**Overview of Refugee Health Screening: Overseas**

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**Refugee Arrivals in New Hampshire, 2012**

**Mobility: time for health interventions?**

**Refugee Health Screening**

- Congress authorizes HHS Secretary to screen persons coming to US via Immigration Act
- HHS Secretary delegates CDC (DGMQ) to determine specific regulatory requirements and technical guidelines
- Medical exam is mandatory for all refugees
- Purpose: to identify applicants with inadmissible health-related conditions (all treatable)
  - Communicable disease of public health significance
  - Lack certain vaccinations
  - Physical/mental disorder with harmful behavior
  - Substance abuse
- Exams by ~6500 panel physicians selected by DOS & CDC
  - In US exams performed by ~3000 civil surgeons

**Overseas Medical Exam**

- Screening and/or Treatment for
  - Tuberculosis
  - Intestinal parasites
  - Malaria
  - Vaccine Preventable Diseases
  - Not HIV
**Overseas TB Screening: 1991 TB screening algorithm**

- **Inactive TB (class B2 TB)**
  - Chest radiograph
  - **No TB**
  - **Active TB**
  - **AFB sputum smears (3)**
  - All neg.
  - Smear-negative TB (class B1 TB)
  - Smear-positive TB (class A TB)
  - At least one pos.

**2007 Revised TB Screening & Rx**

- For applicants 2 - 10 years of age:
  - Medical history
  - Physical examination
  - Tuberculosis skin test
  - AFB sputum smears
  - Drug susceptibility testing (if needed)

- For applicants 11 + years of age:
  - Medical history
  - Physical examination
  - Chest radiograph
  - Medical history
  - Physical examination
  - Chest radiograph
  - Medical history
  - Physical examination
  - Chest radiograph
  - Drug susceptibility testing (if needed)

Screening for applicants in countries with WHO est'd incidence ≥ 20/100,000

**Travel Clearance Validity: TB evaluation**

- If no TB classification or only classified as LTBI (B2) or a contact (B3) and no HIV:
  - Travel clearance is valid for 6 months from the time the evaluation is complete
- Otherwise travel clearance valid for 3 months

**Tuberculosis Treatment**

- Applicants with pulmonary or laryngeal TB must complete treatment under DOT prior to US immigration
- Applicants with possible TB who are sm and culture negative are not treated overseas unless their CXR and clinical findings are highly suggestive of TB
- Treatment is according to ATS/CDC/IDSA guidelines using only quality-assured drugs
- Contact investigations are performed, contacts evaluated and started on treatment as needed

**Intestinal Parasites**

- Smear-negative TB
- Contact investigations are performed, contacts evaluated and started on treatment as needed
- Smear-positive TB
- AFB sputum smears (3)
- (class A TB)
- Travel Clearance Validity: TB with WHO est'd incidence >
Parasitic Helminths

- Trematodes (flukes)
  - Blood/various systems: Schistosoma
  - Biliary tract: Clonorchis, Fasciola
  - Lung: Paragonimus
- Cestodes (tapeworms)
  - Taenia saginata, Taenia solium, Hymenolepis nana
- Intestinal (nematodes/roundworms)
  - Blood, lymphatic, subcutaneous

Global Prevalence of Disease

<table>
<thead>
<tr>
<th>Rank</th>
<th>Disease</th>
<th># Infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ascaris</td>
<td>807,000,000</td>
</tr>
<tr>
<td>2.</td>
<td>Trichuriasis</td>
<td>604,000,000</td>
</tr>
<tr>
<td>3.</td>
<td>Hookworm</td>
<td>580,000,000</td>
</tr>
</tbody>
</table>


Soil Transmitted Helminths = STH

- Ascarias (“Roundworm”)
- Trichuriasis (“Whipworm”)
- Hookworm

Soil Transmitted Helminths (STH)

- Intestinal Nematodes
- Part of development occurs in the soil
- Average 3-4 weeks in soil until infective
- Infection via eggs in contaminated soil (Ascaris, Trichuris) or skin penetration (Hookworm)

Intestinal Helminths

- Ascaris lumbricoides
  - May be asymptomatic
  - Mild abdominal discomfort to (fatal) SBO
  - Malnutrition, impaired growth
- Trichuriasis
  - May be asymptomatic
  - Heavy infection – Frequent painful bloody stools with mucus, rectal prolapse
  - Children – anemia, growth retardation
- Hookworm
  - Most asymptomatic, or mild GI symptoms
  - Blood loss leading to anemia and protein loss, growth retardation in children

Ascaris lumbricoides (roundworm)
Whipworm: Trichuriasis Colitis

The Human Hookworms

Necator americanus
Ancylostoma duodenale

Human Hookworm

How Prevalent are STSs in Refugee Populations?

- CDC and International Organization for Migration (IOM) screened Barawan Somali refugees awaiting resettlement
  - 38% had intestinal parasites
  - 25% had multiple infections

Implementation of Pre-Departure Therapy for Intestinal Parasites

- Since May 1999: all sub-Saharan African refugees
  - Single dose of albendazole
  - Within 3 days of departure
  - Pregnant women and children < 2 yrs excluded

- Swanson et al:
  - Retrospective study of ~27,000 African and SE Asian refugees resented in Minn between 1993 and 2007
  - Screened by stool examination for intestinal parasites on resettlement
  - Showed decrease in prevalence of intestinal nematodes among newly arrived refugees

What is the most effective approach?

- Muennig et al study of “watchful waiting” vs. universal screening vs. presumptive treatment with albendazole
- Compared with “watchful waiting”
  - Presumptive treatment: avert 870 disability life years (DALY’s) and prevent 33 deaths and 374 hospitalizations, save $42 million/yr
  - Universal stool screening & treatment: cost $159,236 per DALY averted
- Presumptive Rx saves lives and money

Preventing Malaria

655,000 deaths in 2010 - mostly children <5

Giardia
Hookworm
Trichuris
Ascaris
Strongyloides
Any helminth
Multiple helminths

Prevention of Malaria

Benefits of Presumptive Treatment for STH

• Since overseas implementation of empiric albendazole therapy, there has been a significant decrease in intestinal parasites among newly-arriving refugees
  - 96% reduction in Hookworm prevalence
  - 93% reduction in Ascaris prevalence
  - 54% reduction in Trichuris
  - ~ 3-fold reduction in all stool helminths

Pre-departure Presumptive Therapy

• Revised pre-departure recommendations now include presumptive treatment for Strongyloides and Schistosomiasis in selected populations
  - Ivermectin x 2 days for non-pregnant refugees from South/SE Asia and all non-loa loa endemic areas of Africa (being piloted)
  - Praziquantel for all sub-Saharan African refugees (January 2010)
  - Albendazole (single dose), all African and Asian refugees

See www.cdc.gov/ncidod/dq/refugee/index.htm

Pre-Departure Presumptive Therapy for Malaria

Malaria Morbidity & Mortality

Malaria morbidity & mortality

- 194 endemic counties (~40% of population) in 2011
- 216 million episodes in 2010
- 635,000 deaths in 2010 - mostly children <5
- 2010

Preventing Malaria

Focus
- Plasmodium falciparum
- Sub-Saharan Africa (SSA)

Before arrival
- Prevalence of P. falciparum infection is >50% in much of sub-Saharan Africa

After arrival
- Many infected refugees are asymptomatic
- Some refugees are parasitemic for months
- A minority develop clinical malaria

Malaria may be locally transmitted in the U.S.
Prevalence of Malaria Infection in US-Bound or Newly Arrived Refugees

<table>
<thead>
<tr>
<th>Study Site, Year</th>
<th>Origin of Refugee</th>
<th>Timing</th>
<th>Prevalence of Infection</th>
<th>Percent P. falcip.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya, 1993 (n=279)</td>
<td>Somalia</td>
<td>Pre-departure</td>
<td>15%</td>
<td>30% 91%</td>
</tr>
<tr>
<td>Kenya, 1997 (n=385)</td>
<td>Somalia</td>
<td>Pre-departure</td>
<td>7%</td>
<td>10% 96%</td>
</tr>
<tr>
<td>US, 1997-2000 (n=44 children)</td>
<td>W. Africa</td>
<td>1 mo. post-arrival</td>
<td>--</td>
<td>64% 54%</td>
</tr>
<tr>
<td>Canada, 2000-2001 (n=521)</td>
<td>E. Africa</td>
<td>0-4 mo. post-arrival</td>
<td>19%</td>
<td>-- 83%</td>
</tr>
</tbody>
</table>

1999 Recommendation
Mass pre-departure treatment
- All refugees from SSA
- Sulfadoxine-pyrimethamine (SP,Fansidar™)

More Data to support Malaria Pre-departure Presumptive Treatment
- Is this effective?
  - Stauffer et al: screened 103 Libyans 4 wks after arrival (2005)
  - 9% infected with P. falciparum by PCR vs. >60% prior to empiric treatment
- Is it cost-effective?
  - Collinet-Adler et al: retrospective chart review of 58 symptomatic, confirmed cases of malaria seen in Hennepin County, MN, 1996 through 2005
  - Rs in US = $1700 vs presumptive pre-departure Rs = $150-$350 to prevent one case (NNTT=14)
  - Cost-effective if malaria prevalence >1%

General Recommendations for Refugees from Sub-Saharan Africa
- Mass pre-departure treatment
  - 1999: Sulfadoxine-pyrimethamine (SP, Fansidar™)
  - 2005: Artemisinin-based combination therapy (ACT)
    - Artemether-lumefantrine (AL, Coartem™) preferred
    - Implementation delayed until July 2007 due to drug cost and availability

Outbreaks of Vaccine-Preventable Diseases affecting U.S.-Bound Refugees

<table>
<thead>
<tr>
<th>Year</th>
<th>Disease</th>
<th>Refugee Population</th>
<th>Camp location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Hepatitis A, varicella</td>
<td>Hmong</td>
<td>Thailand</td>
</tr>
<tr>
<td>2005</td>
<td>Measles, rubella, varicella</td>
<td>Liberian</td>
<td>Côte d’Ivoire</td>
</tr>
<tr>
<td>2006</td>
<td>Measles, rubella, varicella</td>
<td>Ethiopian, Somali</td>
<td>Kenya</td>
</tr>
<tr>
<td>2006</td>
<td>Varicella</td>
<td>Burmese</td>
<td>Thailand</td>
</tr>
<tr>
<td>2007</td>
<td>Polio</td>
<td>Somali</td>
<td>Kenya</td>
</tr>
<tr>
<td>2007</td>
<td>Measles, typhoid, varicella</td>
<td>Burmese</td>
<td>Thailand</td>
</tr>
<tr>
<td>2007</td>
<td>Meningitis</td>
<td>Somali, Sudanese</td>
<td>Kenya</td>
</tr>
<tr>
<td>2008</td>
<td>Measles</td>
<td>Somali</td>
<td>Kenya</td>
</tr>
<tr>
<td>2008</td>
<td>Meningitis, mumps</td>
<td>Burundian</td>
<td>Tanzania</td>
</tr>
<tr>
<td>2008</td>
<td>Mumps</td>
<td>Eritrean</td>
<td>Ethiopia</td>
</tr>
<tr>
<td>2008</td>
<td>Pertussis</td>
<td>Somali</td>
<td>Kenya</td>
</tr>
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Summary and Future Directions in Refugee Screening

- Shift from domestic to more pre-departure screening, treatment, prevention
  - TB screening
  - Presumptive Rx for STHs and malaria
- The pre-departure interventions are evidence-based, cost-effective
- Future plans to increase post-arrival surveillance and follow-up
- Increased communication across systems (e.g. from overseas to post-arrival clinicians)
- Adapting to population-specific guidelines

Contacts of Tuberculosis Cases

Contacts of persons with pulmonary tuberculosis disease should be removed from exposure to the person with tuberculosis.

All contacts should receive a TST or IGRA.

Contacts who have clinical findings or CBO findings suggestive of tuberculosis should provide at least three sputum specimens for AFB microscopy and mycobacteria culture.

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http://www.imdb.com/video/hulu/vi2933562905?ref_=tt_pv_vi_1

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TB Classifications

No TB Classification
Applicants with mental tuberculosis remain unchanged.

Class 1 TB with tuberculin
All applicants who have tuberculosis disease and have been granted a visa.

Class II TB, Pulmonary
No treatment
- Applicants who have medical history, physical exam, or CXR findings suggestive of pulmonary tuberculosis but have negative AFB smears and cultures and are not diagnosed with tuberculosis or are not at risk to have tuberculosis contact need skin testing.

Completed treatment
- Applicants who were diagnosed with pulmonary tuberculosis and successfully completed directly observed therapy prior to immigration. The same rule should apply to the patient's smear status and cultures must be negative if drug susceptibility testing results are available.

Class III TB, Extrapulmonary
Applicants with evidence of extrapulmonary tuberculosis. The same rule of skin testing should be implemented.

Class IV TB, LTBI Evidence
Applicants who have a tuberculosis-related test (TST or positive IGRA) but do not have a positive medical history for tuberculosis. The site of the TST must be IGRA or IGRA, and the applicant's status of latent TB infection (LTBI) should be determined. For applicants who have a positive TST or IGRA, all testing and records related to the applicant's TST or IGRA should be documented. A cut-off of 10 mm or positive IGRA should assess this status along with a record of LTBI evidence. (continued...