MEDICAL CHALLENGES:
INFECTIOUS DISEASES IN INTERNATIONALLY ADOPTED, REFUGEE, AND IMMIGRANT CHILDREN

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Speaker’s Disclosure

Dr. Conrad has disclosed he is a member of advisory with International Research Vaccine Safety Monitoring Committee and GlaxoSmithKline. He has received honorarium.

The planning committee reviewed the content and determined there was not conflict of interest with the discussion or presentation of materials.
Immigrant Health

• Children arriving in the United States should be evaluated as soon as possible after arrival to begin medical assessment and preventive health services.

• Routine childhood immunization per the currently recommended CDC childhood immunization schedule is critically important.

• Screening for infectious diseases is important to identify infections with a long latency period that may not be prevalent in children born in the United States.
Internationally Adopted Children

• In general, children adopted internationally have health insurance, and many adoptive families interact with the health care system before arrival of the child.

• Internationally adopted children are considered legally as a type of immigrant and are required to have a medical examination performed by a physician designated by the US Department of State in their country of origin.

• This examination usually is limited to completing legal requirements for screening for certain communicable diseases and to examination for serious physical or mental disorders that would prevent the issue of an immigrant visa; such an evaluation is not a comprehensive assessment of the child’s health.
Refugees and Asylees

• Refugees and asylees have legal status in the United States

• Various states have different protocols for the initial evaluation of a refugee

• The Centers for Disease Control and Prevention (CDC) has issued recommendations for screening of refugees: www.cdc.gov/immigrantrefugeehealth/guidelines/domestic/domestic-guidelines.html
Immigrants

• Recently, the number of immigrant children has increased to represent the largest and most diverse group of new arrivals to the United States

• Medical evaluation is individual to each case, depending on whether the child is documented or has insurance coverage, the circumstances of immigration, country of origin, medical history, and socioeconomic status

• The AAP has developed a toolkit for the evaluation of the health of immigrant children: www.aap.org/en-us/Documents/cocop_toolkit_full.pdf

• Written documentation of immunizations that includes month and year of administration is accepted as valid if they conform to US/WHO schedules
Infectious Diseases to Consider in Immigrant Children

- *Mycobacterium tuberculosis*
- *Mycobacterium bovis*
- Human Immunodeficiency Viruses 1, 2
- Viral hepatitis
  - Hepatitis A
  - Hepatitis B
  - Hepatitis C
  - Hepatitis D (chronic carriers of Hepatitis B)
Infectious Diseases to Consider in Immigrant Children

• Skin infections
  • Scabies (*Sarcoptes scabiei* subsp. *hominis*)
  • Head lice (*Pediculus humanus subsp. capitis*)
  • Body lice (*Pediculus humanus subsp. corporis*)
  • Pubic lice (*Pthirus pubis*)
  • Impetigo (*Staphylococcus aureus*; *Streptococcus pyogenes*)
  • Cutaneous larva migrans (*Ancylostoma braziliense*; *Ancylostoma caninum*)

• *Helicobacter pylori*
Infectious Diseases to Consider in Immigrant Children

• Parasitic infections
  
  • Soil-transmitted helminths
    • Roundworm (*Ascaris lumbricoides*)
    • Whipworm (*Trichuris trichura*)
    • Hookworm (*Necator americanus; Ancylostoma duodenale*)

  • Strongyloidiasis (*Strongyloides stercoralis*)
  • Amebiasis (*Entamoeba histolytica*)
  • Giardiasis (*Giardia duodenalis; syn. Giardia intestinalis; Giardia lamblia*)
  • Cryptosporidiosis (*Cryptosporidium hominis; Cryptosporidium parvum*)
  • Cysticercosis (*Taenia solium*)
  • Toxocariasis (*Toxocara canis; Toxocara cati*)
Infectious Diseases to Consider in Immigrant Children

• Malaria (*Plasmodium falciparum; Plasmodium vivax; Plasmodium ovale; Plasmodium malariae; Plasmodium knowlesi*)

• Typhoid fever (*Salmonella typhi*) among recently arrived febrile patients

• Sexually Transmitted Infections
  • Gonorrhea (*Neisseria gonorrhoeae*)
  • *Chlamydia trachomatis*
  • Syphilis (*Treponema pallidum*)
Infectious Diseases to Consider in Immigrant Children

• Geography-specific infections:
  • Schistosomiasis (*Schistosoma mansoni; Schistosoma japonicum; Schistosoma mekongi; Schistosoma intercalatum; Schistosoma haematobium*)
  • Southeast Asian Liver fluke (*Opisthorchis spp.*)
  • Chagas Disease (*Trypanosoma cruzi*)
  • Coccidioidomycosis (*Coccidioides immitis; Coccidioides posadasii*)
  • Histoplasmosis (*Histoplasma capsulatum*)
  • Lymphatic filariasis (*Wuchereia bancrofti; Brugia malayi; Brugia timori*)
  • Loiasis (*Loa loa*)
  • Leishmaniasis (*Leishmania spp.*)
  • Chikungunya virus
  • Dengue virus
  • Zika virus
Hepatitis A

• Endemic in most countries of origin of internationally adopted, refugee, and immigrant children

• Studies have demonstrated that 1-6% of newly arriving international adoptees have acute hepatitis A infection

• Serologic testing for acute infection (hepatitis A immunoglobulin M [HAV-IgM]) and immunity (total hepatitis A IgG and IgM antibody) can be considered at the initial visit

• Children without HAV immunity who are 12 months and older should receive hepatitis A vaccine according to the routine immunization schedule
Hepatitis A

• For children adopted internationally from a country with high or intermediate HAV prevalence where health care can be planned in advance, hepatitis A (HepA) vaccine should be administered, ideally 2 or more weeks before the arrival of the adoptee, to all previously unvaccinated people who anticipate having close personal contact (e.g., household contact or other regular caregiver)

• Adoptive parents and any accompanying family members traveling to adopt a child should ensure that they are immunized or otherwise immune to hepatitis A infection
Hepatitis A

- Hepatitis A Vaccine: Two doses, 0.5-mL intramuscularly; second dose 6-12 months following first dose (Havrix®); 6-18 months following first dose (Vaqta®) at ages 12 months-18 years

- Use 1.0-mL dose for ages 19 years and older

- May use Twinrix® for ages 18 years and older to immunize against hepatitis A and hepatitis B

- IGIM can be used for immediate passive protection: 0.02-mL/kg (protects for 3 months); 0.06-mL/kg (protects for 5 months)

- Hepatitis A vaccine and IGIM can be administered at the same time
Hepatitis B

• In prior studies (1990s) prevalence of hepatitis B surface antigen (HBsAg) antigemia ranged from 1-5% in internationally adopted children and from 4-7% in refugee children.

• Hepatitis B infection was most common in children from Asia and Africa, some countries of central and eastern Europe (e.g., Romania and Bulgaria), and states of the former Soviet Union (e.g., Russia and the Ukraine).

• By 2015, hepatitis B vaccine had been introduced nationwide in 184 countries; 96 countries had introduced the birth dose.
Hepatitis B

- Even when a birth dose of hepatitis B is administered, efficacy of postexposure prophylaxis is lower among infants born to pregnant women with high HBV viral load and hepatitis B e antigen (HBeAg)-positivity.

- All children should be tested for hepatitis B surface antigen (HBsAg) to identify cases of chronic infection regardless of immunization status.

- Unimmunized children with negative HBsAg and negative hepatitis B surface antibody (anti-HBsAg) test results should be immunized.
Hepatitis B

• Approximately 90% of children infected perinatally or within the first year of life will develop chronic hepatitis B infection; 25-50% of children infected between 1-5 years of life will become chronically infected

• Children with a positive HBsAg test result should be reported to the local or state health department

• To distinguish between acute and chronic HBV infection, HBsAg-positive children should be evaluated by enhanced antigen and antibody testing

• All unimmunized household contacts of children with chronic HBV infection should be immunized
Hepatitis B

- Absence of IgM antibody to hepatitis B core antigen (IgM anti-HBc) or persistence of HBsAg for at least 6 months indicates chronic HBV infection.

- For HBsAg-negative children, IgG antibody against HBsAg alone is consistent with immunity following immunization; IgG antibodies against HBsAg and total antibody against HBc is consistent with immunity following infection.

- Detection of HBeAg correlates with greater risk of infectivity.

- Serum HBsAg can be transiently detected 1-21 days following immunization.
Hepatitis B

• Hepatitis B vaccination: 0.5-mL (RecombivaxHB®/Engerix-B®) intramuscularly at times 0, 1-month, and 6-months

• RecombivaxHB®, 1.0-mL intramuscularly at times 0 and 4-6 months later approved for adolescents aged 11-15 years

• Unimmunized travelers to areas where the incidence of chronic hepatitis B infection is 2% or greater should be immunized (ideally completing the series prior to travel)

• If travel will occur within the next 4 months, an alternative 0, 1, 2, and 12 month schedule (Engerix-B®) can be used if the first three doses can be administered prior to travel
Hepatitis C

• Hepatitis C virus (HCV) infection testing is recommended for all internationally adopted children; most international adoptees in recent years have been adopted from countries with elevated rates of prevalence (e.g., China, Russia, southeast Asia)

• HCV screening for refugee and immigrant children is not recommended routinely during the new-arrival medical examination unless individuals have risk factors:

<table>
<thead>
<tr>
<th>HCV-positive mother</th>
<th>Intravenous Drug use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overseas surgery</td>
<td>Tattoos</td>
</tr>
<tr>
<td>Transfusion</td>
<td>Sexual activity/abuse</td>
</tr>
<tr>
<td>Dental work (major)</td>
<td>Female genital and traditional cutting</td>
</tr>
</tbody>
</table>
Intestinal Parasites

- Serial fecal examinations for ova and parasites will identify a pathogen in 15-35% of internationally adopted and refugee children.

- Most common pathogens identified:

<table>
<thead>
<tr>
<th>Giardia duodenalis</th>
<th>Ascaris lumbricoides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dientamoeba fragilis</td>
<td>Trichuris trichiura</td>
</tr>
<tr>
<td><em>Hymenolepis</em> species</td>
<td></td>
</tr>
</tbody>
</table>

- Less common pathogens identified:

<table>
<thead>
<tr>
<th>Strongyloides stercoralis</th>
<th>Cryptosporidium spp.</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Entamoeba histolytica</em></td>
<td>Hookworm</td>
</tr>
</tbody>
</table>
Intestinal Parasites

• Presence or absence of symptoms is not predictive of parasitosis

• Stool specimens (1-3) collected on separate days may be examined for ova and parasites

• Direct fluorescent antibody testing or EIA may be performed for *Giardia* spp. and *Cryptosporidium* spp.

• Multiplex pcr testing can identify: *Cryptosporidium* spp.; *Cyclospora cayetanensis*; *Entamoeba histolytica*; *Giardia duodenalis*

• When newly arrived children have acute onset of bloody diarrhea, stool specimens should be tested for:
  • *Salmonella* spp.
  • *Shigella* spp.
  • *Campylobacter* spp.
  • Shiga toxin-producing *Escherichia coli* (including *E coli* O157:H7)
Intestinal Parasites

• Some clinicians prefer to administer presumptive therapy with albendazole

• Therapy for intestinal parasites generally is successful, but complete eradication may not occur

• Proof of eradication is not recommended for individuals who are asymptomatic following therapy

• Children who fail to demonstrate adequate catch-up growth, who have unexplained anemia, or who have gastrointestinal tract symptoms or signs that occur or recur months or even years after arrival in the United States should be reevaluated for intestinal parasites
Tissue Parasites

• Eosinophilia is commonly present in people with tissue parasites

• Refugee children may have received presumptive treatment of intestinal helminths overseas before departure to the United States

• Children not presumptively treated with albendazole or ivermectin who have negative stool ova and parasite test results but have eosinophilia (absolute eosinophil count exceeding 450-cells/mm³) should be considered for serologic testing for *Toxocara canis*, strongyloidiasis, schistosomiasis, and lymphatic filariasis
Unexplained Eosinophilia

- *Toxocara canis* is prevalent worldwide; screening is warranted in children who have no identified cause of eosinophilia.

- For all immigrant children with eosinophilia and no identified pathogen, serologic testing for *Strongyloides stercoralis* is reasonable regardless of country of origin.

- Testing for *Schistosoma* spp. should be performed for all children with eosinophilia who are from Sub-Saharan Africa, southeast Asia, or areas of the Caribbean and South America where schistosomiasis is endemic.

- Serologic testing for lymphatic filariasis should be considered in children older than 2 years with eosinophilia who are from countries with endemic lymphatic filariasis (Tropics/sub-tropics of Asia, Africa, the Western Pacific, Haiti, the Dominican Republic, Guyana, and Brazil).
Map of the Caribbean region indicating localities with a history of schistosomiasis mansoni

Review
Status of Schistosomiasis Elimination in the Caribbean Region

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Presumptive Parasite Treatment Regimens for Migrants

- Albendazole (for soil-transmitted helminths)
  - 400-mg for refugees ≥2-years old
  - 200-mg for children 12-23 months of age

- Ivermectin (for Strongyloides)
  - 200-μg/kg once a day for 2 days for adults and children weighing ≥15kg

- Praziquantel (for schistosomiasis)
  - 40-mg/kg divided in 2 doses for adults and children ≥4 years old

- Artemether-lumefantrine (for malaria)
  - 6-dose (1-4 tablets/dose) treatment for adults and children weighing ≥5kg
## Treatment of Presumptive Parasitic Infections for US-Bound Refugees Administered by International Organization for Migration [February 2017]

<table>
<thead>
<tr>
<th>Region</th>
<th>Country of Processing</th>
<th>Principal Refugee Groups</th>
<th>Presumptive Parasite Treatment for Eligible Refugees</th>
<th>Special Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>Chad</td>
<td>Central African Republic; Sudanese Darfuri</td>
<td>Albendazole Praziquantel Artemether-lumefantrine</td>
<td>Ivermectin is not administered to refugees who have resided or traveled in <em>Loa loa</em>-endemic countries due to risk of encephalopathy associated with ivermectin treatment in a person with <em>Loa loa</em> infection</td>
</tr>
<tr>
<td></td>
<td>Burundi, Djibouti, Ethiopia, Kenya, Rwanda, South Africa, Tanzania, Uganda, others</td>
<td>Somali; Congolese; Ethiopian; Eritrean; Sudanese (other than Sudanese Darfuri); South Sudanese</td>
<td>Albendazole Praziquantel Ivermectin Artemether-lumefantrine</td>
<td>Of note, refugees of Congolese or South Sudanese origin who resided or traveled in Democratic Republic of Congo (DRC) or South Sudan do NOT receive ivermectin. However, children of Congolese or South Sudanese origin who were born in the camps in non- <em>Loa loa</em>-endemic countries and have not resided or traveled in DRC or South Sudan are (usually) treated with ivermectin. Only refugees from sub-Saharan Africa receive artemether-lumefantrine</td>
</tr>
</tbody>
</table>
## Treatment of Presumptive Parasitic Infections for US-Bound Refugees
Administered by International Organization for Migration [February 2017]

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<th>Special Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>Malaysia, Nepal, Pakistan, Thailand</td>
<td>Burma/Myanmar origin (Karen, Karenni, Kachin, Rohingya); Bhutanese; other</td>
<td>Albendazole Ivermectin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indonesia</td>
<td>Multiple</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sri Lanka</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle East</td>
<td>Egypt</td>
<td>Iraqi; Syrian</td>
<td>Albendazole Ivermectin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iraq</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jordan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lebanon</td>
<td>Multiple</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Turkey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>Austria, Malta, Moldova, Russia, Ukraine</td>
<td>Multiple</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Americas</td>
<td>Cuba, Ecuador, El Salvador, Guatemala, Honduras</td>
<td>Cuban; Colombian; Salvadoran; Guatemalan; Honduran</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ivermectin Precautions in *Loa loa*-endemic Areas

- Ivermectin is not administered to refugees who resided or traveled in countries where *Loa loa* is endemic due to the risk of encephalopathy associated with ivermectin treatment in persons with *Loa loa* infection.

- Countries that are currently considered endemic for *Loa loa* are:

<table>
<thead>
<tr>
<th>Angola</th>
<th>Cameroon</th>
<th>Central African Republic</th>
<th>Chad</th>
<th>Democratic Republic of the Congo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equatorial Guinea</td>
<td>Gabon</td>
<td>Nigeria</td>
<td>Republic of the Congo</td>
<td>South Sudan</td>
</tr>
</tbody>
</table>
# Summary of malaria treatment and testing recommendations for asymptomatic refugees in sub-Saharan Africa relocating to the United States

<table>
<thead>
<tr>
<th>Population</th>
<th>Presumptive treatment without testing</th>
<th>Test by blood smear or rapid diagnostic test</th>
<th>Test result</th>
<th>Treat</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>All adults and children (except pregnant women during their first trimester, children who weigh less than 5-kg, and persons with known contraindication to recommended regimen)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td><strong>Option 1</strong>: artemether-lumefantrine <strong>Option 2</strong> (only if Option 1 is not available): artesunate-amodiaquine (consult CDC)</td>
</tr>
<tr>
<td>Lactating women can receive treatment regardless of infant weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnant women during the first trimester</td>
<td>No</td>
<td>Yes</td>
<td>Positive</td>
<td>Yes</td>
<td>National guidelines</td>
</tr>
<tr>
<td>Infants weighing less than 5-kg</td>
<td>No</td>
<td>Yes</td>
<td>Positive</td>
<td>Yes</td>
<td>National guidelines</td>
</tr>
<tr>
<td>Persons with other contraindications to recommended regimen (e.g., known allergy)</td>
<td>No</td>
<td>Yes</td>
<td>Positive</td>
<td>Yes</td>
<td>Discuss with CDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Negative</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
### Dosing of artemether-lumefantrine for asymptomatic *Plasmodium falciparum* malaria

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Artemether-lumefantrine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Number of tablets per dose</strong></td>
</tr>
<tr>
<td></td>
<td>Given at 0 hours, 8 hours, 24 hours, 36 hours, 48 hours, and 60 hours</td>
</tr>
<tr>
<td>&lt; 5</td>
<td>Not recommended</td>
</tr>
<tr>
<td>5–14</td>
<td>1 tablet</td>
</tr>
<tr>
<td>15–24</td>
<td>2 tablets</td>
</tr>
<tr>
<td>25–34</td>
<td>3 tablets</td>
</tr>
<tr>
<td>&gt; 35</td>
<td>4 tablets</td>
</tr>
</tbody>
</table>
Syphilis

• Congenital syphilis, especially with involvement of the central nervous system, may not have been diagnosed or may have been treated inadequately in children from some resource-limited countries.

• Children aged 15-years and older should have had serologic testing for syphilis as part of the required overseas medical assessment.

• Children who had positive test results are required to complete treatment before arrival in the United States.

• Health care professionals should screen immigrant children for syphilis by reliable nontreponemal and treponemal serologic tests regardless of history or a report of treatment.
Syphilis

• Nontreponemal testing
  • Venereal Disease Research Laboratory (VDRL) slide test
  • Rapid Plasma Reagin (RPR) card test
  • Automated Reagin test (ART)

• Treponemal testing
  • *Treponema pallidum* particle agglutination (TP-PA)
  • *Treponema pallidum* enzyme immunoassay (TP-EIA)
  • *Treponema pallidum* chemiluminescent assay (TP-CIA)
  • Fluorescent treponemal antibody absorption (FTA-ABS)
  • Microhemagglutination test for *Treponema pallidum* (MHA-TP)

• Yaws, pinta, leptospirosis, rat-bite fever, relapsing fever, and Lyme disease can cause false-positive Treponemal testing results

• Reverse sequence testing
  • TP-EIA/TP-CIA screening; if positive, then VDRL/RPR
Syphilis

- Penicillin G benzathine, 50,000-Units/kg, intramuscularly (maximum/adult dose 2.4-million Units) once for primary, secondary, and early latent (acquired within preceding 12 months) syphilis

- Penicillin G benzathine, 50,000-Units/kg, intramuscularly (maximum/adult dose 2.4-million Units) as three doses at weekly intervals for late latent (acquired beyond preceding 12 months/unknown) and tertiary (adult) syphilis

- Aqueous crystalline penicillin G, 200,000-300,000-Units/kg/day (maximum/adult dose 18-24-million Units/day) intravenous every 4-6 hours for 10-14 days or penicillin G procaine 2.4-million Units intramuscularly daily plus probenecid, 500-mg orally 4-times/day for 10-14 days (adult) for neurosyphilis
Tuberculosis

- *Mycobacterium tuberculosis* infection is commonly encountered in immigrant children

- Incidence rates of tuberculosis (TB) vary by country and by age within countries

- Predeparture TB screening requirements for immigrants (October 2013):
  - Chest radiograph for all persons aged 15-years and older
  - Sputum smears and cultures for those persons with an abnormal chest radiograph
  - Drug susceptibility testing for all isolates
  - Completion of directly observed treatment before immigration for persons with pulmonary disease
Tuberculosis

• Refugees and immigrant children aged 2-14 years from countries with TB prevalence ≥20 cases per 100,000 population also must have a tuberculin skin test (TST) or interferon-gamma release assay (IGRA) performed

• Children with a positive TST or IGRA result should have undergone chest radiography prior to arrival

• Children aged younger than 2-years are not tested unless it is brought to the attention of screening physicians outside the United States that they are a known contact of an active case, have known HIV infection, or have signs or symptoms suggestive of TB disease
Tuberculosis Screening for Applicants in Low Tuberculosis Burden Countries

Tuberculosis Screening for Applicants 2 - 14 Years of Age in Low TB burden countries*

- For all applicants 2 through 14 years of age in low tuberculosis burden countries
  - Medical history
  - Physical examination

- For those with signs or symptoms of tuberculosis or known HIV infection
  - IGRA
  - Chest x-ray
  - Three sputum smears and three cultures for M. tuberculosis

- For those with positive cultures
  - Drug susceptibility testing

Tuberculosis screening for applicants 15 years of age or older in low TB burden countries*

- For all applicants ≥15 years of age in low tuberculosis burden countries
  - Medical history
  - Physical examination
  - Chest x-ray

- For those with a chest x-ray suggestive of tuberculosis, or signs or symptoms of tuberculosis, or known HIV infection
  - Three sputum smears and three cultures for M. tuberculosis

- For those with positive cultures
  - Drug susceptibility testing

*Tuberculosis screening for applicants 2 through 14 years of age in countries with a WHO-estimated tuberculosis disease incidence rate <20 cases per 100,000 population.

*Tuberculosis screening for applicants ≥15 years of age in countries with a WHO-estimated tuberculosis disease incidence rate <20 cases per 100,000 population.
Tuberculosis Screening for Applicants 2 - 14 Years of Age in High Burden Countries*

For all applicants 2 through 14 years of age in high tuberculosis burden countries
- Medical history
- Physical examination
- IGRA

For those with a positive IGRA or signs or symptoms of tuberculosis or known HIV infection
- Chest x-ray

For those with a chest x-ray suggestive of tuberculosis, or signs or symptoms of tuberculosis, or known HIV infection
- Three sputum smears and three cultures for *M. tuberculosis*

For those with positive cultures
- Drug susceptibility testing

Tuberculosis Screening for Applicants 15 Years of Age or Older in High TB Burden Countries*

For all applicants ≥ 15 years of age in high tuberculosis burden countries
- Medical history
- Physical examination
- Chest x-ray

For those with a chest x-ray suggestive of tuberculosis, or signs or symptoms of tuberculosis, or known HIV infection
- Three sputum smears and three cultures for *M. tuberculosis*

For those with positive cultures
- Drug susceptibility testing

* Tuberculosis screening for applicants ≥ 15 years of age in countries with a WHO-estimated tuberculosis disease incidence rate ≥ 20 cases per 100,000 population.
Tuberculosis

• Testing for latent *Mycobacterium tuberculosis* infection (LTBI) in infant, children, and adolescent populations of immigrants, adoptees, and refugees should be done.

• Presence or absence of a Bacille Calmette-Guérin (BCG) vaccine scar should be noted, although approximately 10% of children who received a BCG vaccine as infants will not have a scar.

• Receipt of BCG vaccine is not a contraindication to a TST.

• Either TST or IGRA can be used for children aged 2-years or older, but IGRA is preferred to avoid a false-positive TST result caused by a previous vaccination with BCG.
Tuberculosis

- In BCG-vaccinated children aged 2-years and older, IGRA can be performed to help determine whether a “positive” TST result is attributable to LTBI or to the previous BCG vaccine.

- Some anergic immigrants may have false-negative TST or IGRA tests because of underlying malnutrition, stress, or untreated HIV infection.

- Routine chest radiography is not indicated in asymptomatic children in whom the TST or IGRA result is negative.

- In children with a positive TST or IGRA test, further investigation, including chest radiography and a complete physical examination is necessary to determine whether tuberculosis disease is present.
HIV

• Screening for HIV should be considered for all internationally adopted children; any test results from the child’s country of origin may not be reliable

• Refugees and immigrants no longer are required to have HIV testing routinely as part of the immigration medical assessment

• HIV testing still is recommended for persons who are diagnosed with tuberculosis disease as part of the overseas medical assessment

• HIV testing after arrival in the United States is recommended for refugees aged 13-64 years and is encouraged for refugees aged 12-years or younger and 64-years or older
HIV

• The decision to screen immigrant children for HIV after arrival in the United States should depend on history and risk factors:
  • Receipt of blood products
  • Maternal drug use
  • Physical examination findings
  • Prevalence of HIV infection in the child’s country of origin

• If there is a suspicion of HIV infection, testing should be performed before administration of live-antigen vaccines
HIV

• Children aged <13-years should be screened unless negative HIV status for the mother of the child is confirmed and the child is at low risk of infection (no history of previous blood-product transfusions, early sexual activity, or history of sexual violence or abuse)

• Most children aged <13-years will require HIV screening due to an absence of a complete past medical history

• Children aged <18-months who test positive for HIV antibodies should receive further testing with DNA or RNA assays

• All children born to or breast-fed by an HIV-infected mother should receive chemoprophylactic trimethoprim/sulfamethoxazole beginning at age ≥6 weeks until they are confirmed to be uninfected
HIV

• The HIV-1 Western blot is interpreted as positive if bands appear at the site of two or more of the following HIV antigens: p24; gp41; gp120/160

• The Western blot is considered indeterminate if bands are present but with fewer than two of the latter bands

• The Western blot is interpreted as negative only if no bands are present

• Current HIV EIAs are >99% sensitive and specific for HIV infection

• Fourth-generation HIV antigen/antibody combination test simultaneously detects HIV p24 antigen and antibodies to HIV type 1 and HIV type 2
HIV

• Rapid HIV antibody assays have high sensitivity and specificity (>99%) and are useful for screening individuals who may not return for the results of conventional screening tests

• A reactive rapid HIV test result must be confirmed with a follow-up supplemental test (e.g., Western blot or RNA) before a final diagnosis of HIV infection can be made

• If confirmatory testing yields negative or indeterminate results, follow-up testing should be performed on a blood specimen collected 4 weeks after the initial reactive rapid HIV test result
HIV

- Qualitative RNA testing has been FDA-approved for diagnosis of acute HIV infection in antibody-negative persons

- Qualitative RNA testing may also be used to confirm a reactive antibody screening test

- Quantitative tests for HIV RNA are available, but are not FDA-approved for diagnosis; quantitative RNA tests are routinely used to quantify viral load for monitoring progression of HIV disease
Chagas Disease

• Chagas disease is endemic throughout much of Mexico and Central and South America

• Countries with endemic Chagas disease include: Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Uruguay, and Venezuela

• If a child (aged >12-months) comes from a country with endemic Chagas disease or has received a blood transfusion in a country with endemic disease, testing for *Trypanosoma cruzi* should be considered

• The risk of Chagas disease is low in immigrant children from countries with endemic infection
Measles

• In the United States, multiple outbreaks of measles have been reported in children adopted from China and in their US contacts

• Prospective parents who are traveling internationally to adopt children, as well as their household contacts, should ensure that they have a history of natural disease or have been immunized adequately for measles according to US recommendations

• Prospective parents and contacts who were born after 1957 in the absence of documented measles infection or contraindication to the vaccine should receive 2 doses of a measles-containing vaccine after the age of 12-months with the 2 doses separated by at least a 28-day interval
Suggested Screening Tests for Infectious Diseases in International Adoptees, Refugees, and Immigrants

Hepatitis B virus serologic testing:
- Hepatitis B surface antigen (HBsAg) [can also include hepatitis B surface antibody (anti-HBs) and hepatitis B core antibody (anti-HBc)]

Hepatitis C virus serologic testing (when indicated)

Syphilis serologic testing:
- Nontreponemal test (e.g., RPR, VDRL, or ART)
- Treponemal test (e.g., MHA-TP, FTA-ABS, TP-EIA, TP-CIA, or TP-PA)

Human immunodeficiency virus (HIV) 1 and 2 serologic testing; consider combination rapid HIV antigen/antibody testing
Suggested Screening Tests for Infectious Diseases in International Adoptees, Refugees, and Immigrants

Complete blood cell count with red blood cell indices and differential

Stool examination for ova and parasites (1–3 specimens) with specific request for *Giardia duodenalis* and *Cryptosporidium* spp. testing by direct fluorescent antibody or EIA testing

Tuberculin skin test or interferon-gamma release assay

In children from countries with endemic infection:

*Trypanosoma cruzi* serologic testing
Suggested Screening Tests for Infectious Diseases in International Adoptees, Refugees, and Immigrants

In children with eosinophilia (absolute eosinophil count exceeding 450-cells/mm$^3$) and negative stool ova and parasite examinations, can consider:

- *Toxocara canis* serologic testing
- *Strongyloides stercoralis* serologic testing
- *Schistosoma* spp. serologic testing for children from sub-Saharan African, Southeast Asian, and certain Latin American countries

Lymphatic filariasis serologic testing for children older than 2-years from countries with endemic infection
Other Infectious Diseases

- Skin infections that occur commonly in immigrant children include bacterial (e.g., impetigo) and fungal (e.g., candidiasis) infections and ectoparasitic infestations (e.g., scabies and pediculosis).

- Diseases such as typhoid fever, leprosy, or melioidosis are encountered infrequently in immigrant children; therefore, routine screening for these diseases is not recommended.

- Findings of fever, splenomegaly, respiratory tract infection, anemia, or eosinophilia should prompt an appropriate evaluation on the basis of the epidemiology of infectious diseases that occur in the child’s country of origin.
Resources/Literature Cited

- https://www.cdc.gov/parasites/lymphaticfilariasis/
- https://www.cdc.gov/immigrantrefugeehealth/exams/ti/panel/tuberculosis-panel-technical-instructions.html#screening
- https://www.cdc.gov/immigrantrefugeehealth/