Conflict of Interest Disclosure

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Once upon a time ...

Travel to exotic destinations was a rare privilege ...

and (sometimes) a definite hazard

American Express Travel Poster circa 1920s

Today ...

the world is smaller and more accessible, but medical hazards still exist.

View of Earth from Apollo 11

Global Tourism Today

A leading leisure activity

A vital source of employment and income

In 2007:

900 million international tourist arrivals

(6.6 % ↑ over previous year)

USD 856 billion in monetary receipts
“It is better not to fall ill... than to be cured.”

Giovanni Maria Lancisio
(1654-1720)

Preparation for Travel
The Basics

Medical / Dental Check-Up
Medical “Dossier”
Overseas Health Care
Traveler’s Medical Kit

Preparation for Travel
The Six “I’s”

INSECTS
repellents, nets, medication

INGESTIONS
food and water safety

INDISCRETIONS
HIV, STIs

INJURIES
personal safety, accidents

IMMERSION
schisto, leptospirosis

INSURANCE
coverage, access to care

Preparation for Travel
Anticipation of Special Hazards

Jet Lag
Motion Sickness
Altitude Sickness
Sun Exposure
Allergic Reactions
Water reactions
Snakebite
HIV risk or testing requirements
Political terrorism

In the Clinic:
3 Main Topics of Discussion

- Vaccinations for Travel
- Traveler’s Diarrhea
- Vector-borne Infection, eg malaria
Immunizations for Travel

Routine Childhood and Adult Vaccines

- Tetanus-diphtheria or TDaP
- Polio
- Measles-Mumps-Rubella
- Varicella
- Hepatitis B
- Influenza
- Pneumococcal

Immunizations for Travel

Vaccines for Special Settings or Risks

- Yellow Fever*
- Hepatitis A / Hepatitis B
- Typhoid
- Meningococcal*
- Rabies
- Japanese encephalitis

Immunizations for Travel

Vaccines rarely if ever used

- Smallpox
- Cholera
- BCG
- Typhus
- Anthrax

Variola major (last natural infection acquired Somalia, 1977)

Tetanus - San Lazaro Hospital, Manila, 1987
**Pharyngeal membrane of diphtheria**

**Maculo-papular facial rash – measles (rubeola)**

**Polio—New Problems on the Road to Eradication**

- Independent Outbreaks
  - Vaccine Associated Paralytic Polio (VAPP)
    - Belarus (1965-66)
    - Canada (1966-68)
    - Egypt (1983-1993)
    - Guinea (2000-2001)
    - Philippines (2002)
    - Haiti (2002)
    - China (2006)
    - Cambodia (2005-2006)
    - Myanmar (2006-2007)

- Global Measles Deaths
  - From 750,000 (2000) to 200,000 (2007)
Chickenpox progressing to acute respiratory failure (pre-Acyclovir)

Risk of Hepatitis A, sidewalk crab seller – Taiwan, 1983

Acute hepatitis B -- Bangkok, 1999

**Hepatitis A Vaccine**

*Licensed schedules for adults*

- **Havrix (GSK)** 1 ml (1440 U) x 2 0, 6-12 mo
- **Vaqta (Merck)** 1 ml (50 U) x 2 0, 6-12 mo
- **Twinrix (GSK)** 1 ml (720, 20) x 3 0, 1, 6 mo

**Immune Serum Globulin**

Is there still a role for gamma globulin shots?

In certain patients, the answer is “YES”

Typhoid Fever: Have we Forgotten?
**Typhoid Vaccine Efficacy**

<table>
<thead>
<tr>
<th>Type</th>
<th>Efficacy</th>
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<tbody>
<tr>
<td>Parenteral</td>
<td>42-93%</td>
</tr>
<tr>
<td>Oral Ty21a (US volunteers)</td>
<td>87%</td>
</tr>
<tr>
<td>(Egypt)</td>
<td>90%</td>
</tr>
<tr>
<td>(Chile)</td>
<td>67%</td>
</tr>
<tr>
<td>Vi capsular polysaccharide</td>
<td>70%</td>
</tr>
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**TYPHOID FEVER: A Look at Recent Trends**

*JAMA “Typhoid Fever in the US,” 1999-2006*

- 1902 patients: median age 22 yrs (1-90), 79% traveled overseas within 30 days of illness
- 13% multi-drug resistant (AMP, CP, TMP-SX)
- 38% decreased susceptibility to Ciprofloxacin, increasing from 19% in 1999 to 54% in 2006
- Patients with resistant infections more likely to report travel to Indian subcontinent

**Countries Visited by TF Patients in 30 days before illness**

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of Travelers</th>
</tr>
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<tbody>
<tr>
<td>India</td>
<td>606 (47%)</td>
</tr>
<tr>
<td>Pakistan</td>
<td>126 (10%)</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>124 (10%)</td>
</tr>
<tr>
<td>Mexico</td>
<td>90 (7%)</td>
</tr>
<tr>
<td>Philippines</td>
<td>57 (4%)</td>
</tr>
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**Meningococcal Vaccination 2010**

**Yellow Fever in Africa and Americas**
**Japanese Encephalitis**

- Most common epidemic viral encephalitis
- Culex vector / bird and mammal reservoir
- Up to 10-20 cases/100,000 q yr
- Subclinical disease 50-100 : 1

**NOTE:** NOT ALL RABID ANIMALS LOOK LIKE THIS!
**Traveler's Diarrhea**

**The Usual Suspects**

- *Enterotoxigenic E. coli (ETEC)*
- *Salmonella, Shigella, Campylobacter*
- *Aeromonas, Plesiomonas, Vibrios*
- *Rotavirus, Norwalk agent (norovirus)*
- Intestinal protozoa
  - (e.g., Cryptosporidium, Giardia, Entamoeba—more indolent in onset)

**Treatment of Traveler's Diarrhea**

**Recommended Agents**

**Prophylaxis**
- Bismuth subsalicylate (PB), Norfloxacin, Ciprofloxacin, Rifaximin

**Symptomatic Treatment**
- Bismuth subsalicylate (PB), Loperamide

**Antibiotic treatment**
- Fluoroquinolones (Norfloxacin, Ciprofloxacin, Ofloxacin, Levofloxacin), Azithromycin, Rifaximin

*DO NOT FORGET ORAL REHYDRATION!*
Vector-borne Diseases
What do you need to know?

- MALARIA, MALARIA, MALARIA
- Other Mosquito-borne infections (e.g., dengue fever, J EV)
  PLUS
- Sandflies, blackflies, ticks, tsetses ...

DENGUE FEVER

- 100 MILLION CASES YEARLY
- RNA virus: family Togaviridae, genus Flavivirus
- 4 ANTIGENICALLY SIMILAR SEROTYPES
- Aedes vector: day-biting, urban-dwelling

Diffuse, blanching rash during 2nd phase of “saddleback” fever

Dengue hemorrhagic fever: spontaneous bleeding from gums

60 yo UCLA professor post-travel to San Juan, Puerto Rico

Aedes aegypti mosquito—dengue fever vector
Other Travel-related Arboviruses

- Yellow Fever
- Japanese encephalitis
- West Nile virus
- Chikungunya
- Tick-borne encephalitis

UCLA ER patient -- 5 days post South Africa
Dx RICKETTSIA AFRICAEE - Rx DOXYCYCLINE

Phlebotomus (sandfly) - vector of leishmaniasis

Ulcerating nodules weeks after sandfly bites in tropical Costa Rica

African Tsetse fly
Trypanosoma brucei trypamastigotes in blood
Female Anopheles mosquito – vector of human malaria

Malaria worldwide distribution: past and present

4 Main Species of Human Malaria

** Plasmodium falciparum **
* Plasmodium vivax *
Plasmodium malariae
Plasmodium ovale

P. falciparum threatens 2.4 billion people – 35% of the global population

74% of PF cases in Africa,
25% in Asia,
1% in the Americas

P. vivax threatens 2.6 billion—almost 40% of world’s population

Of 130-390 million yearly PV cases:
52% in S. and S.E. Asia,
15% in E Mediterranean,
13% in South America
Malaria in US Residents

- 1997-2006: 10,745 cases reported
- 60% acquired in sub-Saharan Africa
- 14% acquired in Asia
- 13% acquired in Caribbean, Central and South America

During same period, 54 fatal infections—85% PF, 71% acquired SSA

Prevention of Malaria in Travelers

Education
Mosquito avoidance
“Prophylactic” medication
Self-administered empiric therapy
Post-exposure prophylaxis for *P. vivax*
**Prevention of Malaria in Travelers**

**Personal Protective Measures**

- Chemoprophylaxis = 75-95% protection
- Insecticides (e.g., deltamethrin, permethrin): knock-down sprays or impregnate clothes/nets
- Repellants (e.g., DEET, PMD, picaridin) for skin
- DEET-based repellants
  - best evidence and longest history of use
  - 20% DEET safe in pregnancy
  - Now sanctioned for infants > 2 months

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**Antimalarials in the 21st century**

**Prophylactic Regimens**

- **Atovaquone-proguanil (Malarone)**
  - 250/100 mg qd
  - 7 days beyond
- **Mefloquine**
  - 250 mg q wk
  - 4 weeks beyond
- **Doxycycline**
  - 100 mg qd
  - 28 days beyond
- **Chloroquine**
  - 500 mg q wk
  - 4 weeks beyond

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**Antimalarials in the 21st century**

**Stand-by Emergency Self-Treatment (SBET)**

- **Artemether-lumefantrine (Riamet, Co-Artem)**
  - Effective, rapid parasite and fever clearance, good safety/tolerability
- **Atovaquone-proguanil (Malarone)**
  - Currently effective, good safety/tolerability - BUT - pending resistance?
- **Mefloquine (Lariam)**
  - Effective -- BUT -- neurotoxicity ↑ at treatment doses
- **Chloroquine (Nivaquin)**
  - Inexpensive, safe — BUT — widespread resistance

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**Travel Medicine**

**Special Cases and Issues**

- Global Health workers
- Long-term travelers
- Immunocompromised patients
- Unanticipated hazards in “clean” environments (e.g., norovirus outbreaks on cruise lines)
- Emerging infectious diseases
- Prompt, expert evaluation of post-travel illness

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-- Chen, Wilson, Schlagenhauf, JAMA, 2006

-- South China Sea, 1987