Pediatric Travelers: What is needed for our traveler and how do we manage fever in a returning traveler?

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Speaker Introduction

- Jennifer Burns obtained her BSN and MSN from Loyola University in Chicago. Since 2005, she has worked in pediatric infectious disease section at University of Chicago Comer Children's Hospital. She is a board-certified pediatric nurse practitioner. Her clinical practice focuses on providing immunization education, pre-travel vaccines and counseling to families with infants and young children who will be traveling internationally. Ms. Burns has broad pediatric infectious diseases experience. She provides 24/7 infectious diseases inpatient consultation service to four Chicago-area hospitals, which includes management of patients in the neonatal and pediatric ICU, those with HIV and AIDS, oncology and transplantation patients. She is clinical manager for Health4Chicago, which is a school located vaccine clinic that provides influenza, Tdap, and all vaccines needed for children and adolescents in Chicago schools. She speaks regularly on the behalf of the Illinois Chapter of the American Academy of Pediatrics on topics related to immunization.

Disclosures

I have nothing to disclose

Learning Objectives

- Identify basic travel medicine prevention principles to keep their patients at low risk for infectious disease and avoid injury while traveling.
- Learn how to evaluate fever in a returning traveler.
- Understand how to evaluate the child who is returning from travel with a fever

Question 1

How would you describe your level of expertise with travel medicine?
1. Extremely knowledgeable
2. Somewhat knowledgeable
3. Low level knowledge
4. No clue at all that’s why I am here
5. Just refer them to a travel clinic

Question 2

How many have had a Pediatric Traveler return Ill from Travel?
1. Never had a case
2. A couple of cases in practice
3. Many of your patients travel and return with illness
Pediatric Travelers

- CDC estimates 2.4 million US children travel internationally yearly and the number consistently increases.
- It is estimated that only 20% to 40% of pediatric patients notify their primary providers regarding their international travel plans.
- Data GeoSentinel Global Surveillance Network reports:
  - only 51% of all children and 33% of the children visiting friends and relatives (VFRs) had received pretravel medical advice compared with 59% of adults.
  - Persons visiting/staying VFR’s are more likely to get Infectious disease compared to people staying in hotels.

- The most commonly reported health problems among child travelers are as follows:
  - Diarrheal illnesses
  - Dermatologic conditions, including animal, arthropod bites and sunburn
  - Systemic febrile illnesses, especially malaria
  - Respiratory disorders
  - Vaccine Preventable Diseases (VPD’s)-Measles, flu

Question 3
Which Vaccine preventable disease will the traveler most encounter?

- Hepatitis A
- Meningococcal Disease
- Varicella
- Influenza

Influenza

Estimated Annual Cases of Influenza Are Between 12 and 35 Million

Question 4
What did Hannah bring back from vacation?

a) a shirt
b) a snow globe
c) measles

MEASLES
General Travel Principles

- Most insurances do not offer or have limited coverage for travel vaccines
  - Yellow fever
  - Typhoid
  - Japanese Encephalitis
  - Rabies (prophylaxis)
- The most common thing not covered is the professional fee for counseling
- Travel clinic is a fee for service. Payment is required at the end of the visit

General Principles of Travel Clinic

- Ideally the travel visit should be the second reservation after the flight arrangements
- Review Itinerary
  - Destinations: purpose, time, duration and accommodations
  - Potential exposure to insects and animals
- Immunization Records
- Vaccines
- Recommended vs Required
- Routine Immunizations
- Required Immunizations
- Malaria Prophylaxis
- Protective Measures
- Traveler’s Diarrhea
  - Preventive measures
  - Treatment prescription
- Travel Kit
- Other important documents and items

Approach to Fever in Returning Traveler

- Data from 1996-2011 had a total of 82,825 travelers reporting illness
- 3655 (4%) acute/life threatening illness
- Falciparum malaria 77% of 3655 cases
- Enteric fever 18%
- 13 patients died
  - 10 with falciparum malaria
  - 2 with melioidosis (Burkholderia pseudomallei)
  - 1 with severe dengue
- Mortality is higher in Elder travelers
- Overall Mortality is uncommon ranging from 0.2%-0.5%
Scenario 1
• Receive a call from Trek Leader in Chicago regarding 18 y.o. female who is on trek in Haiti
• Building school in Haiti
• Dropped Brick on hand 2 days ago
• Now in Port Au Prince leaving tomorrow

What information do I need?
• VITAL SIGNS??
• PHOTO??
• How well appearing is the trekker?
• Risk benefit ratio of going to the hospital
• Where does she fall on the pathway

Approach to Fever in Returning Traveler
• Quick Sepsis related Organ Failure Assessment (qSOFA)
• Can be used as part of rapid clinical assessment to ID pts with sepsis and needing higher level of care
• Criteria (patients meet 2 or more of the following)
  • Altered mentation
  • RR >22
  • Systolic b/p < 100
  • Eschar (typhus)
• If patients meet 2 or more of the criteria escalation of care with hospitalization is needed

What information do I need?
• VITAL SIGNS??
• T: 101.9 HR 96 Resp 24
• PHOTO??
• How does the trekker appear?
  • Stable alert
• Risk benefit ratio
  • Can I get this kid to a hospital? Yes, but need to call special forces to get to hospital
  • Safety an issue? Yes
Question 5

• What would you do?
  1. Go to the hospital now
  2. Do nothing get on the flight in the morning
  3. Try to lance the yellow bumps and apply warm compresses
  4. Give antibiotics
  5. Do 3 and 4

What organisms do I need to worry about?

• Gram Positive
  • Staph Aureus
  • GAS
  • Diphtheria
  • Gram Negative
  • Soil
    • Pseudomonas
  • E. Coli
  • Water
    • Aeromonas

Plan

• Have team try to lance lesions
• Start Ciprofloxacin 500 mg every 12 hours and Doxycycline 100mg every 12 hours
• Plan on getting child home on flight in the morning
• If the patient is still having febrile immediately get to ED once through customs

Outcome

• The next morning after starting antibiotics child became afebrile
• Swelling of finger was stable
• Patient was able to get on Flight and get back to the USA
• Patient was seen in ID clinic
  • Culture was sent
  • Grew Staph Aureus (MSSA)
• Images obtained
  • No fracture

What antibiotics would you start?

1. Ciprofloxacin
2. Malarone
3. Mefloquine
4. Doxycycline
5. Doxycycline and Ciprofloxacin
Scenario 2

- Received a call from Suburban ED
- 12 y.o. male presented to ED after being in India (Goa and Bombay) for 1 month visiting family
- ROS/PE
  - Had fever early in the week but in ED is 100.2
  - ROS: Significant for fatigue, generalized achiness. No diarrhea or vomiting or URI. Sore throat earlier in the week
  - PE: unremarkable

Question 7

What tests would you obtain?
1. No tests patient most likely has a virus
2. CBCD, CMP, Viral panel and blood culture
3. Need to look for all things kid was in India

Test/Labs/Results

- CBCD
  - 2WBC, 14.9 HGB, 43.3 HCT PLT 56,000 (low)
  - DIFF: 54N 8B, 36L, 2M
- CMP: Normal no hepatitis, good Renal function
- PT/INT/PTT: 14.4/1.11/46.5

Plan

- Child clinically stable in ED
- 1st Malaria smear negative
- Discharged the patient home to follow up in ID clinic the following day.
- Patient to return to ED if anything changes
Comer Clinic Follow up

- Patient follow up in Comer Clinic
- Clinic
  - First get labs, but needs major assistance to walk to lab holding onto dad
  - Overnight had blood nose was able to stop it
- VS
  - 37.3, 78, 18, 110/69
- ROS/PE
  - Afebrile
  - Rash on hands/palms and spreading up extremities
  - General fatigue
  - Shoddy LAD
  - No HSM

Question 8

What is the significance of bleeding and rash?

1. Malaria
2. Dengue Fever
3. Zika
4. Chikungunya

DENGUE FEVER

- Caused by an flavivirus (single stranded RNA virus)
  - There are 4 types of Dengue virus
- Transmitted via the bite of Aedes mosquitoes
- Its estimated that 40% to 80% of infections are asymptomatic
- Most common presentation is febrile illness
- About 5% of patients will develop severe life threatening disease

WHO Dengue Classification System

Dengue

- > 2 clinical findings
  - Rash
  - Positive tourniquet test
  - Aches and pains
  - Leukopenia
  - Nausea/Vomiting

Severe Dengue

- Anyone of the following symptoms
  - Severe plasma leakage
  - Shock
  - Severe bleeding
  - Severe organ failure
  - Heart impairment
  - Transaminases
**Dengue Fever Worldwide Incidence**

**Differential diagnosis**
- **Bacterial**
  - TB
  - Typhoid
- **Viral**
  - EBV/CMV
  - Enterovirus
- **Hemorrhagic fever**: Dengue Fever, Chikungunya, Zika
- **Parasitic**
  - malaria

**Comer Clinic Follow up**
- **LABS**
  - CBCD
  - CMP
  - PT/INR/PTT
- **Plan**
  - Anything else you would do with new physical exam findings?

**What did we do?**
- Plt’s dropped to 34,000 we recommended admission to Comer
- Since the rash was concerning for dengue or rickettsia diseases we started doxycycline
- Placed IV did type and screen
- Consulted Heme/Oncology
- Recommended CBCD every 6 hours
- Plts dropped to 26 and patient continued to have Bloody nose so he was transfused with platelets

**Differences between disease caused by Aedes aegypti**

<table>
<thead>
<tr>
<th>Symptons</th>
<th>Dengue Fever</th>
<th>Chikungunya</th>
<th>Zika</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>High Fever &gt; 38 Lasts 6-7 days</td>
<td>High Fever Lasts 2 to 3 days</td>
<td>Absent or Low grade Lasts 3-5 days</td>
</tr>
<tr>
<td>Joint Pain</td>
<td>Mild Pain (May be present)</td>
<td>Intense Pain in about 50% of cases</td>
<td>Moderate Pain Almost always Present</td>
</tr>
<tr>
<td>Rash</td>
<td>Does not immediately appear</td>
<td>After 48 hours (May be present)</td>
<td>Almost always Present in the first 24 hours</td>
</tr>
<tr>
<td>Itchiness</td>
<td>Light (May be present)</td>
<td>Light (May be present)</td>
<td>Moderate to Intense ~50% to 80%</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>Light (May be present)</td>
<td>May be present</td>
<td>Present in about 50% of cases</td>
</tr>
<tr>
<td>Muscle Pain</td>
<td>ALMOST ALL CASES! 30% of cases</td>
<td>60% of Cases</td>
<td>60% of Cases</td>
</tr>
<tr>
<td>Bleeding</td>
<td>MODERATE</td>
<td>LIGHT</td>
<td>ABSENT</td>
</tr>
</tbody>
</table>

**DEET/PERMETHERIN**
- Use mosquito repellent
- Necessary precautions
  - Wear full sleeved clothes
  - Remove water from cistern & small containers
- Regular fumigation
- Use mosquito net
Protective measures

- DEET
  - Use at least 30% concentration
  - Can be use on infants older than 2 months of age
- PERMETHRIN
  - Insecticide that may be used to treat bed nets and clothing
  - Clothing
    - Light colored clothing with long sleeves and pants

Precautions for Use of Diethyltoluamide (DEET)

- Use repellents containing > 30% DEET only
- Apply sparingly to exposed skin
- Apply only to intact skin
- Apply to face by wiping, avoid eyes and mouth
- Do not spray directly on face
- Wash off with soap and water when coming indoors
- Do not inhale or ingest repellent
- Do not apply on hands or other areas that are likely to come in contact with the eyes or mouth
- Do not allow children under 10 years to apply DEET themselves
- Apply to your own hands then apply to the child
- Do not use on children less than 2 months of age

Scenario 3

- 17 y.o. male presents to ED with high fever for 3 days. He returned from travel 2 weeks ago from Malawi where he was a billing school
- Was taking weekly malaria prophylaxis but finished taking his prescription
- Complaining of headache with fever
- Mild nausea, no vomiting or diarrhea
- Labs show elevated LFT’S and WBC’S

Question 9

What do I need to do with this patient?

1. Nothing, he was on malaria prophylaxis
2. Draw routine labs like CBCD, CMP & Viral Panel
3. Obtain malaria smear
4. Admit to the hospital

Malaria Smear

- Malaria smear is positive for P. Falciparum at 4%
- Admit child to PICU
- Start treatment for malaria:
  - Artemether-lumefantrine (Coartem®) 20mg artemether/ 120 mg lumefantrine
Coartem™

- A 3-day treatment schedule with a total of 6 oral doses
- Adult dose is 4 pills
- The patient should receive the 1st dose, followed by the second dose 8 hours later
- Then 1 dose bid for the following 2 days

Cerebral Malaria/Severe Malaria

- Impaired consciousness
- Seizures
- Severe anemia
- Significant bleeding
- Shock
- Acidosis
- Hyperparasitaemia > 10%
Cerebral Malaria/Severe Malaria

- Call CDC HOTLINE (855) 856-4713
- Contact CDC to get IV Artesunate under expanded access investigational new drug (IND) protocol
- Artesunate dosage (Adults/Children)
  - Give 2.4 mg/kg per dose:
  - at 0, 12, and 24 hours for a total of three doses

Cerebral Malaria/Severe Malaria Improves

Adults
- Coartem™ (Preferred)
- Malarone™
- Quinine + doxycycline
- Quinine + Clindamycin
- Mefloquine™

Pediatric
- Coartem™ (Preferred)
- Malarone™
- Quinine + doxycycline
- Quinine + Clindamycin
- Mefloquine™

Drug | Dosage | Dosage Form | Comments
--- | --- | --- | ---
Malarone | Prophylaxis in all areas | 250 mg/100 mg | Take daily 1-2 days prior to travel, daily while traveling. Then QD for one week after travel.

Table peroxide | Prophylaxis in all areas | 80 mg base (160 mg salt) | Take weekly, one week before, weekly during travel and weekly for 4 weeks.

Doxycycline | Prophylaxis in all areas | 100 mg | Take weekly, one week before, weekly during travel and weekly for 4 weeks.

Hydroxychloroquine | Prophylaxis in all areas | 310 mg (400 mg salt) | Take weekly, one week before, weekly during travel and weekly for 4 weeks.

Mefloquine | Prophylaxis in mefloquine sensitive areas | 250 mg | Take weekly, one week before, weekly during travel and weekly for 4 weeks.

Primaquine | Prophylaxis for short duration travel to areas of P. vivax | 30 mg base (52.6 mg salt) | Take daily 1-2 days prior to travel, daily while traveling. Then QD for one week after travel.

Tafenoquine | Prophylaxis in all areas | 200 mg | Not for less than 16 years. Take daily for 3 days prior to travel. Then take weekly while traveling and for 1 week after malarious area.

Scenario 4

- 10 y.o. female presents to PCP office with fever, body aches with diarrhea
- Mom verbalizes that they returned yesterday from a 6 week trip in Pakistan
- PCP sends patient to hospital to be admitted since the patient is dehydrated
- ID gets consulted to assist with FUO work up in a Traveler
Question 10

What do we need to worry about with a patient with fever and diarrhea who has returned from Pakistan?

1. Influenza
2. EBV
3. Malaria
4. Typhoid

Typhoid Fever

- Typhoid fever and paratyphoid fever are systemic bacterial infections known as enteric fevers
- Caused by Salmonella enterica Typhi and Para typhi (A, B, and C)
- Transmission is through the consumption of fecal contaminated food or water

Typhoid Fever

- An estimated 26 million cases of typhoid fever per year
- Estimated 5 million cases of paratyphoid fever per year
- Worldwide, Typhoid fever causes 215,000 deaths per year
- In the United States during 2008–2015, approximately 350 culture-confirmed cases of typhoid fever and 90 cases of paratyphoid fever caused by Para typhi A were reported

Traveler's Diarrhea

- Oral Rehydration
- Antibiotics
  - Ciprofloxacin (increasing resistance)
  - Azithromycin (preferred)
    - If prescribing as a liquid make sure to have the prescription dispensed as a powder b/c once mixed only good for 2 weeks
- Zinc
  - 10-20 mg per day
  - Found to decrease duration
  - If traveler's diarrhea does not respond to a course of antimicrobial therapy, medical attention should be sought

Prevention of Traveler's Diarrhea

- **DO**
  - Eat only thoroughly cooked food served hot
  - Peel fruit
  - Drink only bottled, carbonated, boiled, chemically treated, or filtered water
  - Prepare all beverages and ice cubes with boiled or bottled water
  - Wash hands before eating or preparing foods
  - Continue breastfeeding throughout travel period
- **DON'T**
  - Eat raw vegetables or unpeeled fruit
  - Eat raw seafood or shellfish or undercooked meat
  - Eat food from street vendors
  - Drink tap water
  - Consume milk or dairy products unless labeled as pasteurized or irradiated
Prevention of Traveler’s Diarrhea

If you cannot
• BOIL IT
• PEEL IT
• OR COOK IT

DO NOT EAT IT

Recap

• Patient comes to you and tells you traveling to Nigeria and they are leaving tomorrow
• Don’t Panic
• Review itinerary
• Make sure routine immunizations UTD
• Prescriptions
  • Malaria prophylaxis
  • TD
• Follow up appointment after Travel
  • Patients who travel internationally should be screened for TB

Recap

• Patient presents with fever after travel
• Get complete History
  • Itinerary
  • Mosquito borne illness:
    • Malaria risk needs to be excluded first
    • Dengue or Chikungunya
  • Diarrheal disease
• Use Fever in Traveler Chart to focus your work up
• If patient is extremely ill refer to ED for management
Travel Checklist

Prevention of Traveler’s Diarrhea

**Traveler’s Diarrhea**

- Oral Rehydration
- Pepto-bismol for prevention
- Antibiotics: Ciprofloxacin or Azithromycin
  - If prescribing as a liquid make sure to have the rx dispensed as a powder b/c once mixed only good for 2 weeks
  - If traveler’s diarrhea does not respond to a course of antimicrobial therapy, medical attention should be sought

**Travel Checklist**

**Prevention of Traveler’s Diarrhea**

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- Wash hands before eating or preparing foods
- Continue breastfeeding throughout travel period

**Don’t**
- Eat any vegetables or unpeeled fruit
- Eat raw seafood or shellfish or undercooked meat
- Eat food from street vendors
- Drink tap water
- Consume milk or dairy products unless labeled as pasteurized or irradiated

**Boiling is best!**

- Easy
- Economical
- Kills all pathogens

- Bring to rolling boil for 1 minute or 3 minutes if altitude >6,562 feet (2000 meters)
- Let cool, can add salt for taste
- Can store in clean, covered containers

**Other items**

- Insect repellent containing DEET (up to 50%)
- Purchase mosquito repellent with ≥ 20% to <30% DEET
- Repellent for biting and non-biting insects
- Sunscreen (preferably SPF 15 or greater)
- Anti-pyretic medications
- Nasal decongestants
- Oral rehydration solution packets
- Band-aids, first aid kit, bandages, latex gloves, antacid, tweezers, scissors, cotton-tipped applicators
- Antimicrobial hand wipes or alcohol-based hand sanitizer containing at least 60% alcohol (1)
- Nasal saline spray
- Lubricating eye drops
- First aid quick reference card
- Other items that may be useful in certain circumstances
- Perform a 72 h lead-up diet or other dietary restrictions
- High altitude preventive medication
- Water purification tablets
- Oral rehydration solution may be prescribed by healthcare provider. These items will also require a letter from prescribing provider on letterhead stationery.
- Large containers
- Address and phone numbers of area hospitals or clinics
DEET
Sawyer good brand

- REI
  - On Halsted near North ave
  - Oakbrook location
- CABALA’S
  - Off of 294
- ONLINE though amazon or REI

Medications

- Personal prescription medications in their original containers (copies of all prescriptions should be carried, including the generic names for medications, and a note from the prescribing physician on letterhead stationery for controlled substances and injectable medications)
- Antimalarial medications, if applicable
- Over-the-counter antidiarrheal medication (e.g., bismuth subsalicylate, loperamide)
- Antibiotic for self-treatment of moderate to severe diarrhea
- Antihistamine, Benadryl
- Decongestant, alone or in combination with antihistamine
- Antimotion sickness medication
- Acetaminophen, aspirin, ibuprofen, or other medication for pain or fever
- Midazolam
- Cough suppressant/expectorant
- Throat lozenges
- Antacid
- Antifungal and antibacterial ointments or creams
- 1% hydrocortisone cream
- Epinephrine auto-injector (e.g., EpiPen), especially if history of severe allergic reaction. Also available in smaller-dose package for children.

Smart Traveler Enrollment Program (STEP)

- The Smart Traveler Enrollment Program (STEP) is a free service provided by the U.S. Government to U.S. citizens who are traveling to, or living in, a foreign country.
- STEP allows you to enter information about your upcoming trip abroad so that the Department of State can better assist you in an emergency.
- STEP also allows Americans residing abroad to get routine information from the nearest U.S. embassy or consulate.

Smart Traveler Enrollment Program (STEP)

- Security/Safety
  - Smart Traveler – http://travel.state.gov/
  - To Enroll: https://step.state.gov/step/

TRAVELER’S INSURANCE

- Check through airline, home owner’s policy, credit card
- Evacuation insurance needed good investment

Pedialyte Recipe

- Homemade Pedialyte Recipe
- Serves 6
- 4 cups water
- 1/2 teaspoon baking soda
- 1/2 teaspoon salt
- 3 tablespoons sugar
- 1/2 packet unsweetened Kool-Aid (optional)
- Mix all until dissolved. Keep refrigerated and use within a couple of days.