Travel Medicine Update

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Learning Objectives

• Describe the concept and practice of travel medicine and pre-travel health
• Describe the epidemiology of the most common food/water, person to person, and vector borne travel-related illnesses
• Discuss disease prevention strategies and counseling points for travelers

Magnitude of Global Travel

• World population increased from 2.5 to 6.6 billion 1950-2007 (2.6 fold)
• International tourist arrival increased from 23.5 to 901 million in the same time period (35 fold)
• International arrivals increasing by 2.9 million from 2000-2009

Travelers crossing international borders

What is Travel Medicine?

• Devoted to the health of international travelers
• Main emphasis is Pre-travel health
• Patient and itinerary specific care
• Education, vaccination, pharmacology
• Travel medicine intersects other specialties
• Returned traveler
  – Tropical medicine
  – Travel medicine

Reasons for Travel for 880 million International Arrivals (2009)

<table>
<thead>
<tr>
<th>Reason for Travel</th>
<th>% of Arrivals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leisure/holiday</td>
<td>51</td>
</tr>
<tr>
<td>Visiting friends and relatives, health</td>
<td>27</td>
</tr>
<tr>
<td>Business</td>
<td>15</td>
</tr>
<tr>
<td>Unknown</td>
<td>7</td>
</tr>
</tbody>
</table>

http://www.world-tourism.org/facts/menu.html
What do we know about travelers from the US?

Reason for travel and 2 most frequent destinations

Travel related morbidity/mortality

- 20-70% report some illness
- 1-5% seek medical attention
- 3% report fevers
- 0.1-0.01% require medical evacuation
- 1/100,000 – death

Hill DR. CID. 2006
Pre-travel consultation: General Elements

- Assessing the health of the traveler
- Assessing the risk of travel
- Preventative advice
- Immunizations/prophylaxis/self treatment

Exacerbation of comorbidities is the predominant cause of death in US Travelers:

The world is everyone’s oyster

- Lots of people traveling with conditions historically would have precluded travel
  - Dialysis cruises
  - Oxygen dependent
  - Post-transplant
  - HIV
  - pregnancy
- Want early consultation with Travel Medicine Practitioner (4-6 weeks) AND underlying disease stabilized
Infections acquired during stay in developing countries

- 20-70% - Traveler’s diarrhea
- 3% - Malaria (no chemoprophylaxis in Africa)
- 1% - Influenza, Dengue
- 0.5% - Animal bite, PPD conversion
- 0.05% - Typhoid, Hep A
- 0.001% - Japanese encephalitis
- < 0.0001% - Meningococcal disease, polio

Steffen R. J Trav Med. 2008

Assessing the risk of travel

- Evaluation of risk and hazards associated with:
  - Where (country(ies), urban/rural)
  - When (departure date, duration and season of travel)?
  - Why are they traveling?
  - What will they be doing when they get there?
  - How will they be traveling and living while there?
  - Who will be traveling (age)?
- Vaccine preventable infections, malaria, traveler’s diarrhea, vector borne illness

The 3 “R’s” of Immunization

- Routine
  - Childhood, adolescent, adult

- “Required” (World Health Organization)
  - Yellow fever vaccine may be required by W.H.O regulations for certain countries

- “Recommended”
  - Geographic destination/activities planned
  - Individual traveler’s underlying health
  - Live vaccines - avoid in IS/pregnant patients
Routine Vaccines

- Tetanus-diphtheria and pertussis
  - Everyone is indicated for Tetanus-diphtheria
  - At risk in your own backyard or Africa
  - Routine booster q10 yrs
- Influenza
  - One dose every year
  - Northern vs southern hemisphere differences
  - Year round disease in tropics
  - Same indications/contraindications for domestic use
- MMR
  - Traveler’s should have 2 doses of MMR
- Update other routine vaccines (i.e. pneumococcal)

How to determine risk of vaccine preventable diseases?

- CDC Yellow Book
- WHO
  - http://www.who.int/ith/en/
- Other
  - http://www.mdtravelhealth.com/
- What do we use in clinic?
  - Travax™ EnCompass

Case: Bill

- 65 year-old male planned a 3 week trip to Asia, leaving in 15 days
- Itinerary:
  - India (1.5 weeks) – Delhi, Jaipur, Mumbai
  - Thailand (1.5 weeks) – Bangkok and resort islands
- Some tours, exploring on his own, hotels
- “I love Indian and Thai food and I plan to eat where the food is the best, on the street”
Assessing the health of the traveler

- Underlying medical conditions:
  - GERD and Hypertension

- Medications
  - Omeprazole and lisinopril

- Allergies
  - none

- Immunization history
  - Polio; Hepatitis B; born before ‘57; had varicella
  - Influenza shot current, Tdap 2 years ago

Recommendations based on Bill’s medical issues

- HTN
  - Keep meds in carry-on
  - Bring copies of Rx

- Consider obtaining evacuation insurance
  - Example: International SOS http://buymembership.internalsos.com/, MEDEX

Which immunizations would you recommend to Bill?

A. Hepatitis A
B. Hepatitis E
C. Japanese encephalitis
D. Typhoid
E. A and D
**Hepatitis A**

- **Transmission:**
  - Food/water
- **Risk:**
  - 1-4,000-1:16,000 per/mo abroad
- **Vaccine**
  - Intramuscular (inactivated)
  - Life-long protection after 2nd dose at 6 mo
  - Ok to give up until departure

Victor JC. NEJM. 2007

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**Typhoid Fever**

- **Transmission:**
  - Food/water
- **Risk:**
  - Highest for those off the usual tourist routes and for those visiting friends and family
  - Highest rates for travelers to the Indian subcontinent
  - > 400 cases annually US (travel #1 risk factor)
- **2 vaccines (50-80% protective)**
  - Intramuscular (inactivated) – booster Q2 years
  - Oral (live attenuated) – complete 7-10 days prior to departure - booster Q5 years

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**Hepatitis E**

- **Transmission:**
  - Food/water
- **Risk:**
  - Less transmissible than Hepatitis A
- **Endemic and epidemics**
- **High mortality in pregnant women**
- **No vaccine available**

Teshale EH. CID 2010
Other immunizations to consider in travelers to Asia

- Japanese Encephalitis
- Hepatitis B
- Rabies
- Polio


Malaria

- 1997-2006: 10,745 malaria cases in US, 54 (0.5%) fatal
- Risk is highly variable by travel region

Malaria map of India

Freeman DO. NEJM 2008
Malaria map of Thailand

Malaria prevention

- Low risk:
  - Insect avoidance: DEET; bed nets; long sleeves; avoid being outside at dusk and dawn
  - Consider chemoprophylaxis in certain persons:
    • vulnerable travelers
    • immigrants visiting friends/relatives
    • prolonged travel (> 1 mo)
    • unreliable access to medical care

- Moderate - High risk:
  - Chemoprophylaxis
### Malaria chemoprophylaxis

<table>
<thead>
<tr>
<th>Drug</th>
<th>Directions</th>
<th>Side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mefloquine (Lariam™)</td>
<td>Weekly; start 1 week before, during and 4 weeks post</td>
<td>Vivid dreams, avoid if psychiatric or seizure disorder</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>Daily; start day before, during, 4 weeks post</td>
<td>Photosensitivity; GI upset</td>
</tr>
<tr>
<td>Atovaquone/proguanil (Malarone™)</td>
<td>Daily; start day before, during, 1 week post</td>
<td>Expensive</td>
</tr>
<tr>
<td>Chloroquine</td>
<td>Weekly; start day before, during, 4 weeks post</td>
<td>GI upset. Only effective in limited areas (West of Panama canal, Haiti)</td>
</tr>
</tbody>
</table>

### Gin and Tonic for malaria prevention?

- 500-1000 mL tonic water in 15 min (6 volunteers)
- Mean quinine plasma level at 2 hrs = 0.62mg/L (MIC =0.68-0.89 mg/L)
- Impossible to consume sufficient quantity to maintain level

Meyer et al. Trop Med Int Health 2004

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### Lifecycle of P. falciparum
Malaria Chemoprophylaxis Decision-Making

- Is the traveler going to malaria zone?
- Will be exposed? (accommodations, night exposure, altitude)
- Is there drug resistance there?
- Are there any drug contraindications:  
  - Allergies, meds, pregnancy, psych hx, etc?
- What is the traveler’s experience with malaria meds?
- What is the duration of anti-malarial use?
- What is their budget?

Malaria prevention for Bill?

- After weighing risks and benefits...  
  - Malarone™ for his time in India

- Summary of vaccine recommendations  
  - Hep A  
  - Typhoid  
  - Polio – adult booster  
  - Routine vaccines: offer pneumococcal vaccine

Insect Prevention Measures

CDC Recommended Insect Repellants

- DEET – OFF!, Cutter, Sawyer, Ultrathon  
  - controlled release DEET more effective then simple DEET
- Picaridin – Cutter- Advanced, skin so soft bug guard plus
- Oil of Lemon Eucalyptus – Repel
- IR3534 – Skin so soft bug guard plus expedition
Insect Prevention Measures

- Permethrin: insecticide
  - Nervous system toxicity to insects
  - Caution in ragweed or chrysanthemum allergy
- Effective against: lice, ticks, fleas, mites and other
  - Applied to clothing (odorless, colorless, won’t stain)
  - Retention time depends on contact time
    - 0.5% spray = 2 weeks or 2 washings
    - 0.5% soak = 6 weeks or 6 washings
  - Applied to insect netting

Traveler’s Diarrhea (TD)

- #1 travel-related illness: 30-70% of travelers
- Most likely within the first 14 days of travel (especially bacterial)
- Defined as ≥3 loose stools in an 8 hour period or ≥ 4 loose stools in a 24-hour period PLUS other symptoms (N, abd cramping, etc)
- Etiology:
  - Bacteria 80-90%: ETEC & EAEC, campylobacter, shigella, salmonella
  - Viruses 10%: Norovirus, rotavirus
- Course:
  - Bacterial and viral diarrhea lasts 3-5 days
  - Longer durations suggests other diseases

Epidemiology of Traveler’s Diarrhea

- Susceptibility to TD varies widely
- Who is at risk
  - Increase gastric pH (PPIs and H2s) (Bill !)
  - Children/adolescents
  - Traveler from a low risk country going to a high risk country
  - Lack of care in food and beverage selection
- Development of immunity
  - Protective immunity from natural infection
  - Risk decreases as length of stay increases
  - Previous visit to a high-risk country doesn’t decrease risk
Prevention of Travelers Diarrhea

- Avoidance: food and water precautions
  - FOOD “boil it, peel it, cook it or forget it”
- Chemoprophylaxis
  - Recommended for:
    - Travelers on tight schedules (musicians, diplomats, lecturers), history of illness during travel, if the traveler requests it, underlying medical conditions
  - Options
    - Bismuth subsalicylate QID dosing
    - Antimicrobials: ciprofloxacin or rifaximin
    - Probiotics? Studies mixed results

Self-Treatment of TD

- Oral rehydration therapy
- Mild loose stools without other symptoms
  - Use of an antibiotic probably not necessary
  - Use bismuth subsalicylate or loperamide
- Moderately loose or frequent stools with cramps or nausea
  - Antibiotic for up to 3 days +/- BSS or loperamide

Self-Treatment TD

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Regimen</th>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciprofloxacin</td>
<td>500mg bid x 3 d</td>
<td>Least expensive</td>
<td>Resistant campy in SE Asia</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>500mg qd x 3d, 1000mg x1</td>
<td>Single daily dose</td>
<td>Resistant campy in SE Asia, $S</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>2000mg PO once or 500mg qd x 3 d</td>
<td>Effective vs FQRC</td>
<td>Slower speed of response</td>
</tr>
<tr>
<td>Rifaximin</td>
<td>200mg TID or 400mg BID x 3 d</td>
<td>Safest, as effective as others</td>
<td>Less effective vs febrile dysenteric, not for systemic infx</td>
</tr>
</tbody>
</table>
TD prevention/treatment recommendations for Bill?

- Safe food/water intake
- Prophylaxis
  - Rifaximin 200 mg PO QD
- Breakthrough treatment
  - Azithromycin 500 mg PO QD x 3d
- When to seek medical attention
  - Fever > 2 days, dehydration, bloody diarrhea

Vector borne illness prevention

- Travel risk for Bill?
  - Dengue fever in India and Thailand
  - Chikungunya fever in S. India
- Recommendations
  - Long sleeve clothing, avoid high risk areas
  - Insect repellents
    - DEET ~ 35% for skin
    - Permethrin for clothing

Dengue Fever and Chikungunya

**Dengue** (break bone fever)
- self limiting
- fever, myalgias/arthralgias
- severe headache/n&v
- rash, ↓ wbc/plt; ↑ AST/ALT
- 2-3 weeks
- DHF (30% mortality)

**Chikungunya** (that which bends up)
- similar
- headache/myalgias/arthralgias
- rash
- weeks to years
- not fatal

- Urban and rural
- Daytime mosquito biters
- Use DEET and/or permethrin
- No vaccine, no treatment
Yellow Fever

- Transmission: mosquito (daytime)
- Risk:
  - W. Africa: 50/100K; S. America: 5/100K
  - Only required vaccine
- Vaccination risk (↑ with age)
  - Neurologic Disease (0.8/100K)
  - Viscerotropic Disease (0.4/100K)
- Contraindications
  - < 9 months, egg allergy, immunosuppression, thymus disorders

Other infectious and non-infectious risks of travel

- Plan to swim in fresh water?
  - Leptospirosis
  - Schistosomiasis
- Travel to High Altitude: > 8000 ft?
  - Common destinations: Machu Picchu, Tibet, etc...
  - Some symptoms > 25%
  - Educate on acclimatization
  - Acetazolamide prophylaxis
Travelers Visiting Friends and Relatives (VFR)

- Immigrants or 2nd gen persons returning to their homeland to visit friends and relatives
  - Higher degree of exposure
  - Insufficient protection measures
- Immigrant VFR traveler vs. tourist traveler
  - Malaria risk: 8.7x
  - Intestinal parasite: 3.8x
  - Hospitalization: 8.3x

Other important topics to discuss

- Safe sex
- Avoidance of animals
- Injury prevention
- Managing symptoms of jet lag
- Sun exposure

THE FEBRILE RETURNING TRAVELER
Fever in Returned Travelers: Results from the GeoSentinel Surveillance Network

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Clinical Infectious Diseases 2007

Etiology of fever according to region traveled

Etiology of fever according to interval after travel

THE FEBRILE RETURNING TRAVELER

Exposures?
• Insect or animal exposures?
• Fresh water exposure?
• What did they consume?
• Other ill travelers?
• Sexual activity?

Prophylaxis?
• Vaccinations?
  — Which ones?
  — Timing of vaccinations?
• Malaria prophylaxis?
  — Appropriate agents?
  — Taken appropriately?

Summary

• Prevention of infection is best
  — Education, immunization, prophylaxis
  — Goal is to minimize health risk during travel (identify health conditions that could worsen during travel)
  — Consider using specialist in travel medicine

• DDx infections of traveler is finite
  — Use resources
• Detailed history and exam helps to narrow DDx
  — Specific destinations
  — Duration of stay (incubation period)
  — Activities
  — Exposures

Questions?
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