Objectives

- Understand which travelers are high risk
- Know where to refer travelers for information on sources of medical care abroad
- Know the adverse effects of, and contraindications to, vaccines in elderly and immune compromised travelers
- Understand important drug interactions for patients on warfarin and HIV+ travelers

Agenda

- Who is the high risk traveler?
- Medical emergencies while traveling
- Visiting friends and relatives (VFRs)
- Case #1: The elderly traveler with multiple medical problems
- Case #2: The HIV+ traveler
- Case #3: The renal transplant traveler
Who Is the High Risk Traveler?

- Destination
- Purpose of travel
- Activities
- Pregnancy
- Extremes of age
- Immune compromised

Mortality in Travelers

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of deaths</td>
<td>176</td>
<td>2,240</td>
<td>1,277</td>
<td>860</td>
<td>1,146</td>
<td>1,260</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>92</td>
<td>493</td>
<td>542</td>
<td>512</td>
<td>412</td>
<td>602</td>
</tr>
<tr>
<td>Malaria</td>
<td>1,3</td>
<td>1,3</td>
<td>-</td>
<td>1,3</td>
<td>-</td>
<td>1,3</td>
</tr>
<tr>
<td>Other causes</td>
<td>9</td>
<td>7</td>
<td>20</td>
<td>30</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Medical Care Abroad

- International Assn for Medical Assistance to Travelers (IAMAT)
  - www.iamat.org
- US Embassy
- International SOS
- Divers Alert Network

© Editor 2008. Racanelli et al. Travel Medicine
Medical Evacuation Insurance

- Repatriation to home country
- Repatriation of remains
- Exclusion of high-risk or adventure activities?

Visiting Friends and Relatives (VFRs)

- Less likely to seek pre-travel advice
- >50% of cases of imported malaria
- >75% of cases of imported typhoid
- Increased risk of tuberculosis

Case #1 - The Elderly Patient with Multiple Medical Problems

- 66 yo woman traveling to Peru (Cuzco ~11,000’ - Machu Picchu - Puno/Titicaca ~12,600’) and Brasil for 2 weeks holiday
- PMH: Type 2 DM, mild non-proliferative diabetic retinopathy, paroxysmal afib, HTN, hyperlipidemia, seizure d/o (well controlled)
Case #1 - The Elderly Patient with Multiple Medical Problems

- Meds: atorvastatin, lisinopril, HCTZ, lamotrigine, warfarin
- Received triamcinolone injection 4 weeks ago for quadriceps tendonitis
- Yellow fever vaccination required

Can she safely receive the yellow fever vaccine?
Can she safely travel to high altitude?
Are there contraindications to medications used for traveler’s diarrhea or altitude sickness?
Will any travel-related medications interact with her warfarin?

Yellow Fever Vaccine and the Elderly

- US incidence of YEL-AND is 0.8/100,000 doses
  - 1.6 per 100,000 doses in persons 60–69 years
  - 2.3 per 100,000 doses in persons ≥70 years of age
- US incidence of YEL-AVD is 0.4/100,000 doses
  - 1 per 100,000 doses in persons 60–69 years
  - 2.3 per 100,000 doses in persons aged ≥70 years
  - Case fatality rate of YEL-AVD is ~50%
Altitude and Preexisting Medical Conditions

<table>
<thead>
<tr>
<th>Note: No.</th>
<th>Altitude is a reality for all ages.</th>
<th>Some documented risk - consider medical monitoring, expandability of oxygen.</th>
<th>Behaviors that risk: avoid and balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children and adolescents with long-term medical conditions (e.g., COPD)</td>
<td>Hypertension, diabetes, obstructive sleep apnea, heart failure, respiratory failure</td>
<td>AMS incidence decreases with age.</td>
<td>Elderly with well-compensated CAD do just fine at moderate altitude.</td>
</tr>
<tr>
<td>Acetazolamide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potential K+ lowering effects - keep in mind if on K+ wasting diuretic or digoxin.</td>
<td>90% elimination by kidneys – avoid if GFR &lt; 10ml/min.</td>
<td></td>
</tr>
</tbody>
</table>

Altitude Illness and the Elderly

- No age limit
- AMS incidence decreases with age
- Elderly with well-compensated CAD do just fine at moderate altitude

Acetazolamide

- Potential K+ lowering effects - keep in mind if on K+ wasting diuretic or digoxin.
- 90% elimination by kidneys – avoid if GFR < 10ml/min.
Altitude and Anticoagulation

- Altitude > 2400m associated with a 2.7-fold risk of INR below desired range
- Odds ratio of sub-therapeutic INR is 5.6 if also have atrial fibrillation
- Anticoagulation can be affected by changes in diet, travel-related illnesses and activities

INR Self-Testing for Travel

- CoaguCheck XS
  - www.coagucheck.com
- INRatio2
  - www.hemosense.com
- Protime Advantage
  - www.itcmed.com

What Would You Recommend for Traveler’s Diarrhea?

- Ciprofloxacin
- Azithromycin
- Rifaximin
- Loperamide
- Diphenoxylate-atropine
- Bismuth SS
Warfarin-Antibiotic Interactions

- Oral antibiotics increase risk of over-anticoagulation via drug interactions and by eliminating vitamin K-producing gut flora
- Relative risk of bleeding is 3-5 for ciprofloxacin, azithromycin and doxycycline
- Mean INR change in one study was 0.51 for azithromycin and 0.85 for levofloxacin

Quinolones and Tendon Rupture

- Risk factors: age>60; corticosteroid use; organ transplant; rheumatoid arthritis; prior tendon rupture; renal insufficiency; strenuous physical activity

Quinolones and Seizure Risk

- Potential to lower seizure threshold
- NSAIDs increase risk
- Reports of seizures in previously controlled patients who took quinolones for TD while at altitude
Informed Consent

Which Antimalarial Would You Recommend?

- Atovaquone/Proguanil
- Doxycycline
- Mefloquine
- Primaquine

Warfarin-Antimalarial Interactions

- Mefloquine may enhance warfarin effect due to high plasma protein binding capacity
  - Two cases of serious bleeding reported from Kenya

- Atovaquone also has high plasma protein binding but no evidence of warfarin interaction
  - However single case report of warfarin potentiation by proguanil
Warfarin-Antimalarial Interactions

- Doxy increases bleeding risk by 3-5x
- Check effect of antimalarial on INR before departure
- INR self-testing?

Case #2 – The HIV+ Traveler

- 42 yo with AIDS on HAART with CD4+ 507, viral load <75 traveling to Guyana for 3 months to VFR
- Will stay in “very rural towns” and also travel to neighboring countries

Case #2 – The HIV+ Traveler

- PMH: bipolar d/o, drug abuse, paroxysmal afib
- Meds: HAART (Atripla), aripiprazole, lamotrigine, citalopram, testosterone
- Vaccination history: hepatitis A and B, rabies, pneumococcal
Case #2 – The HIV+ Traveler

- How does his CD4+ count affect his risk for infections?
- What about vaccine efficacy?
- Are there any vaccine contraindications?

### CD4+ Count

<table>
<thead>
<tr>
<th>CD4 count</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD4+ &gt;500</td>
<td>Not immune compromised</td>
</tr>
<tr>
<td>CD4+ 200-500</td>
<td>Limited immune deficits</td>
</tr>
<tr>
<td>CD4+ &lt;200</td>
<td>Avoid travel</td>
</tr>
</tbody>
</table>

### Vaccines and the HIV+ Traveler

- Avoid live vaccines
  - YF can be given if CD4+ >200 and significant risk of infection
  - Measles can be given if CD4+ >200 and high risk of infection
- Wait to vaccinate 3 months after starting HAART
- Repeat any vaccines that were given when CD4+ <200
Infections and the HIV+ Traveler

- More susceptible to *Salmonella* infections
- Higher malaria parasitemia and greater risk of severe disease
- Malaria increases HIV viral load

Drug Interactions with HAART

- Doxycycline is best choice for malaria prophylaxis - no interactions with protease inhibitors, NRTIs and NNRTIs
- Quinolones and rifaximin for TD do not have significant HAART interactions
- www.hiv-druginteractions.org

Case #3 – The Renal Transplant Traveler

- 54 yo s/p kidney transplant 7 months ago traveling on 1 week cruise to Mexico
- PMH: HTN, BK virus
Case #3 – The Renal Transplant Traveler

- Meds: tacrolimus (Prograf), mycophenolate (CellCept), valganciclovir, paricalcitol, sevelamer, losartan
- Allergies: clarithromycin (fever), sulfa (hives), dapsone (hives), shrimp (hives)
- Immunizations up to date

What Would You Recommend for Traveler’s Diarrhea?

- Is antibiotic prophylaxis indicated?
- Which antibiotic would you chose for prophylaxis or treatment?

Renal Transplant Patients

- Travel not advised until 1 year after transplant due to higher risk of infection within the first year
- Increased risk of systemic fungal infections
  - Avoid caves due to histoplasmosis
- Increased risk of skin cancer
  - Sun precautions
Summary

- Some travelers are at higher risk of travel-related morbidity and mortality
- Medical evacuation insurance is essential for high risk travelers
- Travel vaccines and medications may be contraindicated in certain high risk travelers
- Commonly used medications in travel medicine can interact with warfarin or HAART

References

- Jong E, Freedman D. The Immunocompromised Traveler. CDC Health Information for International Travel 2010.

Thank you