Migration-Specific Aspects of GeoSentinel

David Hamer, MD
Department of Global Health
Boston University School of Public Health
Section of Infectious Diseases, Dept. of Medicine,
Boston Medical Center

Disclosures
Salary and travel support:
- GeoSentinel funding from US CDC, ISTM, and Public Health Agency of Canada

Talk Outline
- GeoSentinel overview
- Overview of global migrant health data in GeoSentinel
- Examples of two recent analyses
  - Syrian migrants
  - Eritrean migrants and P. vivax
- Conclusions and future directions

GeoSentinel Global Surveillance Network
- Established in 1995 by CDC and International Society for Travel Medicine (ISTM)
- Clinic-based global surveillance system
  - De-identified patient information
  - International travelers and immigrants
  - Central electronic database
  - Link time and place of exposure
  - Detect new infections and patterns
  - Monitor disease burden and distribution

Migrant-Relevant Variables Collected in GeoSentinel

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Travel History</th>
<th>Clinical Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Migration history</td>
<td>Inpatient/outpatient condition</td>
</tr>
<tr>
<td>Age</td>
<td>Country or countries of exposure to current illness</td>
<td>Main presenting symptoms</td>
</tr>
<tr>
<td>Country</td>
<td>Seen during migration or after immigration</td>
<td>Underlying conditions</td>
</tr>
<tr>
<td></td>
<td>Birth, Citizenship</td>
<td>Diagnosis</td>
</tr>
<tr>
<td></td>
<td>Residence before age 10</td>
<td>Diagnostic method(s)</td>
</tr>
<tr>
<td></td>
<td>Current residence</td>
<td>Diagnosis status (CIP)</td>
</tr>
</tbody>
</table>

How does GeoSentinel work?

Patients with migration-related condition

GeoSentinel Site or Affiliate Members

Rapid Query Response Loop

Surveillance Data

Central Database

Reports

Data analysis by Sites

GeoS Sites and Affiliate Members +/-
ISTM Membership +/-
Partners (e.g. ProMED, ECDC, PHAC, WHO, TropNet, EpiCore, and Healthmap)
Sentinel Sites Contributing Data
(as of September 2018)

72 GeoSentinel sites in 31 countries:
- 27 North America
- 25 Europe
- 10 Asia
- 3 Africa
- 3 South America
- 2 Middle East
- 2 Oceana

221 Affiliate members

GeoSentinel Sites and Affiliate Members

Data Summary

Numbers of patient encounters:
• 321,057 patients total (~14% migrants)
• 507,420 final diagnoses
(as of 31 August 2018)

GeoS records cover traveler, immigrant, and refugee exposures in 251 countries and territories

Top 10 Diagnoses: Immigrants & VFRs
(Last 2 Years)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number of Diagnoses</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chagas Disease, Chronic</td>
<td>170</td>
<td>10.6%</td>
</tr>
<tr>
<td>Acute Tuberculosis, Positive Mycobacterium KINH (e.g., Quinolone or T/SPOT) (Not Active Disease)</td>
<td>97</td>
<td>6.2%</td>
</tr>
<tr>
<td>Malaria, P. falciparum</td>
<td>810</td>
<td>5.0%</td>
</tr>
<tr>
<td>Vitamin D deficiency/insufficiency</td>
<td>723</td>
<td>4.5%</td>
</tr>
<tr>
<td>Strongyloides, simple intestinal</td>
<td>607</td>
<td>3.8%</td>
</tr>
<tr>
<td>Eosinophilia</td>
<td>596</td>
<td>3.7%</td>
</tr>
<tr>
<td>Schistosomiasis</td>
<td>404</td>
<td>2.5%</td>
</tr>
<tr>
<td>Hepatitis B, chronic (&gt; 6 mo)</td>
<td>388</td>
<td>2.4%</td>
</tr>
<tr>
<td>Chagas disease, chronic</td>
<td>385</td>
<td>2.4%</td>
</tr>
</tbody>
</table>

Overview of GeoSentinel Migrant Health Data

- Data (purpose of travel = migration) extracted from the database for 1997 – August 2018
- Data stratified into major regions of origin
- Timing of migration analyzed by year for each major region of origin
- Top 10 diagnoses summarized for each major region

- Note of caution: this preliminary analysis uses data that have not been cleaned

Results: Demographics
N = 33,862

- 45% female
- Mean age ± SD: 32 ± 17 years
  - Range 0–103 y
- 87% seen as outpatients
- Top region of origins:
  - Sub-Saharan Africa (32%)
  - Southeast Asia (20%)
  - South Asia (12%)
  - South America (8%)
  - Caribbean and Middle East (6% each)
Results: Timing of Migration

• Sub-Saharan Africa
  - Roughly similar proportions of immigrants seen at GeoSentinel sites since 2006
• Southeast Asia
  - Peak years of migration were 2002-2008 with steady proportions since then until 2015
• South Asia
  - Low proportions until 2010 then a steady flow until 2017

Sub-Saharan Africa: Top 10 Diagnoses

SE Asia: Top 10 Diagnoses

South Asia: Top 10 Diagnoses

South America: Top 10 Diagnoses

Caribbean: Top 10 Diagnoses
Middle East: Top 10 Diagnoses

- Latent TB infection
- Anemia
- Eosinophilia
- Dental problems
- Chronic hepatitis B
- Carriage non-pathogenic protozoa
- Vitamin D deficiency

Major Regional Similarities

- Common health problems:
  - Latent TB infection
  - Anemia
  - Eosinophilia
  - Dental problems
  - Chronic hepatitis B
  - Carriage non-pathogenic protozoa
  - Vitamin D deficiency

Major Regional Similarities and Differences

- Notable differences between regions
  - Schistosomiasis (sub-Saharan Africa)
  - Active tuberculosis (South Asia)
  - Strongyloidiasis (SSA, SE Asia, Middle East, Caribbean)
  - Chagas disease (South America)
  - Neurocysticercosis (South America)

GeoSentinel Syrian Minors: Results (N = 458)

- 94% male
- Age ranges: 16-17 y - 64%
  13-15 y - 28%
  6-12 y - 8%
- Number of transit countries varied from 1-7 with Turkey, Greece, Serbia, Macedonia, and Hungary most common

2 groups of Syrian refugees analyzed:

- 488 minor Syrian migrants screened in Berlin from 2013 to 2015
- 44 ill adult Syrian migrants seen in 8 countries between 2011 and 2015
Syrian Minors: Diagnoses

- No diagnosis: 66%
- 1+ GI protozoa: 22%
  - Giardia: 7%
- Eosinophilia: 17%
- Anemia: 7%
- Schisto (+ serology) 1%
- Dental problems 5%
- Other: fungal skin infections, scabies, URI

GeoSentinel Analysis: Syrian Migrants (N = 44)

- Age range: 1 – 67 y (median 35 y)
- 66% male
- Main countries of evaluation: Norway (15); USA (9); Denmark (7); Canada (6)
- Most common diagnoses:
  - Cutaneous leishmaniasis (32%)
  - Active TB (11%)
  - Chronic viral hepatitis (9%)
  - Latent TB infection (9%)
  - Vitamin D deficiency (9%)

Malaria in Eritrean Migrants: A GeoSentinel Analysis

Schlagenhauf P et al. under review

- Identified 146 malaria cases in Eritrean migrants from 1999 – Sept. 2017
  - Marked increase in 2014-15
- 10 sites reported patients - mainly in Norway, Switzerland, Sweden, Israel, and Germany
- Majority were young male refugees/asylum seekers

Malaria in Eritrean Migrants: Species and Transit Routes

- P. vivax (84%), P. falciparum (8%), and P. ovale 3%
- Severe malaria (6%) (5/9 with P. vivax)
- Country of acquisition of malaria difficult to define
  - Possibly Eritrea or in transit through Ethiopia or Sudan
  - Major transit routes through Egypt, Turkey, Uganda, and Syria

Malaria in Eritrean Migrants

- About 1/3 had malaria during migration
- Most had onset of symptoms median 39 days after arriving in their host country
- Analysis highlights several challenges:
  - Complex migration routes
  - Difficulty identifying country of exposure
  - Delay in diagnosis and treatment

Conclusions

- GeoSentinel network includes centers that see migrants for screening and/or evaluation of acute illness
- Useful for comparing differences based on country of origin, migration route, and differences in screening procedures
- Great potential for multi-site studies
- Recent GeoSentinel migrant data will be presented by Dr. Elizabeth Barnett this afternoon (IDs in Migrants session 15:30)
Challenges With Collection of Migrant Health Data

- Variable definitions and understanding of refugee/migrant status
- Confidentiality issues (e.g. migration route)
- Difficulty associating specific diseases with country of origin vs. migration route
- Site differences in approach to evaluating migrant health issues (e.g. screening procedures, evaluation for NCDs)
- Limited data on psychiatric illness, trauma

Future Directions for GeoSentinel

- Special projects on specific aspects of migrant health (e.g. missed opportunities for screening NCDs, micronutrient deficiencies)
- Chagas disease (lead = Clara Crespillo, Madrid)
- Schistosomiasis (lead = Emmanuel Bottieau, Antwerp)
- Strongyloidiasis (lead = Andrea Boggild, Toronto)

Acknowledgments

- Site directors and co-directors
- GeoSentinel leadership team
- CDC team – esp. Kristina Angelo, Calvin Patimeteeporn
- ISTM administrative team
- Special advisors
- Funding from CDC (U50CK00189), ISTM and PHAC