Lecture outline

1. Why should you know about travel medicine?
2. Who needs pre-travel care?
3. The pre-travel visit
4. Post-travel evaluation

International travel in 2010

- **940 million** travelers crossed international boarders

- **60 million** traveled from the US internationally
  - Almost half traveled to a developing country

---

Travelers crossing international borders

Keystone. Travel Medicine. 2008

Reason for travel and 2 most frequent destinations

Larocque R. Clin Infect Dis. 2011

What is the magnitude of 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

Lecture outline

1. Why should you know about travel medicine?
2. Who needs pre-travel care?
3. The pre-travel visit
4. Post-travel evaluation
Who should seek pre-travel care?

- Travelers to resource poor settings
- Travelers with significant medical issues

Lecture outline

1. Why should you know about travel medicine?
2. Who needs pre-travel care?
3. The pre-travel visit
4. Post-travel evaluation

Pre-travel consultation

1. Assessing the health of the traveler
2. Assessing the risk of travel
3. Education
4. Vaccination
5. Prescribing prophylactic/self-treatment meds

Pre-travel consultation

1. Assessing the health of the traveler
2. Assessing the risk of travel
3. Education
4. Vaccination
5. Prescribing prophylactic/self-treatment meds
Exacerbation of comorbidities is the predominant cause of death in US Travelers:

- Cardiovascular Disease: 49%
- Injury: 22%
- Infection: 6%
- Other/Unknown: 6%
- Suicide/Homicide: 3%
- Cancer: 6%
- Medical: 14%

Pre-travel consultation

1. Assessing the health of the traveler
2. Assessing the risk of travel
3. Education
4. Vaccination
5. Prescribing prophylactic/self-treatment meds

Assessing the risk of travel

- Destination(s)
- Season
- Duration of stay
- Planned activities
- Accommodations
- Purpose of travel
Educational topics

- Insect avoidance
- Injury prevention
- Safe food and water
- Altitude
- Safe sex
- Animal avoidance
- Evacuation insurance/access to medical care overseas

Insect avoidance

- Vector-borne diseases are some of the most common travel-associated infection
  - Mosquitos
  - Flies
  - Ticks

Mosquitos

- Viruses
  - Dengue fever
  - Chikungunya fever
  - Jap. encephalitis, Yellow fever, WNV, etc.

- Protozoa and helminths
  - Malaria
  - Lymphatic filariasis

- Insects
  - Botfly
Dengue fever


Botfly

*Dermatobia hominis*


**Flies**

- Protozoa
  - Leishmaniasis
- Helminths
  - Loa lao

**Geographic distribution of cutaneous leishmaniasis**

Reithinger R. Lancet ID. 2007

*Old world*
- Dry, arid conditions

*New world*
- Forested areas
Cutaneous leishmaniasis

*L. panamensis* via Costa Rica

*Tache noire*

**Ticks**

- African tick-bite fever (*Rickettsia africae*)
- Lyme disease (*Borrelia afzelii and garinii*)
- Tick-borne encephalitis (*TBEV*)

*L. major* via Israel

“Afican tick-bite fever”
How to prevent insect exposure?

• Avoid outbreaks
  – [www.cdc.gov/travel](http://www.cdc.gov/travel)

• Avoid high risk periods
  – Keep indoor from dusk to dawn (malaria)

• Physical barriers
  – Proper clothing and bed nets

• Insect repellents
  – DEET for skin (efficacy peeks at 50%)
  – Permethrin for clothing

Educational topics

• Insect avoidance
• Injury prevention
• Safe food and water
• Altitude
• Safe sex
• Animal avoidance
• Evacuation insurance/access to medical care overseas

Preventable causes of death in US travelers 2008-2010

- Homicide, 533
- Vehicle accident, 735
- Suicide, 537
- Accidental death, 332
- Maritime death, 31
- Disaster, 131
- Accident other, 332
- Air accident, 82
- Drug-related, 67
- Execution, 13
- Terrorist, 52

Food and water safety

• Many common travel-related infections are transmitted by contaminated food/water
  – Travelers’ Diarrhea
  – Hepatitis A
  – Hepatitis E
  – Typhoid fever
  – Parasitic infections

Prevention of food-borne disease

• Most studies failed to correlate guideline adherence to risk of travelers’ diarrhea
  • Why? **Where** you eat, less than **what** you eat
  • Safe options?
  • Drinks
    – Bottled water, carbonated soft-drinks
  • Foods:
    – Piping hot, processed, packaged, peeled, dry goods

Educational topics

• Insect avoidance
• Injury prevention
• Safe food and water
• Altitude
  • Safe sex
• Animal avoidance
• Evacuation insurance/access to medical care overseas

Altitude illness

• Many popular destination are at high-altitude
Prevention of altitude illness

• Behavioral
  – Gradual ascent (allow > 1 day to get to 9K feet)
  – Sleep at lower altitudes
  – Minimize ETOH and exercise in first 24 hours
  – If symptoms develop – do not ascend further!

• Pharmacological
  – Acetazolamide 125 mg PO BID, start 2 days before ascent, during ascent, and 2 days after reaching apex

Educational topics

• Insect avoidance
• Injury prevention
• Safe food and water
• Altitude
• Safe sex
• Animal avoidance
• Evacuation insurance/access to medical care overseas

Pre-travel consultation

1. Assessing the health of the traveler
2. Assessing the risk of travel
3. Education
4. Vaccination
5. Prescribing prophylactic/self-treatment meds

Vaccine preventable diseases

• Routine vaccination should be up to date
• Required vaccines
• Travel-related vaccines
Travel-related vaccines

- Hepatitis A*
- Typhoid fever*
- Yellow fever*
- Meningococcal infection
- Japanese encephalitis
- Polio vaccine
- Rabies vaccine
- Hepatitis B

Hepatitis A

- Transmission:
  - food/water
- Risk: 1 in 4-16K per/mo
- Vaccine (inactivated)
  - Intramuscular: Hep A and Hep A/B (Twinrix)
  - Life-long protection after 2nd dose (6 mo)
  - Ok to give up until departure in most patients
- Immune globulin
  - < 2 wks pre-travel and < 12 mo, > 40 yr, liver dz, IS

Typhoid Fever

- Transmission:
  - food/water
- > 400 cases annually US
  - Travel #1 risk factor
- 2 vaccines (50-80% protective)
  - Intramuscular (inactivated) – booster Q2 years
  - Oral (live attenuated) – booster Q5 years

Yellow Fever

- Transmission: mosquito
- 1970-2010:
  - 9 travelers; 8/9 died
- YF Risk: illness (death)
  - W. Africa: 50(10)/100,000
  - S. America: 5(1)/100,000
- Vaccine required and regulated
- Live vaccine
- Side effects rare but significant
Other travel-related vaccines

• Japanese encephalitis
• Meningococcus
• Polio vaccine
• Rabies vaccine
• Hepatitis B

Pre-travel consultation

1. Assessing the health of the traveler
2. Assessing the risk of travel
3. Education
4. Vaccination
5. Prescribing prophylactic/self-treatment meds

Prophylactic/self-treatment medications for travelers

• Malaria*
• Travelers’ diarrhea*
• Altitude illness
• Jet lag
• Motion sickness
• Common infections (UTI, SSTI, yeast infection)

Malaria in U.S. travelers: 2010

• 1691 cases (30% increase from 2008)

- 10% cases were severe; 9 deaths

Malaria prevention

- Low risk: *Insect avoidance, consider chemoprophylaxis in certain travelers*
  - 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>Areas of use</th>
<th>Directions</th>
<th>Pro/cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atovaquone/proguanil</td>
<td>All</td>
<td>Daily; 1 wk post</td>
<td>Pro: Minimal SEs Con: ↑↑↑$</td>
</tr>
<tr>
<td>Chloroquine</td>
<td>Chloroquine-susceptible</td>
<td>Weekly; 4 wks post</td>
<td>Pro: Weekly Con: GI upset</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>All</td>
<td>Daily; 4 wks post</td>
<td>Pro: ↓$, Con: Photos; GI</td>
</tr>
<tr>
<td>Mefloquine</td>
<td>Mefloquine-susceptible</td>
<td>Weekly; 4 wks post</td>
<td>Pro: ↓$, ok in preg, kids Con: Dreams, avoid psych/Seiz.</td>
</tr>
</tbody>
</table>
Travelers’ diarrhea (TD)

- #1 travel-related illness: 30-70% of travelers
- Pathogens:
  - Bacteria 80-90%: ETEC, campy, shigella, salmonella
  - Viruses 10%: Norovirus, rotavirus
- Course:
  - Bacterial and viral diarrhea lasts 3-5 days
  - Longer durations suggests other diseases

Prevention of TD

- Prevention
  - Avoidance of contaminated food/water
- Prophylaxis
  - Bismuth subsalicylate 2 tabs QID
  - Rifaximin 200 mg PO QD-BID (vs. placebo)
    - TD: 15% vs. 54% in Mexican travelers

Self-treatment of TD

- Ciprofloxacin:
  - 500 mg PO BID for 1-3 days
- Azithromycin: SE Asia, children, pregnancy
  - 500 mg PO QD x 3 days or 1000 mg PO x 1
- Rifaximin: not for invasive infections
  - 200 mg PO TID x 3 days
- Loperamide: not for invasive infections
  - Added benefit, use in “emergency”

A new tool for you to get your patients ready for travel

http://gten.travel/provider/

- Provide destination specific recs using CDC data
- Generates a medical note to cut and paste into EMR
Lecture outline

1. Why should you know about travel medicine?
2. Who needs pre-travel care?
3. The pre-travel visit
4. Post-travel evaluation

Top 5 complaints in returning travelers leading to MD visit

1. Fever without localizing findings
2. Acute diarrhea
3. Dermatological disorders
4. Chronic diarrhea
5. Nondiarrheal gastrointestinal disorders

Freedman DO. NEJM. 2006.

Top 5 complaints in returning travelers leading to MD visit

- Fever without localizing findings
- Acute diarrhea
- Dermatological disorders
- Chronic diarrhea
- Nondiarrheal gastrointestinal disorders

Freedman DO. NEJM. 2006.

How to determine etiology of fever in returned traveler

Patients need immediate evaluation

- Destination(s)
- Incubation period
- Exposures
- Exam findings/labs
- Prophylaxis/immunizations
Exposures?
- Insect or animal exposures?
- Fresh water exposure?
- What did they consume?
- Other ill travelers?
- Sexual activity?

Specific symptoms or exam findings?
- Symptoms
  - Abdominal pain?
  - Headache?
- Exam findings
  - Rash?
  - Lymphadenopathy?
  - Arthritis?
Prophylaxis?

- Vaccinations?
  - Which ones?
  - Timing of vaccinations?

- Malaria prophylaxis?
  - Appropriate agents?
  - Taken appropriately?

Initial testing?

- CBC w/ differential
- LFTs
- Blood cultures x 2
- Thick and thin blood smear x 2
- Urinalysis
- CXR
- Additional testing based on history/exam

Top 5 complaints in returning travelers leading to MD visit

- Fever without localizing findings
- Acute diarrhea
- Dermatological disorders
- Chronic diarrhea
- Nondiarrheal gastrointestinal disorders

Acute diarrhea

- Most likely travelers’ diarrhea
- Consider empiric treatment
  - Ciprofloxacin, azithromycin, rifaximin
Top 5 complaints in returning travelers leading to MD visit

• Fever without localizing findings
• Acute diarrhea
• Dermatological disorders
• Chronic diarrhea
• Nondiarrheal gastrointestinal disorders

Freedman DO. NEJM. 2006.

5 most common dermatological diagnoses in returning travelers

• Cutaneous larva migrans
• Insect bite
• Skin abscess
• Superinfected insect bite
• Allergic rash

Lederman ER. J Infect Dis. 2008

Top 5 complaints in returning travelers leading to MD visit

• Fever without localizing findings
• Acute diarrhea
• Dermatological disorders
• Chronic diarrhea
• Nondiarrheal gastrointestinal disorders

Freedman DO. NEJM. 2006.
Chronic diarrhea

• Protozoal infections
  – Giardia
  – Cryptosporidium
  – *Entamoeba histolytica*
  – Other: Cyclospora, isospora, etc...

• Other infections
  – *C. difficile* colitis

• Non-infectious etiologies

Evaluation of chronic diarrhea

• Bacterial culture

• Stool O&P x 3

• Other tests
  – Giardia antigen
  – Stool AFB stain (cryptosporidium, isospora, etc.)
  – Stool Cryptosporidium antigen
  – Stool *Entamoeba histolytica* antigen

Top 5 complaints in returning travelers leading to MD visit

• Fever without localizing findings

• Acute diarrhea

• Dermatological disorders

• Chronic diarrhea

• Nondiarrheal gastrointestinal disorders

Freedman DO. NEJM. 2006.

Nondiarrheal gastrointestinal disorders

• Intestinal nematode infection
  – Strongyloides, schistosomiasis, ascaris

• Gastritis/PUD

• Acute hepatitis
  – Hepatitis A, E, B

• Constipation
Evaluation of nondiarrheal gastrointestinal disorders

- Check LFTs
- CBC w/ differential (eos?)
- Stool O&P x 3
- Serology: Strongyloides and schistosoma IgG
- GI referral for other diagnoses

Post-infectious irritable bowel syndrome

- 3-10% of travelers after episode of TD
- Diagnosis of exclusion
- Last months - years

Summary

- Travel health risks are dependent on underlying medical conditions as well as itinerary, duration of travel, purpose of travel, and planned activities
- Travelers should be up to date on routine and travel-specific vaccinations
- Travelers should be given prophylactic and self-treatment medications as appropriate
- Recommend evacuation insurance to travelers, particularly those at high-risk
- A febrile returning traveler is a medical emergency

Thank you

brian.schwartz@ucsf.edu