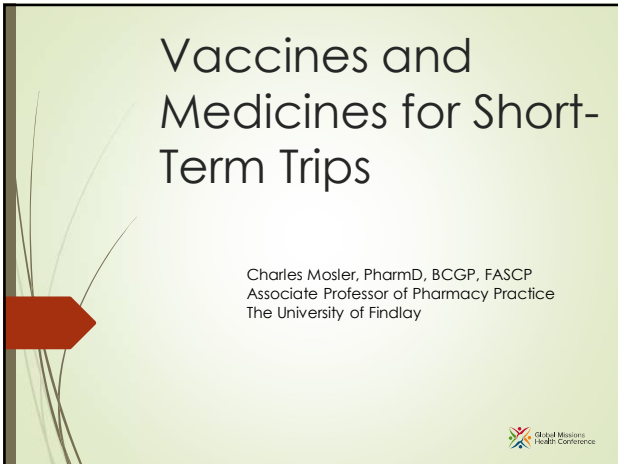
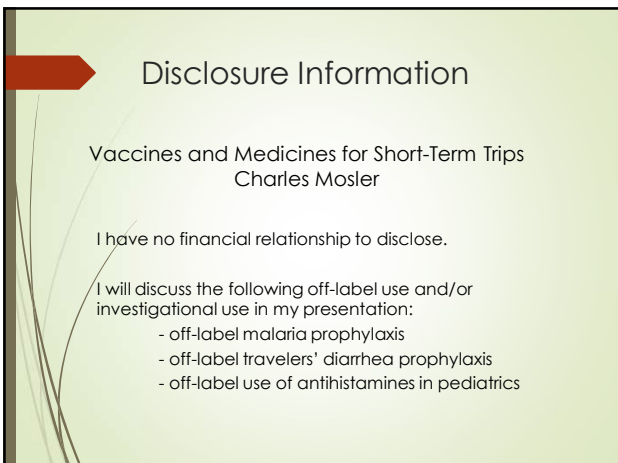




1



2



3

Learning Objectives

- At the completion of this activity, the participant will be able to:
 - Discuss the pathophysiology and clinical course of common conditions occurring with travel medicine
 - Compare and contrast the rationale for the use of certain drugs in travel medicine
 - Develop a care plan for the prophylactic treatment of tropical diseases
 - Design an appropriate plan for monitoring safe and effective pharmacotherapy of tropical diseases
 - Formulate a plan to provide patient counseling for disease states and medications common for travel medicine

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Pre-Trip Thoughts

- Reason for Trip
- Destination(s)
- Vaccination requirements
- Prophylactic Medications
- Altitude
- Motion Sickness
- Medications to take with you

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Incidence Rate per Month in Low-Income Countries

- Traveler's Diarrhea: 30-70%
- Malaria without chemoprophylaxis: 1-6%
- Malaria with chemoprophylaxis: 0.2%
- PPD conversion: 0.4%
- Hepatitis A, Typhoid: < 0.1%
- Hepatitis B, HIV, fatal accident: < 0.01%
- Cholera, Legionella, Poliomyelitis: < 0.001%

Steffen R, Amritprigala J, Mutsch M. Health risks among travelers – need for regular updates. *J Travel Med.* 2008;15(3): 145-6.
2024 Yellow Book - CDC

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Vaccines

- All patients considering international travel should be up to date on their routine vaccinations as determined by the CDC and Advisory Committee on Immunization Practices
- These vaccines include:
 - DTaP/Tdap
 - Hepatitis A & B
 - Influenza
 - MMR
 - Pneumococcal
 - COVID-19
- Recommended vaccinations based on your destination
 - <http://www.cdc.gov/travel/>

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Vaccines (cont)

- **COVID-19**
 - Everyone age 6 months and older
 - Children 5-11 years old
 - 1 dose of Moderna 2024-25 or 1 dose Pfizer-BioNTech 2024-25
 - 12 years and older
 - 1 dose 1 dose of Moderna 2024-25 or 1 dose Pfizer-BioNTech 2024-25 or 1 dose Novavax 2024-25
 - Note: If 1st time ever getting a COVID-19 vaccine and you choose Novavax then you need 2 doses of Novavax, 3 weeks apart to be considered up to date

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Vaccines (cont)

- **Yellow Fever**
 - Documentation required for entrance to some countries
 - Booster not recommended for most; a properly completed ICVP is considered valid for life
 - > 9 months old but < 60 years old (risk vs benefit)

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Vaccines (cont)

■ **Typhoid Fever**

- Oral (Vivotif®): every other day x 4 doses.
 - Repeat every 5 years (live)
 - > 6 years old
- IM (Typhim Vi®): 0.5ml IM x 1 dose.
 - Repeat every 2 years (inactive)
 - > 2 years old

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Traveler's Diarrhea

- Largely, but not entirely, preventable by following safe eating rules:
 - If it's not from a sealed bottle, don't drink it
 - No ice
 - Don't eat from street vendors
 - Fruits/veggies – only eat if you can peel it or cooked
 - Only eat at "tourist" restaurants

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Traveler's Diarrhea (cont)

- Can be caused by bacteria (80-90%), viruses (5-8%), protozoa (8-10%)
- Bacteria
 - *E. coli* (most), *C. jejuni*, *Shigella*, *Salmonella*
- Viral
 - Norovirus, rotavirus, astrovirus
- Protozoa
 - *Giardia* (most commonly), but also amebiasis, cryptosporidiosis, cyclosporiasis possible
- High Risk areas: most of Asia, Middle East, Africa, Mexico, Central and South America

CDC Yellow Book 2024

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Traveler's Diarrhea – Presentation

- **Bacterial** – sudden onset; malaise; mild-severe cramping/abdominal pain; urgent, loose stools; ± vomiting. 3-5 days untreated
- **Viral** – fairly similar to bacteria. Increased vomiting possible. 2-3 days untreated
- **Protozoal** – delayed onset (1-2 weeks), gradual onset of symptoms, belching, malaise, foul-smelling, fatty stools. Weeks-months untreated

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Traveler's Diarrhea - Treatment

- Rehydration
- Antimotility agents
 - Caution if fever > 101°F or bloody diarrhea
- Bacteria
 - empiric treatment (not routinely recommended) with:
 - Ciprofloxacin 750mg x 1 dose or 500mg twice daily x 3 days
 - OR
 - rifaximin 200mg three times a day x 3 days OR
 - azithromycin 1gm x 1 dose or 500mg twice a day x 1 day or 500mg daily x 3 days

CDC Yellow Book 2024

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Traveler's Diarrhea – Treatment (cont)

- Protozoa (all doses listed are adult)
 - **Giardia**
 - Metronidazole – 250mg 3 times a day or 500mg twice a day for 5-7 days
 - Tinidazole – 2000mg x 1 dose
 - Nitazoxanide – 500mg every 12 hours x 3 days
 - **Amebiasis**
 - Metronidazole – 500mg every 8 hours x 7 days followed by paromomycin 25mg/kg/day in 3 divided doses x 7 days
 - **Cryptosporidiosis** – Tx not typically needed
 - Nitazoxanide - 500mg every 12 hours x 3 days
 - **Cyclosporiasis**
 - Sulfamethoxazole-Trimethoprim DS twice a day x 10 days

CDC Yellow Book 2024

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Traveler's Diarrhea - Prophylaxis

- Not routinely recommended unless immunocompromised
- Bismuth subsalicylate – reduces TD by 50%
 - 2 tabs QID or 60ml QID
- Antibiotics – increased resistance limits effectiveness
 - Can try doxycycline, trimethoprim-sulfamethoxazole, rifaximin if deemed necessary
 - FQ not recommended due to resistance and side effects
- Remember that early treatment w/ antibiotics can limit duration of TD to 24 hours or less

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Review Question

A 22-year-old female is planning a mission trip to Southeast Asia. She is concerned about the risk of traveler's diarrhea and asks for your recommendations on how to prevent it.

Which of the following is the **most appropriate** advice to give this patient?

- A. "You should start taking bismuth subsalicylate (Pepto-Bismol) two tablets four times a day, starting one day before your trip."
- B. "It's a good idea to take a prophylactic antibiotic like ciprofloxacin for the duration of your trip."
- C. "Focus on safe food and water practices, such as drinking only bottled water and avoiding raw fruits and vegetables."

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Malaria

- Caused by *Plasmodium* protozoa transmitted by the bite of the female *Anopheles* mosquito
- Roughly 220 million infections per year worldwide with over 400,000 deaths.
- About 1700 cases per year in the US from travelers
- Incidence varies greatly depending on country

<http://www.cdc.gov/malaria/>

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Malaria – Prophylaxis

- All regimens must be taken for a period of time prior to the trip, while on the trip, and a period of time after the trip
- Some areas of the world show resistance to common antimalarials
- Some areas of some countries may not have malaria present

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Tanzania

Yellow Fever Vaccine
 Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission.¹
 CDC recommendations: Generally *not recommended* for travel to Tanzania.

Malaria Prevention
 Transmission areas

- All areas below 1,800 m (=5,900ft) elevation

Drug resistance²

- Chloroquine

Species

- *P. falciparum* (primarily)
- *P. malariae* and *P. ovale* (less commonly)
- *P. vivax* (rare)

Recommended chemoprophylaxis

- Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine¹

Other Vaccines to Consider
 See [Health Information for Travelers to Tanzania](#).
 Date last updated: October 4, 2024

Example screenshot from <https://wwwnc.cdc.gov/travel/yellowbook/2024/preparing/yellow-fever-vaccine-malaria-prevention-by-country>

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Malaria – Prophylaxis

- **Chloroquine**
 - Begin 1-2 weeks before travel, during travel, and continue for 4 weeks after travel
 - Adults: 500mg once a week (same day)
 - Peds: 8.3mg/kg/week (same day)
 - Can use in pregnancy, breastfeeding, and infants
 - Widely resistant – can use only for travel to Caribbean, Central America, and few areas in Asia

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Malaria – Prophylaxis

- **Mefloquine**
 - Begin 1-2 weeks before travel, during travel, and continue for 4 weeks after travel
 - Adults: 250mg once a week
 - Peds: > 6 months old: once a week based on weight
 - Caution in pregnancy, breastfeeding, peds < 6 months old
 - Increasing resistance in some parts of the world (Cambodia, Thailand, Laos, Burma, Vietnam)

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Malaria - Prophylaxis

- **Mefloquine Contraindications**
 - History of seizures
 - History of psychiatric disorder
- **Common Adverse Reactions to Mefloquine**
 - GI upset, headache, insomnia, vivid dreams, dizziness, visual disturbances
- Take with food and 8oz of water
- Can be crushed and mixed in beverage

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Malaria - Prophylaxis

- **Atovaquone/Proguanil**
 - Begin 1-2 days before travel, during travel, and continue for 7 days after travel
 - Adults: 250mg/100mg tab QD
 - Peds: 62.5mg/25mg tabs available – wt based
 - Not recommended for pregnant, breastfeeding, or infants < 5kg

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Malaria - Prophylaxis

- Atovaquone/Proguanil Contraindications:
 - CrCl < 30ml/min
- Common Adverse Reactions
 - Abdominal pain, N/V, headache
- Caution with warfarin
- Should be taken with food or milk-based product
- Can crush tabs for peds and mix w/ condensed milk

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Malaria - Prophylaxis

- Chloroquine Contraindications
 - QT prolongation
 - Retinal/visual changes from prior use
 - Psoriasis
- Common Adverse Reactions
 - GI upset, HA, dizziness
- May take with food to avoid GI upset
- Should monitor eyes and CBC with prolonged use

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Malaria - Prophylaxis

- **Doxycycline**
 - Begin 1-2 days before travel, during travel, and continue for 4 weeks after travel
 - Adults: 100mg once a day
 - Peds: > 8 yo: 2.2mg/kg/day
 - Do not use in pregnancy, breastfeeding, or < 8 years old

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Malaria – Prophylaxis

- Doxycycline Contraindications
 - Pregnancy and peds < 8 years old
- Common Adverse Reactions
 - GI upset, diarrhea, photosensitivity, esophagitis
- Take with meals if GI upset occurs
- Remain upright for 30 min to prevent esophagitis
- Sunscreen!!!

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Review Question

- Let's pretend we're pharmacists!
- A 29 year-old female brings a prescription for 10 tablets of Chloroquine 500mg. She is a chaperone on an upcoming mission trip for her church's High School and College age youth group. She would like to have the prescription filled and wonders if there is anything else she should have with her.

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Review Cont

- What questions should you ask her?
- Is her Rx appropriate?
- Is there anything else you'd recommend she take?

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Motion Sickness

- Symptoms include nausea, vomiting, sweating, feeling of uneasiness, pallor
- Anticholinergics/antihistamines are the treatment of choice
 - Scopolamine patch - 1.5mg patch behind alternating ear every 3 days. Start > 4 hrs before travel
 - Dimenhydrinate
 - Adults: 50-100mg every 4-6 hours up to 400mg/day
 - 6-12 yo: 25-50mg every 6-8 hours up to 150mg/day
 - 2-5 yo: 12.5-25mg every 6-8 hours up to 75mg/day
 - Others
 - Meclizine

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Motion Sickness (cont)

- Contraindications of anticholinergic/ antihistamine therapy:
 - Narrow-angle glaucoma
 - Urinary retention
 - GI obstruction
 - Myasthenia gravis
- Common Adverse Reactions:
 - Dry mouth, drowsiness, blurred vision, thick respiratory secretions
- Pregnancy/Lactation: Use with caution
- Pediatrics: Not FDA indicated

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Cholera

- Bacterial disease spread by drinking water or eating food contaminated with cholera bacteria
- Can lead to severe, watery diarrhea as well as nausea/vomiting
- Prevention is key – avoid contaminated foods/drink
- Vaccine

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Cholera (cont)

- Vaxchora – single-dose oral cholera vaccine
 - Available in US for those ages 2-64
 - 90% effective at 10 days but wanes to 80% at 3 months
 - Still new so not sure how long protection lasts beyond 3-6 months after getting vaccine
 - No recommendation on booster dose
- Other vaccines approved by WHO but not available in US
- Treatment – FLUIDS!
 - Antibiotics - only in most severe cases
 - Doxycycline, azithromycin or ciprofloxacin

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Zika

- Circulating at much lower levels since 2018
- Transmitted by mosquito, mother to child, sexually, blood transfusion
- Symptoms – few people have symptoms and if so it's "flu-like"
- No specific treatment for Zika
- No vaccine

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Zika (cont)

- Travel Recommendations for Zika
 - If you are pregnant: not recommended to travel to area with active CDC Zika Travel Health Notice (currently only 1 area in India)
 - If you are planning to get pregnant:
 - Male traveler – wait 3 months
 - Female traveler – wait 2 months

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mpox

- Two types of mpox – clade I and clade II
 - Clade I typically causes more severe illness and death
 - Symptoms include rash, fever, chills, swollen lymph nodes
- New outbreak declared August 2024
 - Burundi, Central African Republic, Democratic Republic of the Congo, Republic of the Congo, Rwanda, and Uganda
- Spreads through close, personal contact or objects not disinfected after contact
- Wear PPE if providing care

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mpox (cont)

- Vaccine is available for those most at risk
 - MVA vaccine (JYNNEOS)
 - 2 doses (intra-dermal or subq) 28 days apart
 - Replication competent vaccine (ACAM2000)
 - Administered by scarification
- Medications are largely supportive care and pain relief
- In the US antivirals (tecovirimat) only available through CDC or enrollment in STOMP trial
- Can also give vaccine as PEP

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Review Question

A patient is planning to travel to a country with a current mpox outbreak. They are concerned about the risk of infection and ask for your recommendations.

Which of the following is the **most appropriate** advice?

- A. "You should avoid contact with any animals, especially rodents and primates."
- B. "Make sure you get the mpox vaccine before your trip if you might engage in risky behaviors."
- C. "Practice careful hygiene, including frequent handwashing, and avoiding close contact with people who are sick."
- D. All of the above are important precautions.

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Key References

- Steffen R, Amitirigala I, Mutsch M. Health risks among travelers – need for regular updates. *J. Travel Med.* 2008;15(3): 145-6.
- Traveler's Health by the CDC online. www.cdc.gov/travel/. Accessed 10/17/2024.
- Eddleston, Michael, et al. *Oxford Handbook of Tropical Medicine, 5th Ed.* New York: Oxford UP, 2022.
- Beeching N, Gill G. *Tropical Medicine, 7th Ed.* Oxford, UK: Wiley-Blackwell, 2014.
- Farrar J, et al. *Manson's Tropical Diseases, 24th Ed.* New York: Saunders Ltd., 2023.

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Questions?

Evaluation – reminder that each evaluation submission is entered to win a GMHC prize pack!



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