B. Hepatitis B affects ~300 million people globally, most of whom reside in Asia [28]. Many internationally adopted children come from areas of high or moderate prevalence. Virtually all children are tested for hepatitis B infection before adoption. With few exceptions (e.g., children who are part of a sibling group or who have identified special needs), only seronegative children are placed in international adoptions. Despite having negative serological test results in their birth countries, ~3%–5% of all arrivals are consistently identified as being infected with hepatitis B virus (HBV) on arrival in the United States [4, 8, 13, 16, 23–25, 29]. Few differences are found between countries (although hepatitis B is now rare among South Korean adoptees, reflecting the successful na-

tional hepatitis B vaccination program [30]; higher rates were found among Romanian adoptees in the early 1990s). Some international adoptees have unusually severe hepatitis B, possibly because multiple exposures to the virus, concomitant malnutrition, or infection with certain viral genotypes may augment disease expression [31–33].

HBV is readily transmissible through ordinary household contact [34–38]. Before the widespread availability of protective vaccine, as many as 64% of family members developed serological evidence of exposure to HBV after adoption of carrier children [38], emphasizing the need for vaccination of prospective family members. Antibody titers to HBV should be assessed in all members of households in which newly adopted children are found to be carriers, and exposure precautions for unimmunized individuals (e.g., neighbors, visitors, and babysitters) should be reviewed with the adoptive family [3]. Although disclosure of the child's status to schools and day care facilities is not mandated [3], specific recommendations for individual families should be discussed.

Newly arrived children should be tested at the time of arrival for hepatitis B surface antigen (HBsAg), core antibody, and surface antibody (HBsAb) [3]; experts suggest retesting again 6 months later. The "hepatitis panel" (HBsAg and IgM core Ab) offered by some commercial laboratories is inadequate; HBsAb should also be measured to determine whether hepatitis B vaccination is needed. Children found to have HBsAg should

undergo additional testing, including liver function tests (i.e., determination of alanine aminotransferase, aspartate aminotransferase, bilirubin, alkaline phosphatase, and albumin levels) and tests for hepatitis B early antigen (HBeAg), HBeAb, α -fetoprotein, and quantitative viral HBV DNA by PCR. Except in infants in whom antibody may represent maternal antibody, children with isolated hepatitis B core antibody may be recovering from acute HBV infection, be distantly immune with nondetectable levels of HBsAb, have a false-positive core antibody result, or have a false-negative result for HBsAg (i.e., the child could actually be a carrier). These individuals should be retested for liver transaminase levels, HBsAg, and HBsAb within 1–2 months. Some experts would also recommend testing for viral HBV DNA by PCR, especially to identify the latter group. A “booster” dose of HBV vaccine will identify immune individuals whose antibody titers have waned. Liver ultrasound and consultation with a gastroenterologist are recommended for children with elevated transaminase levels.

“Surface antigen–negative” HBV variants have been reported from Europe and Asia and likely are underrecognized [39]. These HBV strains have undergone mutations in the major hydrophilic loop of surface antigen (amino acids 98–156) and have reduced reactivity in conventional diagnostic assays. Individuals infected with these variants may have core antibody in the circulation as the only obvious marker of disease, although at least 10%–40% are viremic, as demonstrated by PCR.

Hepatitis C. Hepatitis C is also found worldwide, with distinct genotypes found in different geographic regions. Certain viral genotypes or coinfection with HBV or HIV increase the morbidity of hepatitis C. Hepatocellular carcinoma develops in ~1.9%–6.7% of patients with chronic hepatitis C virus (HCV) infection after 20 years of disease [40], most commonly in Asians, Hispanics, Native Americans, and Pacific Islanders [40]. Young age at the time of infection—especially in cases of vertical transmission—may protect individuals, to some extent, from an adverse outcome [41].

Screening recommendations for hepatitis C are somewhat unclear. Most authors recognize that the risk of infection is low [13]. The *Red Book* does not recommend routine testing, except in those children who have received blood products, children whose mothers used drugs during pregnancy [3, 14], and children from China, Russia, eastern Europe, and Southeast Asia [3]. However, because these risk factors are rarely known with certainty, screening all arrivals for hepatitis C antibodies by ELISA seems prudent [27]. In 6 studies (including 1 unpublished study) of infectious diseases risks for international adoptees from many countries, only 26 children (1.3%) with HCV infection or exposure were identified among 1932 subjects [13, 15, 24, 42, 43]. In some cases, these were children with maternal antibodies; such antibodies may persist for 12–15 months after birth.

Hepatitis C may be difficult to diagnose. One study showed that as many as 5%–10% of infected children are not identified by antibody screening, although some have seroconversion after a long interval [44]. False-negative test results occur early in the course of disease. False-positive results of screening ELISAs may occur. Thus, positive results should be confirmed by recombinant immunoblot assays, which have better sensitivity and specificity. No antibody tests distinguish between acute, chronic, or resolved infection, nor do they distinguish between maternal antibody or infection-induced antibody. Moreover, the natural history of the disease in perinatally infected individuals is incompletely understood. These concerns support the recommendation that all international adoptees should be screened for hepatitis C at arrival and again ≥ 6 months later.

Qualitative HCV RNA assays are also helpful for confirmation of infection in children with HCV antibodies (they are preferable to quantitative tests). However, PCR tests are costly and not well-standardized. The rates of false-negative and false-positive results may be unacceptably high: in a quality-control study of 86 American laboratories, only 16% correctly determined the results of all samples submitted [45]. A single test result that is negative or positive for HCV RNA should therefore not be considered diagnostic.

Hepatitis A. Screening new arrivals for Hepatitis A is rarely necessary, except to assess the need for hepatitis A immunization in children with hepatitis B or C and in children older than 12–15 months of age (to allow disappearance of maternal antibodies) who reside in areas of endemicity.

Syphilis. Most internationally adopted children are screened for congenital syphilis in their birth countries and are treated if infection is found. Nevertheless, a small number of children arrive in the United States each year with undiagnosed, untreated congenital syphilis. In our clinic, cases in children from China and central American countries have been the most common. We have also seen 1 school-aged child from Bulgaria arrive with unrecognized, untreated syphilis; a history of sexual abuse was elicited.

Congenital syphilis is endemic in Russia and in other countries of the former Soviet Union. A history of congenital syphilis is listed on ~15%–20% of preadoptive reviews from these countries [16]. Generally, this condition is well-managed medically, although details of treatment are often lacking. Typical dental malformations are occasionally seen even when adequate treatment has been provided. Other medical or neurological complications have not yet been reported in this group of children.

Children with a history of treated congenital syphilis should undergo careful serial evaluations [3] until they are 12 months of age. Ophthalmologic and audiologic evaluations should be performed, as well as screening for neurological and developmental disorders. Nontreponemal antibody titers should be nonreactive by ~6 months of age in infants who have been

adequately treated (or who were not infected but initially tested seropositive as a result of the presence of maternal antibody) [46]. Detailed recommendations for the evaluation and treatment of children with positive results of serological screening tests on arrival can be found in the *Red Book* [3].

Children whose test results are negative and whose histories do not indicate syphilis need no further evaluation. The rare child who is adopted internationally at <3 months of age should be screened at arrival and then again at 10–12 weeks of age [46]. If sexual abuse is suspected, testing should be repeated ≥ 1 month after arrival to the United States to identify children who were infected just before departure.

Intestinal parasites. Intestinal parasites are found in $\sim 25\%$ of internationally adopted children after arrival in the United States. The prevalence varies depending on country of origin [5, 8, 11, 13, 14, 23–25, 29]; South Korean children, for example, are rarely infected. *Giardia lamblia* is the most frequently identified pathogen, but others that are often found include *Entamoeba histolytica*, *Dientamoeba fragilis*, *Ascaris lumbricoides*, *Trichuris trichiura*, hookworms, and *Strongyloides stercoralis*. Some children are infected with multiple parasites; in our clinic, 1 child from India was infected with 7 different parasites.

Children who are infected with intestinal parasites are more likely than their noninfected peers to have growth delay and to be anemic. Some infected children may also have impaired cognitive function (unrelated to anemia); eradication of parasites is sometimes accompanied by improved neuropsychiatric function [47–50]. More obvious symptoms of infestation include diarrhea, flatulence, odoriferous stools, abdominal pain, and failure to thrive. Assessment of symptoms may be difficult because of language barriers and the young ages of many of the children [14]. Regular, formed stools do not exclude the possibility of parasitic infection.

All new arrivals should be screened for intestinal parasites. Use of 3 samples improves detection rate [14]. The use of immunoassays for detection of *Giardia* antigen alone is inadequate. Follow-up samples should be obtained after treatment to verify eradication and to screen for additional parasites. Parasites are sometimes missed during the initial screening of stool samples; retesting is advisable if symptoms appear later. Only some parasites induce eosinophilia (especially hookworm and *Strongyloides*, *Ascaris*, and *Toxocara* species). Therefore, absence of eosinophilia does not preclude parasitic infection.

Children with unexplained eosinophilia after initial stool screening should be reevaluated, and less common parasitic causes of eosinophilia (e.g., filariasis, schistosomiasis, and visceral or cutaneous larva migrans) should be considered [51]. Specific serological tests are available for schistosomiasis, strongyloidiasis, filariasis, echinococcosis, and toxocariasis. In children with persistent eosinophilia and no obvious diagnosis, empirical treatment with a broad-spectrum anthelmintic (usu-

ally albendazole [52]) is reasonable [51]. Other explanations should be sought if the eosinophil count does not return to normal [52].

Some sources have suggested that *Giardia* infection need not be treated. In this population, however, treatment is generally indicated because of the high risk of spread within the family and other contacts (e.g., day care) [3, 53].

Some less familiar parasites may cause confusion when reported by the laboratory. Under ordinary circumstances, *Blas-tocystis hominis*, *Entamoeba coli*, *Entamoeba hartmanni*, *Entamoeba polecki*, *Entamoeba dispar*, *Cryptosporidium* species, *Microsporidium* species, *Cyclospora* species, *Isospora* species, *Iodamoeba buetschlii*, and *Endolimax nana* are considered nonpathogens and do not require treatment.

Bacterial enteric pathogens and H. pylori. Gastrointestinal symptoms, such as diarrhea, flatulence, and abdominal pain, should prompt a search for bacterial pathogens, as well as parasites. Stool cultures may reveal evidence of *Salmonella* species, *Shigella* species, enteropathogenic *Escherichia coli*, or *Campylobacter* species. Treatment recommendations for these infections may be found in standard references.

Children who reside in crowded orphanage conditions are at increased risk for infection with *H. pylori* [54]. Because of the long-term risks of this infection and its high prevalence in this population, this diagnosis should be considered for children with symptoms such as dyspepsia, abdominal pain, growth delays, or anemia [55, 56]. It is worth noting that organisms acquired in the developing world may be resistant to standard drug treatment regimens [57].

Tuberculosis. International adoptees constitute a group at high risk for acquisition of *Mycobacterium tuberculosis* and progression to active tuberculosis infection. This group of children must therefore be carefully screened for tuberculosis and aggressively treated if infection is identified. Failure to do this may create a public health hazard, as occurred in a small town in North Dakota in 1999 [58], when an outbreak of tuberculosis that affected 56 people was traced to a child adopted from the Marshall Islands who was inadequately screened at arrival.

Five percent to 20% of internationally adopted children have positive Mantoux test results at the time of arrival to the United States; the prevalence has increased as the number of adoptions from Russia has increased [13]. Many children have been vaccinated with bacille Calmette-Guérin (BCG); some physicians mistakenly believe that this always results in a positive Mantoux test result, or that positive results in these individuals should be “ignored.” In fact, <50% of infants given BCG shortly after birth have reactive Mantoux test results at 6–12 months of age; reactivity usually has disappeared altogether by 6 months of age in children who received BCG at birth [59]. Virtually all vaccinated infants have nonreactive skin test results by 5 years of age [60, 61]. Individuals vaccinated later in childhood may

have positive Mantoux test results for a longer period [61]. The size of the skin test reaction after receipt of BCG varies with the strain and dose of vaccine, the route of administration, the age of the patient, the nutritional status of the recipient, the number of years since vaccination, and the frequency of skin testing [60, 61].

There is no reliable method to distinguish positive Mantoux test reactions caused by BCG vaccination from those caused by infection. Therefore, experts on tuberculosis agree that prior vaccination should influence neither the interpretation of these reactions nor the decision of whether to treat the subject [60, 61]. Interpretation of the Mantoux test reaction is based on the individual child's risk factors. Internationally adopted children with tuberculin skin test reactions of ≥ 10 mm should undergo chest radiography and careful physical examinations looking for clinical evidence of tuberculosis infection [3]. For immunocompromised children or those with known exposure, tuberculin skin test reactions of ≥ 5 mm are considered positive results [3]. Extrapulmonary tuberculosis may sometimes occur. Sites of potential involvement include skin, lymph nodes, bones, joints, genitourinary tract, abdomen, CNS (meningitis or tuberculoma), middle ear/mastoid, pericardium, pleura, as well as miliary or disseminated disease. If no clinical disease is identified, children are considered to have latent tuberculosis infection and should receive 9 months of isoniazid therapy. At present, these recommendations apply even for children adopted from countries with a high prevalence of multiple-drug resistant tuberculosis, although this recommendation may change in the future. Expert infectious diseases consultation is recommended if there are questions regarding diagnosis or management of tuberculosis.

Mantoux tests should be performed for all internationally adopted children after arrival. Experts suggest retesting 6 months later. False-negative results may result if the test is performed within 4–6 weeks after live-virus vaccine administration (for measles, mumps, and rubella vaccine); if the child is malnourished, very young, or immunosuppressed; if the child has concurrent viral or bacterial infection; or if the child was recently exposed to tuberculosis [14].

BCG vaccination occasionally causes a suppurative adenitis, localized abscess, or (very rarely) osteomyelitis. Skin lesions and adenopathy rarely require treatment, because most cases spontaneously resolve. Occasionally, incision and drainage is necessary, or a course of isoniazid and rifampin may be prescribed for prolonged and painful adenitis.

Immunizations and vaccine-preventable diseases. In the first comprehensive review of health issues in international adoptees, Jenista and Chapman [11] identified "deficient immunizations" in 37% of adoptees. They reported that 4 of 128 children developed an acute vaccine-preventable disease within

1 month after arrival, including rubeola (1 case), varicella (2 cases), and mumps (1 case). In 1998, Hostetter and Johnson [9] reported additional problems related to immunizations in internationally adopted children. They found that only 35% of international adoptees from China and Russia and other eastern European countries vaccinated with ≥ 3 doses of diphtheria-tetanus-pertussis (DTP) in their birth countries had protective immunity to tetanus and diphtheria. Similarly, a Dutch study of 133 internationally adopted children who had received ≥ 3 doses of DTP and polio vaccines found that only ~60% of the Chinese children were fully protected against tetanus and diphtheria; some children lacked complete immunity to polio [62]. Other studies report similar findings [63, 64]. Possible explanations for these findings include use of nonimmunogenic vaccines provided to orphanages to administer, improper storage of vaccines, incorrect documentation of administered immunizations, and impaired response to vaccines (associated with malnutrition or stress). Another study, however, found strikingly better immunity among international adoptees [65].

Newly arrived children frequently have incomplete or missing preadoption immunization records. In a recent survey of 504 children, only 178 had preadoption immunization records [66]. Children born in China were especially likely to lack a valid immunization record. Only 9% of children with valid overseas immunization records were considered completely up to date with vaccinations, according to the US schedule for vaccination against DTP, polio, hepatitis B, and measles, mumps, and rubella.

Current recommendations for management of these deficiencies are summarized in the *Red Book* [3] and at the Advisory Committee on Immunization Practices Web site (<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5102a1.htm>) [67]. In brief, antibody levels should be measured to verify immunity, or alternatively, the child should be revaccinated (the cost-effectiveness of these strategies is presently under review). IgG antibodies to diphtheria and tetanus and neutralizing antibodies to poliovirus serotypes 1–3 should be assessed [14, 65]; antibody screening for immunity to pertussis and *Haemophilus influenzae* type b are not recommended for clinical practice. Specific recommendations vary and depend on the age of the child, adequacy of the vaccine record, and country of origin. I and others suggest that vaccine records from South Korea may be accepted without question (the medical records, in general, are excellent). Vaccine records from Guatemala (foster care) and India are also probably acceptable [27]; however, until this is proven, it is advisable to comply with standard recommendations [3, 67].

Skin infections. Skin infections, including impetigo, molluscum contagiosum, and scabies, are relatively common in new arrivals. Scabies should be suspected in any child with a pruritic rash presenting within several weeks of arrival; clinical

signs of scabies can lag behind infection. In some children, typical skin findings may be difficult to identify because of excoriation or eczematization. Empirical treatment (with topical permethrin) decreases the likelihood of household spread. Some children develop postscabetic nodules or infantile acropustulosis after infection. Ivermectin is a useful therapeutic adjunct for children who weigh >15 kg with severe, crusted scabies who do not respond to topical treatment [3, 20].

Rarities. “Exotic” infectious diseases are sometimes seen in internationally adopted children, but these are uncommon. Like other immigrant children, international adoptees may arrive with malaria [29], *P. jiroveci* pneumonia [68], tungiasis [69], or leprosy [29]. Standard references are valuable resources when caring for new arrivals with symptoms of unusual infectious diseases [3, 20, 70].

SUMMARY

The infectious diseases consultant has much to offer the internationally adopted child and his family, before and after adoption. Appropriate screening of new arrivals (table 1) allows a comprehensive assessment of the child’s health and is important for identification of needed interventions and therapies.

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