Globalization: Travel, Human Migration and Public Health Risks

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Outline

• Travel trends
• Traveling populations
• Travel health risks
• Travelers as sentinels
• CDC’s Travel Notices
• Immigrant & Refugee Health
Immigrant and Refugee Arrivals = 437,864
Traveler Visits Abroad > 1 night = 63,502
International Passenger Arrivals = 49,401,528
Wild Mammals Imported = 88,000 (Photo Delta Sky Mag.)
Immigrant and Refugee Arrivals = 437,864
Migrating Populations, 1960-1975

Source: Population Action International 1994
Migrating Populations in the 1990s

4 x increase in volume as compared to 1960-75

Source: Population Action International 1994
A Day in the Life of the Travelers’ Health Team

- Dengue in Argentina
- Chikungunya fever in Italy
- Hepatitis A in Ethiopian adoptees
- Schistosomiasis in Tanzania
- Rabies imported from Thailand and India
- Zika virus in Yap
- Norovirus in Dominican Republic
- Malaria in the Bahamas
Estimated Annual International Arrivals, U.S.A. 2006

International Arrivals 51.1 Million

Immigrants 1,266,264
Refugees 41,150

ITA, Dept. of Commerce, Calendar Year 2006
Number of Visits Abroad of ≥1 night by U.S. Residents, 1995 - 2006

*ITA, includes travel to Canada and Mexico
What proportion of the US adult population traveled outside the US for more than a day during the previous year?

17%
Where Do U.S. Residents Travel?

Of the 17% who traveled outside the U.S. . . .

Source: HealthStyles Survey 2006
VFRs: Visiting Friends and Relatives

- Foreign-born increased 57% since 1990 from 19.8 million to 31.1 million\(^1\)
- 20% of US population are first-generation immigrants or their children\(^2\)
- VFRs comprised ~43% of US overseas travelers in 2006\(^3\)

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\(^2\) Angell & Cetron, 2005

\(^3\) 2006 Profile of U. S. Resident Travelers Visiting Overseas Destinations Reported From: Survey of International Air Travelers, Office of travel and tourism Industries, USDOC
VFRs: Visiting Friends and Relatives

- Increased risk of travel-related infections
  - Malaria
  - Typhoid fever
  - Hepatitis A
  - Tuberculosis
- Unlikely to seek pre-travel health advice
- Limited access to care (e.g., uninsured)
- Lower perceived risk
- Primary-care clinicians unaware of risk

## U.S. Study-Abroad Students

### Leading Destinations 2005-2006, (N=223,534)

<table>
<thead>
<tr>
<th>United Kingdom</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>Austria</td>
</tr>
<tr>
<td>Spain</td>
<td>New Zealand</td>
</tr>
<tr>
<td>France</td>
<td>Czech Republic</td>
</tr>
<tr>
<td>Australia</td>
<td>Greece</td>
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<tr>
<td>Mexico</td>
<td>Chile</td>
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<tr>
<td>Germany</td>
<td>South Africa</td>
</tr>
<tr>
<td>China</td>
<td>Argentina</td>
</tr>
<tr>
<td>Ireland</td>
<td>Brazil</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>India</td>
</tr>
</tbody>
</table>
Seniors

- 9% of U.S. adults traveling abroad were ≥ 65 years
  ~3 million

- 25% were age ≥ 55 years
  ~8 million

ITA, 2004
Immunocompromised Travelers

- HIV
- Active leukemia/lymphoma
- Generalized malignancy
- Aplastic anemia
- Solid organ transplant
- Bone Marrow Transplant (BMT) within 2 years
- Transplant on immunosuppressive medication
- Congenital immunodeficiency
- Radiation Therapy
Travelers’ Health Risks

Of 100,000 travelers to a developing country for 1 month:

- 50,000 will develop some health problem
- 8,000 will see a physician
- 5,000 will be confined to bed
- 1,100 will be incapacitated in their work
- 300 will be admitted to hospital
- 50 will be air evacuated
- 1 will die

Steffen R et al. J Infect Dis 1987; 156:84-91
Deaths Related to International Travel

N = 2463

- Cardiovascular
- Medical
- Injury
- Homicide/Suicide
- Infectious Disease
- Other

Injury Deaths and International Travel

N = 601

Infectious Disease Risks to the Traveler

- Malaria
- Diarrhea
- Leishmaniasis
- Rabies
- Dengue
- Meningococcal Meningitis
- Schistosomiasis
- Tuberculosis
- Leptospirosis
- Polio
- Yellow Fever
- Measles
- JEV
Medical Tourism

COUNTRIES PROMOTING MEDICAL TOURISM

- Cuba
- Costa Rica
- Hungary
- Lithuania
- Turkey
- Israel
- Jordan
- India
- Thailand
- Malaysia
- South Africa

http://www.cbc.ca/news/
GeoSentinel Surveillance

- Provider-based Surveillance of international travelers and migrants.
  Does not cover endemic diseases in local populations
  - 39 travel/tropical medicine clinics globally (since 1996)
  - 145 Network Members on all 6 continents (since 2002)

= GeoSentinel Site
= Network Member
GeoSentinel Dataset, March 2007

Number of Patients in GeoSentinel ($n = 65,190$)

Place of Likely Exposure in Patients Seen After Travel
Who are GeoSentinel patients? (as of March 2007)

Complete Database

- 50% (31,955)
- 35% (22,682)
- 15% (10,026)

After Travel Visits

- Tourism 59% (18,540)
- VFR 14% (4629)
- Business 14% (4523)
- Research/Education 4% (1349)
- Missionary/Volunteer 9% (2784)

Visit clinic after travel
Visit clinic during travel
Immigration travel only

(n = 65,190)
(n = 31,995)
GeoSentinel: How Are the Data Used?

- Detect alarming events
  - new or emerging disease
- Monitor disease trends
- Identify risk groups
- Identify new risk areas
- Conduct epidemiologic research
Initial Events During SARS

Severe Acute Respiratory Syndrome (SARS)
March 14 - Urgent Alert

Dear GeoSentinel Sites:

Please see below this important alert from CDC and WHO who are both aggressively following these outbreaks of an apparently highly communicable atypical pneumonia and investigating any possible links.

Alert: Asia Highly Communicable Respiratory Disease

Dear GeoSentinel Network Members:

Please see below this important alert from CDC and WHO who are both aggressively following these outbreaks of an apparently highly communicable atypical pneumonia and investigating any possible links between cases in China, Hong Kong and Macau. We request all GeoSentinel sites to be on the alert for cases of atypical pneumonia in travelers recently returned from China, Hong Kong SAR, or Vietnam. Your appropriate national public health authorities should be notified. GeoSentinel is working closely with CDC on this and would appreciate e-mail advisement of any suspicious cases. Please keep this restricted to the GeoSentinel network for now.

David

Subject: FW: CDC Update 00117 - WHO issues a global alert about cases of atypical pneumonia

This is an official
CDC Health Update

Distributed via Health Alert Network
March 12, 2003, 23:15 EDT (23:15 PM EDT)
CDCHAN-00117-03-03-12-UPD-N
The Signal from Toronto Global, not just Asian Implications

RE: respiratory deaths in travellers to Hong Kong - Toronto URGEN

Hi Guys:
A quick heads up - we have just had 2 deaths (one in their 30s and one in their 60s) and 3 secondary cases (2 now in ICU) from an acute respiratory disease in recent travellers to Hong Kong. Early diagnostic tests for influenza A and B and other respiratory viruses are NEG. Anyone else having similar cases??
Kevin

Kevin C. Kain MD FRCPC
Professor of Medicine
University of Toronto

Severe Acute Respiratory Syndrome (SARS)
March 14 - originally released to site directors only

Dear Site Directors:

Six hours ago Kevin Kain at the Toronto GeoSentinel site submitted the shocking report shown below. An autopsy has been completed in the past few hours. The implications of this on a global basis are staggering in light of the apparent high contagiousness of the pathogen as reported from the outbreaks ongoing in Asia. The GeoSentinel link with CDC has allowed tissue to be routed directly to appropriate places in Atlanta. This will likely hit the news tomorrow in Canada but we wanted to give GeoS a heads up in front of the storm that is surely to follow. Because of sensitivities this news acquired directly through GeoS is not being routed with the CDC imprimatur and please keep this highly confidential until it hits the usual sources. In a few minutes I will follow with some updates as per the official CDC contact points. Privately we have been told of suspect cases in at least 3 other countries in Asia and possibly one in the US. Please
Rapid Institution of Enhanced Surveillance example: weekly trend analysis during SARS

Suspected Pneumonia in Travelers

proportion of ill dx per month


LCL T = .010 UCL
Leptospirosis-EcoChallenge, 2000

- September 11, 2000; London site Queries by e-mail concerning ill returnees from Eco-Challenge, Sabah 2000
- Query-Response to GeoS sites: Cases from NYC and Toronto. **Elapsed time=8 hours.**
- Participants worldwide still within incubation period. Wide broadcast of GeoSentinel Alert to to ISTM, ProMed, IDSA, TropMed. **Elapsed time=14 hours.**
- GeoSentinel sites interface directly with public health authorities in USA, UK, Australia and Canada to contact all at risk individuals. **Elapsed time=48 hours.**
Update: Outbreak of Acute Febrile Illness Among Athletes Participating in Eco-Challenge-Sabah 2000 — Borneo, Malaysia, 2000

During September 7–11, 2000, CDC was notified by the Idaho Department of Health, the Los Angeles County Department of Health Services, and the GeoSentinel Global Surveillance Network of at least 20 cases of acute febrile illness in three countries; all ill patients had participated in the Eco-Challenge-Sabah 2000 multisport expedition race in Borneo, Malaysia, during August 21–September 3, 2000 (1). Participants included athletes from 29 U.S. states and 26 countries. This report updates the ongoing investigation of this outbreak through December 2, which suggests that Leptospira were the cause of illness and that water from the Segama River was the primary source of infection. Participants in adventure sports and exotic tourism should be aware of potential exposure to unusual and emerging infectious agents.
Transmission of Malaria in Resort Areas --- Dominican Republic, 2004

Malaria is caused by any of four Plasmodium parasites carried by Anopheles mosquitoes and usually is transmitted by the bite of an infective female Anopheles. In rural areas of the Dominican Republic, P. falciparum malaria is endemic, with the highest risk in the far western region of the country, and prophylactic medication with chloroquine is recommended for incoming travelers. Conversely, urban and resort areas in the Dominican Republic have been considered nonmalarious, and prophylactic medication has not been recommended for persons traveling to these areas (1). However, since November 2004, CDC has received reports of three malaria cases in U.S. travelers returning from areas in La Altagracia and Duarte provinces (Figure) previously considered nonmalarious. An additional 14 cases of malaria in La Altagracia Province, in the far eastern region of the country, have been reported in European and Canadian travelers. This report describes three of these 17 malaria cases and summarizes the overall investigation, which led to expansion of CDC recommendations for chloroquine prophylaxis to include all of La Altagracia and Duarte provinces.

Reported by: C Kay, MD, D Patrick, MD, British Columbia Centre for Disease Control, Vancouver; J Keystone, MD, Univ Health Network/GeoSentinel, Toronto; M Bodie-Collins, Public Health Agency of Canada, C Riera, MD, Pan American Health Organization; J Puello, MD, Ministry of Health, Dominican Republic; T Jelinek, MD, Berlin Institute of Tropical Medicine, Germany; D Freedman, MD, GeoSentinel Global Surveillance Network of the International Society of Travel Medicine, Stone Mountain, Georgia; P Kozarsky, MD, C Reed, MD, Div of Global Migration and Quarantine; M Parise, MD, P Nguyen Dinh, MD, R Stolec, MD, Div of Parasitic Diseases, National Center for Infectious Diseases; M Eliades, MD, EIS Officer, CDC.

* The first U.S. patient was reported through the Emerging Infections Network, a provider-based sentinel network developed by the Infectious Disease Society of America. The other two U.S. patients were reported through the CDC Malaria Hotline. The Public Health Agency of Canada, the GeoSentinel Network, and the European Network on Imported Infectious Disease Surveillance reported six cases in travelers from Canada and eight cases in travelers from Europe.
Spectrum of Disease and Relation to Place of Exposure among Ill Returned Travelers

David O. Freedman, M.D., Leisa H. Weld, Ph.D., Phyllis E. Kozarsky, M.D., Tamara Fisk, M.D., Rachel Robins, M.D., Frank von Sonnenburg, M.D., Jay S. Keystone, M.D., Pratima Pandey, M.D., Martin S. Cetron, M.D., for the GeoSentinel Surveillance Network

ABSTRACT

Background Approximately 8 percent of travelers to the developing world require medical care during or after travel. Current understanding of morbidity profiles among ill returned travelers is based on limited data from the 1980s.

Methods Thirty GeoSentinel sites, which are specialized travel or tropical-medicine clinics on six continents, contributed clinician-based sentinel surveillance data for 17,353 ill returned travelers. We compared the frequency of occurrence of each diagnosis among travelers returning from six developing regions of the world.
TRAVEL NOTICE DEFINITIONS

CDC issues different types of notices for international travelers. As of April 2004, these definitions have been refined to make the announcements more easily understood by travelers, health-care providers, and the general public. The definitions are laid out below. They describe both levels of risk for the traveler and recommended preventive measures to take at each level of risk.

<table>
<thead>
<tr>
<th>Type of Notice/Level of Concern</th>
<th>Scope*</th>
<th>Risk for Travelers †</th>
<th>Preventive Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the News</td>
<td>Reports of sporadic cases</td>
<td>No increased risk over baseline for travelers observing standard recommendations</td>
<td>Keeping travelers informed and reinforcing standard prevention recommendations</td>
</tr>
<tr>
<td>Outbreak Notice</td>
<td>Outbreak in limited geographic area or setting</td>
<td>Increased but definable and limited to specific settings</td>
<td>Reminders about standard and enhanced recommendations for the region</td>
</tr>
<tr>
<td>Travel Health Precaution</td>
<td>Outbreak of greater scope affecting a larger geographic area</td>
<td>Increased in some settings, along with risk for spread to other areas</td>
<td>Specific precautions to reduce risk during the stay, and what to do before and after travel‡</td>
</tr>
<tr>
<td>Travel Health Warning</td>
<td>Evidence that outbreak is expanding outside the area or populations initially affected</td>
<td>Increased because of evidence of transmission outside defined settings and/or inadequate containment measures</td>
<td>In addition to the specific precautions cited above, <strong>postpone nonessential travel‡</strong></td>
</tr>
</tbody>
</table>

*The term “scope” incorporates the size, magnitude, and rapidity of spread of an outbreak.

†Risk for travelers is dependent on patterns of transmission, as well as severity of illness.

‡Preventive measures other than the standard advice for the region may be recommended depending on the circumstances (e.g., travelers may be requested to monitor their health for a certain period after their return, or arriving passengers may be screened at ports of entry).
### Immigrant & Refugee Health
#### U.S. Arrivals, 2005

- **All arrivals** 175,400,000
- **Unique individuals** ~60,000,000
  - **Short-term visitors** 54,000,000
  - **Long-term visitors** 3,000,000
    - (> 2 mo stay)
  - **Immigrants** 1,120,000
    - new admissions 380,000
    - status-adjusters 740,000
  - **Refugees** 50,000
Immigrants: 2 Categories

- **New arrivals**
  - Immigration visa from overseas consulate
  - Numbers:
    - \(~ 350,000\) immigrants per year
  - Medical exam by overseas “panel physicians”
    - appointed by consulates
    - “technical instructions” by CDC

- **“Status adjusters”**
  - Persons in U.S. on non-immigrant visa applying for legal permanent residence (“Green Card”)
  - Number: 450,000 to 750,000 per year
  - Medical exam by U.S.-based “civil surgeons”
“Durable Solutions” for Refugees
(8,500,000 in 2005)

• 3 UNHCR recognized durable solutions
  – Voluntary repatriation
    • 1,100,000 in 2005
  – Local integration
    • 70,000 in 2005
  – 3\textsuperscript{rd}-country resettlement
    • 80,000 in 2005
Refugee Resettlement, 2004
Admitting Countries

- Scandinavia* - Sweden, Norway, Denmark, Finland
- Others† - Netherlands, UK, New Zealand, Ireland, Chile, Mexico
- United States
- Canada
- Australia

* - Sweden, Norway, Denmark, Finland
† - Netherlands, UK, New Zealand, Ireland, Chile, Mexico
U.S. Refugee Admissions
1996-2008

Fiscal Year Number

Source: U.S. Dept. of State

* Projected or proposed
Overview: Overseas Medical Assessment

- Focus: “inadmissible conditions”
- Components
  - Medical history
    - Note: history is often unreliable among this population
  - Immunization history
    - Immigrants: at least 1 dose of ACIP-recommended vaccines
    - Exemption: international adoptees
  - Physical exam
  - Serologic tests: syphilis, HIV
  - TB screening
## Inadmissible Conditions

### Class A Conditions

*From Past Medical History and Physical Examination Worksheets*

- TB, active, infectious *(Class A, from Chest X-Ray Worksheet)*
- Syphilis, untreated
- Chancre, untreated
- Gonorrhea, untreated
- Granuloma inguinale, untreated
- Lymphogranuloma venereum, untreated

**Class A: inadmissible without waiver**

### Class B Conditions

*From Past Medical History and Physical Examination Worksheets*

- TB, active, noninfectious *(Class B1, from Chest X-Ray Worksheet)*
  - Treatment: □ None □ Partial □ Completed
- TB, inactive *(Class B2, from Chest X-Ray Worksheet)*
  - Treatment: □ None □ Partial □ Completed
  - See Section #4 on page 2 for TB treatment details
- Syphilis (with residual deficit), treated within the last year
- Other sexually transmitted infections, treated within last year
- Current pregnancy, number of weeks pregnant ________
- Other *(specify or give details on checked conditions from worksheets)*

**Class B: require notification**

- Human immunodeficiency virus (HIV)
- Hansen's disease, lepromatous or multibacillary
- Addiction or abuse of specific* substance without harmful behavior
- Any physical or mental disorder *(including other substance-related disorder)* with harmful behavior or history of such behavior likely to recur
  - *amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids, phenylcyclines, sedative-hypnotics, and anxiolytics*
- Hansen's disease, prior treatment
- Hansen's disease, tuberculoid, borderline, or paucibacillary
- Sustained, full remission of addiction or abuse of specific* substances
- Any physical or mental disorder *(excluding addiction or abuse of specific* substance but including other substance-related disorder) without harmful behavior or history of such behavior unlikely to recur
  - *amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids, phenylcyclines, sedative-hypnotics, and anxiolytics*
Overseas Medical Screening -- Weaknesses

- **Current program**
  - Regulatory approach rather than public health approach
  - Focus is “inadmissible conditions”, not improving health of the refugee

- **Weaknesses**:
  - TB screening and treatment under 1991 algorithm
  - No immunization requirement
    - Frequent outbreaks requiring costly interventions
    - Importation of VPD
  - Treatment of parasitic diseases
    - Single-dose albendazole
    - S/P for refugees from Sub-Saharan Africa
  - Prevention of perinatal HIV & HBV
MDR TB Cases, United States, 1993-2005

XDR TB ('00-'06): 76%
1991 Tuberculosis Screening Algorithm ("Technical Instructions")

- Chest X-ray (CXR) if $\geq 15$ years old
- Sputum smears if signs, symptoms or CXR suggestive of TB
- No cultures, no drug susceptibility testing
- No treatment standards
2007 TB Technical Instructions

• Diagnosis
  – Sputum cultures for anyone with suspected TB
  – Drug susceptibility testing
  – Tuberculin skin test for children, with CXR if positive

• Treatment
  – Treatment to completion by directly observed therapy
  – Consistent with U.S. treatment standards (CDC/ATS, Curry Center)

• Implementation:
  – Over 5 years
  – 1st countries:
    • Immigrants: Mexico, Philippines, Vietnam
    • Refugees: Thailand, Malaysia, Nepal
Outbreaks of Vaccine-Preventable Diseases During Resettlement

- Mumps – Ethiopia: 2007
- Rubella – Cote d’Ivoire: 2004
- Hepatitis A – Thailand: 2004
- Polio – Kenya: 2006
- Typhoid fever – Thailand: 2007
Rationale for Providing Vaccines Overseas

- Fewer outbreaks during resettlement
- Lower costs
  - Vaccines less expensive
  - Labor less expensive
- Fewer immunization visits post-arrival
Rationale for Overseas Program

- Lower costs
- More opportunity for prevention
- Better uptake

Refugee Camps, Urban Centers

Overseas Medical Exam Sites

Resettlement Communities

CDC
Refugee Health Initiative

- Improved TB screening with revised “Technical Instructions”
- Future priority: latent TB
- Immunization
- Presumptive treatment of malaria, intestinal parasites, schistosomiasis
- Improved prevention of perinatally transmitted
  - HIV
  - HBV
- Surveillance
When the Soviet Union disintegrated in the early 1990s, national identities were reborn. Nearly four million ethnic Russians have returned to their ancestral home.

CHINA
Roughly 100 million workers have embarked on a massive internal migration, most to coastal provinces, where market reforms have helped spark an economic boom.

PALESTINIANS
Some 3.2 million Palestinians now live in Gaza, the West Bank, Jordan, Syria, and Lebanon—refugees from a state that does not officially exist.

CENTRAL AFRICA
A series of brutal conflicts over the past four decades has spawned a torrent of refugees and gross violations of human rights.

Map Key
- Red: Internal displacement
- Red: Refugee movement
- Green: Immigration
- Yellow: Temporary migration
Acknowledgements

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  – Gregory Armstrong MD
  – Gary Brunette MD
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  – Christie Reed MD

• University of Alabama Birmingham
  – David Freedman MD

Visit CDC’s Travelers Health Website
www.cdc.gov/travel
SAVE THE DATE!

CDC’s 6th International Conference on Emerging Infectious Diseases
Hyatt Regency Hotel, Atlanta Georgia
March 16 – 19 2008

www.iceid.org