THE PEDIATRIC TRAVELER

Disclosure

• I will be discussing off-label uses of many treatments.
• I will discuss a commercial subscription service, but am receiving no benefits and have no financial interest in this company.

The views expressed in this presentation are mine and do not reflect the official policy of the Department of the Army, Department of Defense, or U.S. Government.

Overview

• General Principles
• A Framework for Counseling
• Provider Resources

How Many Travelers Are There?

2011 International Travelers (in millions)

- Europe
- Caribbean
- Asia
- S. America
- C. America
- Oceania
- Middle East
- Africa

Total = 27,023,000
(Does not include Mexico = 20.7 million)

Traveler Demographics

• 35% (9.5 million) are “VFR” travelers
  - “Visiting friends and relatives”
  - Higher risk population
    • Younger travelers
    • Longer stays
    • Areas with malaria, yellow fever, typhoid risks
  • 7% (1.9 million) include children
    - Inaccurately captures teenagers traveling solo or in groups
  • Average duration of stay = 19.6 nights
    • Median = 11 nights

What is the Risk?

• Dependent on location, exposures, preventative measures
• 60-70% chance of illness
  - Most minor, self-limited such as:
    • Diarrhea, respiratory illness, skin disorder
• 5-8% chance of seeking medical care
• <1% chance of hospitalization
• Children at higher risk for:
  - Diarrheal illness
  - Animal bites
  - Mortality from:
    • dermatologic syndromes
    • respiratory infection

U.S. Department of Commerce, Office of Travel and Tourism
General Principles

- Common things are common, even in uncommon places
- You can’t cover every risk in one pre-travel visit
- A little common sense can go a long way
- They don’t make movies about what is “normal”, so don’t worry too much about the Hollywood take on foreign travel

The Most Effective Prevention Against Illness Is…

Good hand hygiene!! Bring hand sanitizer!

The Travel Visit

Ideal vs. Reality

- Scheduled ~6wks in advance of travel
- Knowledge of itinerary, accommodations
- Complete medical records, immunization records available
- Chronic conditions appropriately managed
- Leaving in 2 days
- No reservations yet
- Shots are “up to date,” they think
- The child’s seizures have been more frequent…they need a refill of psych meds which have been out for 1 week…

Typical Patient “Chief Complaints”

- “What vaccines do I need?”
- “Do I need malaria medication?”
- “Just sign my paperwork…”
A Framework

• Information gathering
  – The traveler and the trip
• Risk mitigation
  – Malaria
  – Immunizations
  – Traveler’s diarrhea
• Education
  – Travel tips and safety concerns
  – Food and water safety
  – Vector borne illness
  – Animal risks
  – Miscellaneous

The Traveler

• Pre-existing medical conditions
• Medications
• Allergies
• Immunization status

The Trip

• Where?
  – Urban? Rural?
• Why?
  – VFR? Leisure?
• How long?
• Accomodations?
  – Hotel? Home? Camping?
• Plane, train, automobile?
• Planned activities?

General Tips for All Travel

• Plan ahead
• Leave a trail
  – Copies of itinerary, passport, etc. with family/friends
• Be aware of your surroundings
• Know how to get in touch
  – Family, local contacts, US Embassy, long distance calls to US
• Don’t forget basic safety measures
  – Driving rules
  – Car seats, booster seats
  – Seat belts
  – Pedestrian safety
Airplane Travel

- Hydrate!
- How many hours on a plane?!
- Ascent/descent
  - Breast/bottle feeding, pacifier use for infants
- Use of diphenhydramine for sleep aid?
  - Not routinely recommended
- Bring all medications in carry-on luggage
- Jet lag affects kids, too
  - Ensure adequate “down time” after arrival at destination or return home

Malaria – Where?

The danger zones

- Don’t get bitten by mosquitoes!
  - Avoidance
    - Anopheles sp. peak activity at dusk, dawn
    - Long sleeves, long pants
    - Light colored clothing
    - Bed nets
    - Chemicals
      - Permethrin treated clothing
      - DEET-containing repellant
        - More than 30% DEET is a waste of money
        - Precautions with young children

Malaria Prevention

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# Malaria Prophylaxis

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosing Issues</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroquine</td>
<td>2wk → 4wk</td>
<td>Weekly dosing</td>
<td>Well tolerated in pregnancy, BF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mefloquine</td>
<td>2wk → 4wk</td>
<td>Weekly dosing</td>
<td>Well tolerated in pediatric patients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO: 1st trimester</td>
<td></td>
</tr>
<tr>
<td>Doxycycline</td>
<td>2d → 4wk</td>
<td>Daily dosing</td>
<td>Inexpensive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO: peds &gt;8yrs, pregnancy, BF</td>
<td></td>
</tr>
<tr>
<td>Atovaquone/Proguanil</td>
<td>2d → 7d</td>
<td>Daily dosing</td>
<td>Well tolerated</td>
</tr>
<tr>
<td>(Malarone)</td>
<td></td>
<td>Can double as treatment</td>
<td></td>
</tr>
</tbody>
</table>

BF = breast feeding

# Vaccines

- Ensure all “routine” vaccines up-to-date
  - Includes hepatitis A, tetanus
- Influenza present year-round in many destinations
  - Consider vaccination “out of season”

# Yellow Fever

- Transmitted by mosquitoes (Aedes aegypti)
- Highly fatal when contracted
- Vaccination required for:
  - Entering an endemic country
  - Coming from an endemic country
    - Even if just in transit!
- No documentation of vaccination may result in quarantine

# Yellow Fever Vaccine

- Live-attenuated virus
- Approved for patients >9 months
  - No vaccination of patients <6 months due to encephalitis risk
- Administer 10 days before exposure
- Single dose with booster needed every 10 years
- Contraindications
  - Immunodeficiency
  - Egg allergy
  - Pregnancy (“indicated if exposure can’t be avoided”)
N. meningitidis

- Group A – hyper-endemic, frequent epidemics in sub-Saharan Africa
  - "meningitis belt"
- Group W135 – outbreaks in travelers to the Hajj

N. Meningitidis Vaccine

Polysaccharide vaccine (Menomune)
- Groups A, C, Y, W-135
- Licensed for 2 yrs and up
  - Can be given down to 3mo for short term immunity
- Decreased immunity compared to conjugate vaccine

Protein conjugate vaccine (Menactra, Menveo)
- Groups A, C, Y, W-135
- Routine adolescent vaccine
  - Menactra licensed down to age 2 yrs
- Improved immunity compared to polysaccharide vaccine

Typhoid Fever

- Caused by S. typhi or paratyphi
- Highly endemic in almost all developing countries
  - Extremely high risk in India, Nepal, Bangladesh
- Vaccination is NOT a substitute for appropriate food/water precautions

Typhoid Vaccine

- Not 100% efficacious
  - Large inoculum can overwhelm an optimal vaccine response
- 2 formulations:
  - Injectable polysaccharide (Typhim Vi)
    - Single dose good for 2 years
    - Licensed for ages 2 yrs and older
    - 75-80% efficacy, at best
  - PO live attenuated (Vivotif)
    - 4 doses every other day good for 5 years
    - Licensed for ages 6 and older
    - Must be kept refrigerated
    - Provides better mucosal immunity

Japanese Encephalitis

- Seasonal transmission in many countries
- Low risk in urban areas, typical tourist itineraries
- Illness can be asymptomatic to mild-flu like illness
  - Can result in severe morbidity/mortality

Japanese Encephalitis Vaccine

- JE-Vax
  - No longer manufactured
  - Final doses expired in 2011
- Ixiaro
  - Purified, inactivated Vero cell culture vaccine
  - Licensed in 2009 for patients >17yrs
  - 2 dose primary series given 4 weeks apart
  - Options for pediatric patients
    - Enroll in ongoing NIH pediatric clinical trials
      - 5 U.S. sites – NY, MD, FL, NC, MA
    - Off label use
      - ½ adult dose for 2m-2yr, full adult dose for others

Kaltenbock et al. Vaccine 2010;28:834-9
Other Vaccines

- Anthrax
  - Only given to those in high risk occupations (i.e., military)
- Lyme
  - Discontinued in 2002
- Cholera
  - Partial, transient protection only
  - Not available in US
- Tick-borne encephalitis
  - Available in Europe

Rabies

- Dogs are biggest risk for rabies spread outside of US
- (Nearly) universally fatal
- Counsel to avoid strange/stray animals
  - Easier said than done with active toddlers!
- If bitten/scratched, WASH wound liberally
  - Seek medical attention for post-exposure prophylaxis with vaccination and rabies immune globulin
- Consider pre-exposure prophylaxis (vaccination) in higher risk patients, especially when rabies immune globulin (RIG) may not be available
  - Toddlers
  - Longer travel in hyper-endemic region
  - Activities involving close animal contact

Rabies Vaccine

- Inactivated virus
- Pre-exposure regimen:
  - 3 IM injections on D0, D7, D21
  - Per WHO, not recommended for <12mo
- Post-exposure regimen
  - In naïve patients, 4 IM injections on D0, 3, 7, 14
  - In previously immunized patients, 2 IM injections on D0, 3
- Need for booster doses unclear
  - Recommend checking titers every 2 years in those with sustained significant risk

Traveler's Diarrhea

- AKA Montezuma’s Revenge, Delhi Belly
- Bacteria most commonly:
  - Enterotoxigenic E. coli, Campylobacter jejuni, Shigella sp., Salmonella sp.
  - Typical course of 3-5 days
- Protozoal less common (Giardia) with longer incubation and overall course

Prophylaxis for TD?

- Bismuth subsalicylate (BSS) QID
  - Shown to decrease incidence: 40% → 14%
  - Not recommended for children <12 years
- Probiotics
  - Studies inconclusive
  - No standardized preparations
- Antibiotics
  - Developing resistance makes drug choice difficult
  - Not routinely recommended due to risk profile
  - Possible benefit of non-absorbed rifaximin

Preferred Therapy for TD

- Antibiotics at symptom onset
  - Efficacy proven in many studies...
  - Fluoroquinolones – growing resistance
    - Ciprofloxacin 500mg q12hr x 2 doses
    - Azithromycin 500mg (10mg/kg) daily for 3 days
  - Will need to be reconstituted by family for liquid preparation

- Antibiotic agent (loperamide)
  - Symptomatic relief
  - Good safety profile, even with invasive pathogens
  - Okay to use in children

- Rehydration
  - Use of clean water!
  - ORS widely available worldwide

- Reasons to seek care:
  - Bloody stools
  - Unable to adequately hydrate
  - Persistent symptoms despite treatment

Food Safety

“cook it, wash it, peel it, or forget it”

- Where you eat is just as important as what you eat
- Avoid buffets, street vendors, raw vegetables
- Hot food should be served hot
- All meats should be fully cooked
- Seafood can contain chemical toxins not inactivated by heat/cooking
  - In general, smaller fish are safer than larger ones
- You can be adventurous, just choose wisely
- Avoid further contamination…wash your hands!

“Safe” Water

- Bottled is best

- Alternatives
  - Boiling (x1 minute, then let cool)
  - Chemical treatment (iodine>>chlorine)
    - Available commercially
    - Does not remove parasites such as Cryptosporidium
    - Should not be used by pregnant females
  - Water filters
    - Often does not remove viruses

- Consider all water ingestion
  - Ice cubes
  - Brushing teeth
  - Washing hands
  - Reconstituted juices
  - Cooking water

- Alternatives:
  - Alcoholic beverages
  - Soda from can/bottle
  - Hot tea, coffee
Tuberculosis

- Some recommend testing prior to travel
  - I do not do this in the absence of risk factors
- All travelers to high risk areas should receive testing 3-6 months after return
  - Single post-travel PPD most cost-effective screening method
  - No studies incorporating newer gamma-interferon assays
- Counseling regarding local domestic workers in those families moving overseas

Tan et al. BMC Public Health 2008; 5:201

Dengue

- Very common in endemic areas
- Transmitted by mosquitoes (Aedes sp.)
  - Daytime biters (best to just avoid all mosquitoes!)
- More severe disease with multiple courses
  - Dengue hemorrhagic fever
- No vaccine, no prophylaxis
- Supportive care only

Other Counseling Topics (as appropriate)

- Recreational water safety
- Vehicle/road safety
- Sexually transmitted illness
- Environmental exposures
- Altitude sickness
  - Acetazolamide
What If…

- Pack a travel health kit
  - Commercial kits also available
- Consider travel insurance
  - Medical coverage for treatment at local facilities
  - Evacuation coverage for transport to US facility
- Research location of local medical facilities

Where to Find Information

- Center for Disease Control
  - [www.cdc.gov](http://www.cdc.gov)
  - Yellow Book – Health Information for International Travel
    - Online or in print
- World Health Organization
  - [www.who.int/ith/en/](http://www.who.int/ith/en/)
- U.S. Department of State website
  - [www.travel.state.gov](http://www.travel.state.gov)
  - Country specific data, travel advisories
- Travel & Routine Immunizations (“blue book”)
- Commercial websites, services
  - [www.travax.com](http://www.travax.com)

A Medical Student Goes to Africa…

- Routine vaccines, including hepatitis A
- Other vaccines: typhoid, meningococcal, yellow fever
- General food and water safety
- Malaria prevention
- Sun protection, sunscreen
- Traveler’s diarrhea

Questions?

- Proper bed net use?
- Raw milk ingestion – brucellosis?
- Schistosomiasis from bathing water?