Zika, Yellow-Fever, and Malaria...Oh My: Travel Health Vaccinations
Presenters/Disclosures

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Neither of us have (nor does any immediate family have) a vested interest in or affiliation with an organization whose philosophy could potentially bias our presentation, has a specific commercial service or interest in the therapeutic areas, drugs, and/or devices under discussion, or a corporate organization offering financial support or grant monies for this continuing education program.
Socrative Room Code

KOVAC9877
Objectives

1. Describe vaccinations indicated for a patient traveling outside of the United States

2. Recognize important personal care measures and counseling points to address with patients prior to international travel

3. Discuss measures to prevent Zika for those planning travel to endemic areas

4. Develop a systematic approach to evaluating a patient prior to travel using the appropriate resources available
Case Vignette: Meet the Miller Family

The Miller family of four is planning a 1-week vacation to Peru this upcoming July and presents to your pharmacy for evaluation and potential vaccination to prepare for their upcoming vacation.

Jennifer Miller
35 year old woman

Jason Miller
38 year old man

Emma Miller
6 year old girl

Will Miller
4 year old boy
The Pre-Travel Consultation: Steps to Making Recommendations Regarding Travel Health

1. Gather patient travel and health information
2. Input information into online Center for Disease Control (CDC) Yellow Book for Clinicians
3. Determine if malaria prophylaxis is appropriate
4. Explore precautions based on travel location
5. Summarize recommendations and discuss risks/benefits with patient(s)
Step 1. Travel Health Intake Information

Health Background:
- Past Medical History (PMH)
- Special Conditions
- Immunization History
- Prior travel experience

Trip Details:
- Itinerary (including flight layovers)
- Timing
- Reason for travel
- Travel style/ special activities

Step 2. Visit CDC’s online Yellow Book

Visit the CDC Yellow Book’s website

Click “Destinations” on the left hand side

Under “For Clinicians”
- Select destination from drop-down box
- Click all pertinent “Special Travel Needs”
- Click “GO”
Step 3. Determine if Malaria Prophylaxis is Appropriate

1. Visit the following CDC website link focusing on Malaria: https://www.cdc.gov/malaria/travelers/country_table/p.html

2. Use this chart to determine whether malaria prophylaxis is necessary

3. Refer to the column on the far right to determine the altitude of travel destination
Step 4. Explore Travel Precautions

- Locate and inform patients of closest hospital/healthcare facility

- Discuss prophylactic measures with the patient(s) as needed:
  - Mosquito avoidance
  - Sun exposure
  - Food and water precautions
  - Travelers diarrhea risk and management
  - Injury prevention and safety/security
  - Animal-associated hazards
  - Deep Vein Thrombosis and Pulmonary Embolism

Step 5. Summarize Patient-Specific Travel Recommendations

- Present patient(s) with:
  - List of all recommended routine and travel-specific vaccinations
  - Risks/benefits for malaria prophylaxis
  - Educational materials for preventative measures during travel

- Discuss and compose a plan for pre-travel health needs with a timeline

- Provide “What to Pack in Your Travel Health Kit”
Routine Vaccinations to Consider

- Haemophilus influenzae type b
- Hepatitis B
- Human papillomavirus (HPV)
- Influenza
- Measles, mumps, rubella
- Meningococcal
- Pneumococcal
- Polio
- Rotavirus
- Tetanus, diphtheria, pertussis
- Varicella
- Zoster
Travel Health Vaccinations to Consider

- Cholera (not available in the United States)
- Hepatitis A
- Japanese encephalitis
- Rabies
- Tickborne encephalitis (not available in the United States)
- Typhoid
- Yellow fever
Hepatitis A Virus (HAV)

- Non-enveloped RNA virus
- Transmission: fecal-oral
- Epidemiology:
  - Common in areas of poor sanitation practices and limited access to clean water
- Treatment:
  - Supportive Care
- Prevention:
  - Food and water precautions
  - Maintaining standards of hygiene and sanitation
  - Immune globulin (IG)
  - Vaccination

HAV Prophylaxis: Vaccinations

- **Havrix®** and **Vaqta®**
  - Approved ≥12 months of age
  - 2-dose intramuscular (IM) series
  - Patients aged 1-40 years:
    - Administer 1-dose as soon as travel is considered
    - Administer second dose for long-term protection
  - Low pregnancy risk

- **Twinrix®**
  - Combination vaccine of Hepatitis A and Hepatitis B
  - Approved ≥18 years of age
  - 3-dose series:
    - 0, 1, and 6 months before departure for full protection
    - Accelerated schedule also available (0, 7, 21-30 days)
  - No data to support a single-dose for protection

Japanese Encephalitis (JE)

- Single-stranded RNA virus
- Transmission: vector-borne illness
- Epidemiology:
  - Most common vaccine-preventable cause of encephalitis in Asia
- Most cases are asymptomatic
- Treatment:
  - Supportive Care
  - Management of complications
- Prevention:
  - Avoid mosquito bites
  - Vaccination

JE Prophylaxis: Vaccination

- Ixiaro®
  - Approved for ≥2 months of age
  - 2 dose IM series:
    - Days 0 and 28
    - Series should be completed ≥1 week before travel
  - Booster dose needed for:
    - Future travel to endemic areas
    - If series completed >1 year previously for patients >17 years
    - Lack of studies in pregnant women

- The Advisory Committee on Immunization Practices (ACIP) recommends JE vaccine for travelers who plan to spend ≥1 month in endemic areas during the JE virus transmission season

Rabies

- Neurotropic virus causing acute, fatal, progressive encephalomyelitis
- Transmission: bite from a rabid animal
- Epidemiology:
  - Found on all continents except Antarctica
- Treatment:
  - Symptomatic and palliative supportive care
- Prevention:
  - Education on avoiding animal bites
  - Post-Exposure prophylaxis (PEP)
  - Pre-Exposure Vaccination
Rabies Prophylaxis: Pre-Exposure Vaccination

- **Imovax® (HDCV) and RabAvert® (PCEC)**
  - Approved for use in all age groups
  - Vaccination depends on patients risk-category
  - Often recommended for veterinarians, animal handlers, field biologists, cavers, missionaries, and certain laboratory workers
- 3-dose IM series
  - On days 0, 7, 21 or 28 days
  - Travelers should receive all 3 preexposure immunizations before travel

**Note:** Pre-Exposure vaccination does not eliminate the need for additional medical attention after a rabies exposure, but it simplifies PEP.

Typhoid Fever

- Potentially severe and occasionally life-threatening febrile illness caused by *Salmonella typhi*
- Transmission: contaminated water or food from human feces
- Epidemiology:
  - >90% of cases reported yearly are from Asia
- Treatment:
  - Empiric antibiotic treatment: Fluoroquinolone
    - Antimicrobial therapy shortens the clinical course and reduces the risk for death
- Prevention:
  - Food and water precautions
  - Vaccination

Typhoid Fever Prophylaxis: Vaccination

- **Vivotif**
  - Oral, live attenuated vaccine
  - Not recommended for infants or children aged <6 years.
  - Administration: 4 capsules, 1 taken every other day
  - Regimen should be completed 1-week prior to potential exposure
  - Provides 5 years of immunity

- **Typhim Vi**
  - Not recommended for infants and children aged <2 years
  - One IM dose
  - Dose should be given ≥2 weeks of potential exposure
  - Provides 2 years of immunity

- Both typhoid vaccines protect 50%–80% of recipients

- CDC recommends typhoid vaccine for travelers to areas where there is an increased risk of exposure to *Salmonella typhi*

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Yellow Fever (YFV)

- Single-stranded RNA virus
- Transmission: vectorborne illness
- Epidemiology:
  - Occurs in sub-Saharan Africa and tropical South America
- Treatment:
  - No specific medications for treatment
  - Symptomatic relief
  - Life-saving interventions
- Prevention:
  - Education on avoiding mosquito bites
  - Vaccination
YFV Prophylaxis: Vaccination

- **YF-VAX®**
  - *Live*-attenuated viral vaccine
  - YFV is **required** for entry into certain countries
  - Recommended for ≥9 months
  - Administration: Single-dose subcutaneous (SQ) injection
    - World Health Organization (WHO) concluded that a single primary dose of provides life-long protection
    - The ACIP agreed with WHO, except for the following patients:
      - Patients who were pregnant during their first dose
      - Human immunodeficiency virus (HIV) patients
      - Patients who received a hematopoietic stem cell transplant after receiving the initial dose
  - Each state’s health department certifies centers in that state to administer this vaccination

- Must receive 10 **days prior** to planned trip

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Step 1. Travel Health Intake Information

**Jennifer:**
- 35-year old female
- PMH: No chronic health conditions
- Special Conditions:
  - Not currently pregnant
  - Planning to become pregnant
- Immunization History:
  - Completed childhood vaccinations
  - Tdap x2 for each previous pregnancy
  - Influenza vaccination yearly
- No prior international travel
Revisit Case Vignette: The Miller Family

Step 1. Travel Health Intake Information

Jason:
- 38-year old male
- PMH: Controlled Hypertension
- No special conditions
- Immunization History:
  - Completed childhood vaccinations
  - Influenza vaccination yearly
  - Received a Tdap vaccination 4 years ago
- No prior international Travel
Revisit Case Vignette: The Miller Family

Step 1. Travel Health Intake Information

Will:

- 4-year old male
- PMH: No chronic health conditions
- No special conditions
- Immunization History:
  - Up-to-date on all childhood immunizations
- No prior international travel
Revisit Case Vignette: The Miller Family

**Step 1. Travel Health Intake Information**

Emma:
- 6-year old female
- PMH: Controlled asthma
- No special conditions
- Immunization History:
  - PCV13: completed 4-dose series
  - PPSV23: received at age 5 years
  - Up-to-date on all other childhood immunizations
- No prior international travel
The Miller Family: Trip Details

- **Itinerary:**
  - Puerto Maldonado, Peru
  - Urban area

- **Timing:**
  - July 28, 2017 to August 4, 2017
  - 1-week vacation
  - Time to departure: 6 months

- **Reason for travel:** Tourism

- **Travel style/ special activities**
  - Modes of transportation: Plane and automobile
  - Accommodations: hotel
  - No plans to “eat adventurously” or be near wild animals
  - Also no plans for outdoor sports
Step 2. Visit CDC’s online Yellow Book

Visit CDC website for Clinicians and input the Miller families information:

Click “GO”

Determine which travel-specific vaccinations are needed for each member of the family utilizing this resource.
Case Question #1

What travel vaccines do the Millers need prior to their trip?

A. Hepatitis A only
B. Hepatitis A, Japanese encephalitis, and typhoid fever
C. Hepatitis A, typhoid fever, and yellow fever
D. Hepatitis A, Rabies, typhoid fever, and yellow fever
Case Question #2

True or False:

Will (4 year-old boy) is too young to receive Typhim Vi (Typhoid vaccine).
Case Question #3

True or False:

Only one hepatitis A vaccine dose is needed prior to the Miller’s trip.
The Miller Family's Recommended Travel Vaccines

**Hepatitis A**
- **Havrix® or Vaqta®**
  - 2-dose IM series (6 months apart)
  - 1 dose needed for immunity for trip, 2 doses needed for lifetime immunity

**Typhoid Fever**
- **Typhim Vi®**
  - 1- IM dose
  - Needed ≥2 weeks before exposure

**Yellow Fever:**
- **YF-VAX®**
  - 1- SQ dose
  - Needed 10 days prior to planned trip to area of risk
Self-Treatable Travel-Related Conditions

- Travelers’ Diarrhea
- Altitude Illness
- Jet lag
- Motion Sickness
- Respiratory Infections
Counseling and Advice for Travelers

<table>
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<tr>
<th>Topic</th>
<th>Description</th>
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<td>Sun exposure</td>
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</table>
Mosquito Bite Avoidance

- **Common infection transmission:**
  - Zika
  - Malaria
  - Dengue
  - Chikungunya
  - Yellow fever
  - Others

- **Epidemic and endemic news**
  - Watch for CDC travel notices and recommendations
    - Watch level 1: exercise usual precautions
    - Alert level 2: exercise enhanced precautions
    - Warning level 3: avoid nonessential travel

Mosquito Bite Avoidance Cont’d

- Insect repellent: use EPA-registered insect repellent
  - DEET: use concentrations of at least 25% - 50% for optimal effectiveness
    - Apply to exposed areas only
    - Apply sunscreen and then DEET
    - Re-apply as indicated on product packaging
  - Picaridin- generally as effective as DEET
    - EPA selection tool

- Cover up: wear long-sleeved clothing

- Time of day

- Keep mosquitoes outdoors
  - Choose air conditioned lodging
  - Ensure screens on windows and doors
  - Sleep under bed net if outside or in a room that is not screened

Malaria

- Protozoal infection

- Transmission: Bite from Anopheles species mosquito (nighttime)

- Epidemiology: 350 to 500 million annual cases
  - 1 million deaths annually

- Presentation:
  - Fever and influenza-like symptoms, anemia, jaundice
  - Severe disease:
    - Seizures, mental confusion, kidney failure, acute respiratory diseases syndrome

- Treatment: antiprotozoals
  - Chloroquine, atovaquone-proguanil, quinine, quinidine, doxycycline, and others
  - Supportive care
Malaria: Epidemiology

World Malaria Map

Select a Country

Go

Malaria Chemoprophylaxis

- Recommendations vary throughout each country
  - Country specific information

- Chemoprophylaxis options:
  - Atovaquone/Proguanil, Chloroquine, Doxycycline, Mefloquine, Primaquine

- Considerations:
  - Age and sex (pregnancy status)
  - Concomitant disease states
  - Price
  - Allergies
  - Destination and agenda

Zika Virus

- Single-stranded RNA Virus

- Transmission:
  - Bite from *Aedes* species mosquito (daytime)
  - Sexual contact with infected partner

- Presentation:
  - *Asymptomatic*
  - Mild fever
  - Maculopapular rash
  - Arthralgia

- Treatment:
  - Supportive
    - Analgesia and antipyretic
    - Avoid aspirin and NSAIDs until dengue is ruled out
Zika: Epidemiology

Zika in Pregnancy

- Passed from mother to fetus

- Birth defects: occurred in ~6% of children born to infected mothers
  - Microcephaly
  - Other congenital brain abnormalities

- Prevention:
  - Avoid epidemic and endemic areas
  - If travel is necessary:
    - Avoid mosquitoes
    - Post-exposure precautions

Family Planning

- Pregnant (living in transmission area or potential male partner exposure)
  - Abstain or use condoms for duration or pregnancy

- Planning to become pregnant:

| Recent travel to endemic area or possible exposure with infected partner | Women | Men |
|--------------------------------------------------------------------------------------------------------------------------------------|
| Wait 8 weeks after symptoms start or possible exposure | Wait 6 months after symptoms start or possible exposure |

| Living in area with known transmission (positive Zika test) | Women | Men |
|-------------------------------------------------------------------------------------------------------------------------------------|
| Wait 8 weeks after symptoms start | Wait 6 months after symptoms start |

Revisit Case Vignette: The Miller Family

Step 3. Determine if Malaria Prophylaxis is Appropriate

Visit the following CDC website link focusing on Malaria: https://www.cdc.gov/malaria/travelers/country_table/p.html

Follow the chart to find “Peru”

More specifically, Puerto Maldonado, Peru
Case Question #4

True or False:

The Millers will need malaria prophylaxis for their trip.
Think-Pair-Share

What malaria prophylaxis option(s) would best fit the Millers?
# The Miller Family: Malaria Prophylaxis

<table>
<thead>
<tr>
<th>Country</th>
<th>Areas with Malaria</th>
<th>Estimated relative risk of Malaria for US Travelers</th>
<th>Drug Resistance</th>
<th>Malaria Species</th>
<th>Recommended Chemoprophylaxis</th>
<th>Key Information Needed and Helpful Links to Assess Need for Prophylaxis for Select Countries</th>
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| Peru    | All departments <2,000 m (6,561 ft), including the cities of Iquitos and Puerto Maldonado, and only the remote eastern regions of La Libertad and Lambayeque. None in the following areas: Lima province; the cities of Arequipa, Ica, Moquegua, Nazca, Puno, and Tacna; the highland tourist areas (Cuzco, Machu Picchu, and Lake Titicaca); and along the Pacific Coast. Moderate | Chloroquine | $P.\text{ vivax} \ 85\%$ $P.\text{ falciparum} \ 15\%$ | Atovaquone-proguanil, doxycycline, or mefloquine | 1) City(ies) of travel  
2) Province(s) of travel  
3) Altitude of city(ies) of travel  

[Altitude information and to determine if a city is within a certain province](#)  

[Map of provinces of Peru](#) |
The Miller Family: Malaria Prophylaxis Options

**Atovaquone-proguanil**
- Expensive
- Started 1-2 days prior to travel, continue 1 week after travel
- Pediatric tablets are available
- Decision: Good option for The Miller Family

**Doxycycline**
- Started 1-2 days prior to travel, continue 4 weeks after travel
- Least expensive anti-malarial
- Contraindicated in children <8 years and pregnant women
- Decision: Avoid in The Miller Family

**Mefloquine**
- Begin 2 weeks prior to travel
- Only take once weekly, continue 4 weeks after travel
- Decision: Good option for The Miller Family

Step 4: Explore Travel Precautions for the Miller Family

Visit CDC website for Clinicians and input the Miller families information

Click “GO”

Determine additional precautions and counseling points to discuss with the Millers

Think-Pair-Share

Given Mrs. and Mr. Millers’ plans to conceive, what counseling might you give them on Zika risk and precautions?
The Miller Family: Additional Precautions

▶ Travel Health Notices
  ▶ Alert level 2, Practice Enhanced Precautions - Zika Virus
    ▶ Safe sex practices

▶ Patient Counseling
  ▶ Eating and drinking safely
    ▶ Avoid food served at room temperature and raw food
    ▶ Drink only sealed beverages or boiled water
  ▶ Mosquito/Bug bite prevention
    ▶ Proper clothing and lodging
    ▶ Insect repellent
  ▶ Travel Health Kit

▶ “Traveler View” - patient handout
Step 5: Summarize Travel Recommendations with The Miller Family

- Vaccinations:
  - Havrix® or Vaqta® for Mr. and Mrs. Miller only
    - 1 dose now and 1 dose in at least 6 months
  - Typhim Vi® for each member of the family
    - 1 dose needed at least 2 weeks before departure
  - YF-VAX® for each member of the family
    - 1 dose needed 10 days prior to departure

- Anti-malarial medications (choose one):
  - Atovaquone-proguanil
  - Mefloquine

- Other precautionary measures
Conclusions

- Opportunities in your practice
  - Patient needs in your area

- Collaboration:
  - Physicians and other healthcare providers
  - Businesses, schools, church groups, and others

- Workflow adaptation
  - MTM service model

- Revenue opportunity
  - Consultation
  - Vaccinations

- Resources
  - CDC Yellow Book
  - CDC Website
  - Additional training opportunities
  - WHO
  - Software: Travax, Travelcare, Tropimed etc.
  - Pennsylvania Pharmacists Association (PPA) has a free toolkit:
    - http://www.papharmacists.com/?page=ImmunTravelHealth