Clinical Approach to the Returning Traveler

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UNCLASSIFIED
• Thank You to:
  – COL Stephen Thomas
  – CAPT (Ret) Philip Coyne
Outline

BLUF

• Soliciting a detailed medical history
• Infectious diseases of returning travelers
• Geographic disease distribution
• Infectious Disease Emergencies
• Medical history informing diagnosis
BLUF: Caring for the ID Patient

• A comprehensive, in-depth medical history is your best diagnostic tool

• Geographic and ID threat situational awareness

• Know your ID emergencies

• Know what you don’t know, seek assistance when needed
Common Things are Common

Usually this...

Not this...

Usually this...
Soliciting a Detailed Medical History
Chief Complaint

• Localizing
  – Focal lesion (cellulitis)
  – Bite (arthropod, animal, human)
  – Post-traumatic (altercation, vegetation)
  – Anatomical (CNS, GU, GI, etc.)

• Generalized and systemic
  – Fever, chills, rigors
  – Muscle and/or joint pain
  – Fatigue
Cat bites causing skin/soft tissue infections
History of Present Illness

• Key information
  – Detailed chronology of illness
    • Patient was well until…DATE…when…X…happened
    • Appearance / disappearance of signs / symptoms
      – Non-specific illnesses may declare themselves
    • Identify patterns if they exist
      – Example: patterns of fever (every 3 days)
  – Incorporate important medical background of patient
    • Age (impacts presentation, fever curves, etc.)
    • Immunodeficient (HIV, medications, malignancy)
Elderly WM with eye infection, antibiotic history revealed poor Pseudomonas coverage, infection progressed, patient lost eye.
History of Present Illness

• Key information
  – Incorporate activities/exposures
    • Animals, arthropods, people, vegetation
    • Urban, rural environment exposure
    • Indoor or outdoor activities

  – Incorporate relevant active (recent) medications
    • Prophylaxis, immunomodulators, OTC medications

  – Incorporate relevant associated travel history
AAF with sarcoid on steroids, travels to Arizona, develops bone pain and skin nodules, MRI of knee joint demonstrates *Coccidioidomycosis* lesion
Review of Systems

• Pertinent positives and negatives
  – Specifically mention if no fever
  – CNS: evidence of meningitis, encephalitis, any neuro
  – Respiratory: tracheobronchitis, pneumonia
  – Oropharynx: pharyngitis, bleeding gums, dentition
  – GI: diarrhea with blood, mucus, rice water appearance
  – GU: discharge, dysuria, abnormal menses
  – Skin: rash, location, itching, character
  – Extremities: localized pain, joint vs. bone pain
Elderly WM presents with fever, cough, chest pain, SHx reveals chronic tobacco use, ROS reveals poor dentition, CT scan below, diagnosis lung abscess
Past Medical/Surgical History

• Drill down on relevant pre-existing medical conditions
  – Immunosuppressive conditions

• Drill down on chronic or re-occurring conditions
  – Examples: frequent respiratory infections, meningitis

• Presence or absence of organs
  – Appendix, gallbladder, spleen, thymus

• Previous surgical interventions
  – Heart surgery (valve)
  – Implant of any hardware or foreign material

• Known lab / radiologic abnormalities
  – Examples: lung nodule/Ca++, heart block, etc.
Latino male with chest pain, receives cardiac cath., few days later develops thigh pain, rash, MS changes, fever, N&V, MRI shown, goes to OR, diagnosis *Staphylococcus aureus* necrotizing fasciitis and Toxic Shock Syndrome.
Medications / Immunizations

- Rx and OTC (previous antibiotics)
- Immunosuppressives
  - Examples – prednisone, DMARDs
- Anti-pyretics (ASA, NSAIDS, acetaminophen)
  - Manipulate fever curve
- Prophylaxis (detailed account)
  - Test understanding (especially malaria prophylaxis)
- Anything which could impact absorption or metabolism of chronic or prophylactic medications impacting their performance.

- All routine and travel specific vaccinations!
AAM with sarcoid, treated with steroids, headache and visual disturbance, CSF Gram stain demonstrates *Cryptococcus neoformans*
22 year old USMC E-3

• 29 Aug Presents to sick call on ship with one day of fevers and diarrhea
  • Watery stools, no blood or abdominal pain
  • Temp 101.4, 130/92, p 72 exam normal; dx with VGE, given tylenol and SIQ 24 h
  • Notes indicate he “recently ate sugar cane” but nothing else…

• 01 Sep “feels better”, afebrile

• 02 Sep Diarrhea returns, vomiting, “feels light headed”
  • Temp 104.1, pulse 120-130, tilt positive.
  • Dx with “viral syndrome”, given IV fluid and started on ciprofloxacin

• 04 Sep “unable to keep down fluids”
  • Afebrile, BP 94/63, p 109
  • No assessment in chart, never seen by physician
  • Trimethobenzamide IM, “return if symptoms worsen”

• 05 Sep falls out of his rack and hits head while trying to get to the bathroom
  • Temp 102.2 P 111, 90/39
  • Admitted to ship’s medical hold for “diarrhea/dehydration”
  • WBC 11.8, HGB 10.1 Platelets 42, ALT 114, creat 1.4
  • Doxycycline added to ciprofloxacin for unclear reasons
Multiple other Marines start presenting with diarrhea and fevers.
Warehouse that Housed Marines at Roberts International Airport, Liberia, during August 2003 peacekeeping deployment
- JAMA 1967;199:141
  Vietnam - US Soldiers with Malaria
  Diarrhea in 38%

- JAMA 1994;272:398
  Somalia - US Marines with Malaria
  Diarrhea in 38%

  Liberia - US Marines with Malaria
  Diarrhea in 62%

07 Sep Patients arrives at NNMC with Cerebral malaria
- 17% parasitemia with *Plasmodium falciparum*
- Intubated for 9 days, requires 3 pressor support
- Death imminent board, gets CRBSI with *Acinetobacter*
Marines deploy to Liberia, 44 contract malaria despite prophylaxis and PPMs

An Outbreak of *Plasmodium falciparum* Malaria in U.S. Marines Deployed to Liberia

Timothy J. Whitman,* Philip E. Coyne, Alan J. Magill, David L. Blazes, Michael D. Green, Wilbur K. Milhous, Timothy H. Burgess, Daniel Freilich, Sybil A. Tasker, Ramzy G. Azar, Timothy P. Endy, Christopher D. Clagett, Gregory A. Deye, G. Dennis Shanks, and Gregory J. Martin*

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Abstract. In 2003, 44 U.S. Marines were evacuated from Liberia with either confirmed or presumed *Plasmodium falciparum* malaria. An outbreak investigation showed that only 19 (45%) used insect repellent, 5 (12%) used permethrin-treated clothing, and none used bed netting. Adherence with weekly mefloquine (MQ) was reported by 23 (55%). However, only 4 (10%) had serum MQ levels high enough to correlate with protection (> 794 ng/mL), and 9 (22%) had evidence of steady-state kinetics (MQ carboxy metabolite/MQ > 3.79). Tablets collected from Marines met USP identity and dissolution specifications for MQ. Testing failed to identify *P. falciparum* isolates with MQ resistance. This outbreak resulted from under use of personal protective measures and inadequate adherence with chemophylaxis. It is essential that all international travelers make malaria prevention measures a priority, especially when embarking to regions of the world with high transmission intensity such as west Africa.
What malaria chemoprophylaxis did they take?

• Issued mefloquine (MQ)
• Adherence with weekly dosing: 53%
  – Only 10% had serum MQ levels high enough for protection

• Trop Med Parasitol. 1993 Sep;44(3):257-65
• US Marines randomized double-blind clinical trial
  – 250 mg MQ salt weekly (n = 157)
  – 250 mg MQ daily for 3 days followed by 250 mg weekly (n = 46)

• Steady state MQ plasma levels were attained rapidly with the loading dose regimen in four days versus seven weeks with weekly MQ
Take home points

- This will happen again
  - a fever in Sub-Saharan Africa is malaria until ruled out

- Appreciate geographic variations in transmission intensity
- Understand malaria chemoprophylaxis
- Malaria does more that cause fevers

- Be suspect of adherence to malaria preventive measures

- The natural history of *P. falciparum* in non-immunes ends poorly

- For future GMOs: HNs (E-2s) do not see sick call
Social History

• Activities, hobbies, occupation (defines potential exposures)
  – Examples: hunter, gardener, fishing
• Sexual practices
  – Examples: monogamous, MSM, high risk behaviors
• Drugs and alcohol
  – Needle based drugs, potential for cirrhosis, etc.
• Tobacco
  – American or foreign
• Food
  – OCONUS ("on economy"), imported
• Pets
  – Type, acquisition history, level of interface
WF with RUQ pain, intermittent fever, expat. In Switzerland, owns dog, frequent walks in countryside, CT scan below, diagnosis *Echinococcus multilocularis*
Family History

• First degree relatives
  – Immunosuppressive conditions
  – Recurrent infections

• Individuals sharing household
  – Recent medical events (including vaccinations)
    • “Sick contacts”
  – Immunosuppressive conditions
  – Recent or current illness
    • If yes, explore diagnosis if known
    • Hospitalized?
Travel

• Where (geographic specific infections)

• When (rainy season = vectors)

• Activities during travel (urban, rural)

• Accommodations (hotel with A/C, outdoors)

• Food (hot, cold, water, hotel, street, etc.)

• Precautions (any PPM?)
Infectious Diseases of Returning Travelers
# Infectious Disease Emergencies in Returning Travelers

Special Reference to Malaria, Dengue Fever, and Chikungunya

<table>
<thead>
<tr>
<th>Incubation Period</th>
<th>Diseases</th>
</tr>
</thead>
</table>
| <7 Days           | Common: malaria, traveler’s diarrhea, dengue, enteric fever, respiratory tract infection  
                   | Others: rickettsioses, leptospirosis, meningitis, yellow fever, arbovirus, meningococcal |
| 7–21 Days         | Common: malaria, enteric fever                                             |
                   | Others: rickettsioses, viral hepatitis, leptospirosis, HIV, Q fever, brucellosis, African trypanosomiasis |
| >21 Days          | Common: malaria, enteric fever                                             |
                   | Others: tuberculosis, hepatitis B virus, bacterial endocarditis, HIV, Q fever, brucellosis, amebic liver disease, melioidosis |
Figure 1: Diseases and destinations: the three most common diagnoses in each continent visited. FUO = fever of unknown origin

Table 1: Distribution of Main Diagnoses Leading to Post-travel Hospitalization*

<table>
<thead>
<tr>
<th>Disease</th>
<th>Febrile</th>
<th>Nonfebrile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>54 (26)</td>
<td>None</td>
</tr>
<tr>
<td>Unidentified febrile diseases</td>
<td>34 (16)</td>
<td>None</td>
</tr>
<tr>
<td>Dengue fever</td>
<td>27 (13)</td>
<td>None</td>
</tr>
<tr>
<td>Diarrheal diseases</td>
<td>14 (7)</td>
<td>10 (4)</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>None</td>
<td>18 (9)</td>
</tr>
<tr>
<td>Miscellaneous febrile infections</td>
<td>12 (6)†</td>
<td>None</td>
</tr>
<tr>
<td>Skin diseases</td>
<td>7 (3)‡</td>
<td>4 (2)§</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>7 (3)</td>
<td>None</td>
</tr>
<tr>
<td>Noninfectious diseases</td>
<td>None</td>
<td>7 (3)†</td>
</tr>
<tr>
<td>Onchocerciasis</td>
<td>None</td>
<td>5 (2)</td>
</tr>
<tr>
<td>Idiopathic eosinophilia</td>
<td>None</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Hepatitis infectious</td>
<td>4 (2)</td>
<td>None</td>
</tr>
<tr>
<td>Pulmonary schistosomiasis</td>
<td>2 (1)</td>
<td>None</td>
</tr>
<tr>
<td>Amebic liver abscess</td>
<td>2 (1)</td>
<td>None</td>
</tr>
</tbody>
</table>

* N = 211.

†Epstein-Barr virus (3), leptospirosis (2), echinococcal abscess (1), infective endocarditis (1), viral meningitis (1), upper respiratory tract infection (1), rubella (1), cat-scratch disease (1), tonsillitis (1).
‡Infected wounds (3), cellulitis (2), erysipelas (2).
§Infected myiasis (2), nonspecific rash (1), urticaria (1).
¶Anxiety (2), dizziness (1), hemolytic anemia (1), mefloquine adverse effect (1), hematologic malignancy (1), myositis (1).
### Table 3. Etiologic Diagnoses within Selected Syndrome Groups, According to Travel Region.

<table>
<thead>
<tr>
<th>Syndrome and Cause</th>
<th>All Regions</th>
<th>Caribbean</th>
<th>Central America</th>
<th>South America</th>
<th>Sub-Saharan Africa</th>
<th>South Central Asia</th>
<th>Southeast Asia</th>
<th>Other or Multiple Regions†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systemic febrile illness (n = 3907)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific pathogen or cause reported‡</td>
<td>594</td>
<td>459</td>
<td>527</td>
<td>446</td>
<td>718</td>
<td>522</td>
<td>547</td>
<td>454</td>
</tr>
<tr>
<td>Malaria‡</td>
<td>352</td>
<td>65</td>
<td>133</td>
<td>133</td>
<td>622</td>
<td>139</td>
<td>130</td>
<td>234</td>
</tr>
<tr>
<td>Dengue‡</td>
<td>104</td>
<td>238</td>
<td>123</td>
<td>138</td>
<td>7</td>
<td>142</td>
<td>315</td>
<td>35</td>
</tr>
<tr>
<td>Mononucleosis (due to Epstein–Barr virus or cytomegalovirus)‡</td>
<td>32</td>
<td>70</td>
<td>69</td>
<td>79</td>
<td>10</td>
<td>17</td>
<td>32</td>
<td>63</td>
</tr>
<tr>
<td>Rickettsial infection‡</td>
<td>31</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>56</td>
<td>10</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td><em>Salmonella typhi</em> or <em>S. paratyphi</em> infection‡</td>
<td>29</td>
<td>22</td>
<td>25</td>
<td>17</td>
<td>7</td>
<td>141</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>No specific cause reported‡</td>
<td>406</td>
<td>541</td>
<td>473</td>
<td>554</td>
<td>282</td>
<td>478</td>
<td>453</td>
<td>546</td>
</tr>
<tr>
<td><strong>Acute diarrhea (n = 3859)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parasitic diarrhea‡</td>
<td>354</td>
<td>283</td>
<td>403</td>
<td>368</td>
<td>353</td>
<td>453</td>
<td>262</td>
<td>332</td>
</tr>
<tr>
<td>Giardiasis‡</td>
<td>173</td>
<td>132</td>
<td>136</td>
<td>158</td>
<td>177</td>
<td>286</td>
<td>118</td>
<td>132</td>
</tr>
<tr>
<td>Amebiasis‡</td>
<td>120</td>
<td>105</td>
<td>155</td>
<td>142</td>
<td>138</td>
<td>103</td>
<td>74</td>
<td>135</td>
</tr>
<tr>
<td>Presumptive parasitic cause‡</td>
<td>35</td>
<td>9</td>
<td>45</td>
<td>52</td>
<td>33</td>
<td>55</td>
<td>55</td>
<td>13</td>
</tr>
<tr>
<td>Bacterial diarrhea‡</td>
<td>268</td>
<td>260</td>
<td>190</td>
<td>253</td>
<td>250</td>
<td>294</td>
<td>369</td>
<td>227</td>
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<tr>
<td>Campylobacter infection‡</td>
<td>85</td>
<td>46</td>
<td>32</td>
<td>90</td>
<td>73</td>
<td>87</td>
<td>180</td>
<td>57</td>
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<tr>
<td>Shigella infection‡</td>
<td>41</td>
<td>37</td>
<td>26</td>
<td>41</td>
<td>46</td>
<td>61</td>
<td>26</td>
<td>34</td>
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<tr>
<td>Nontyphoidal salmonella infection‡</td>
<td>27</td>
<td>27</td>
<td>13</td>
<td>14</td>
<td>29</td>
<td>12</td>
<td>12</td>
<td>30</td>
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<tr>
<td>Presumptive bacterial cause</td>
<td>110</td>
<td>132</td>
<td>94</td>
<td>106</td>
<td>99</td>
<td>136</td>
<td>116</td>
<td>95</td>
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<tr>
<td>Viral diarrhea‡</td>
<td>9</td>
<td>23</td>
<td>32</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>7</td>
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<tr>
<td>Unspecified acute diarrhea‡</td>
<td>385</td>
<td>457</td>
<td>377</td>
<td>376</td>
<td>397</td>
<td>289</td>
<td>393</td>
<td>451</td>
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### Dermatologic disorder (n = 2947)

<table>
<thead>
<tr>
<th>Condition</th>
<th>0-50</th>
<th>51-100</th>
<th>101-200</th>
<th>201-300</th>
<th>301-400</th>
<th>401-500</th>
<th>501-600</th>
<th>601-700</th>
<th>701-800</th>
<th>801-900</th>
<th>901-1000</th>
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<tbody>
<tr>
<td>Insect bite, with or without superinfection</td>
<td>187</td>
<td>192</td>
<td>235</td>
<td>156</td>
<td>194</td>
<td>201</td>
<td>179</td>
<td>166</td>
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<tr>
<td>Cutaneous larva migrans†</td>
<td>129</td>
<td>299</td>
<td>134</td>
<td>122</td>
<td>86</td>
<td>64</td>
<td>171</td>
<td>68</td>
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<tr>
<td>Allergic rash or reaction</td>
<td>113</td>
<td>148</td>
<td>128</td>
<td>97</td>
<td>105</td>
<td>112</td>
<td>93</td>
<td>132</td>
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<tr>
<td>Skin abscess‡</td>
<td>97</td>
<td>34</td>
<td>47</td>
<td>50</td>
<td>136</td>
<td>144</td>
<td>122</td>
<td>105</td>
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<tr>
<td>Rash of unknown cause</td>
<td>66</td>
<td>55</td>
<td>74</td>
<td>75</td>
<td>66</td>
<td>48</td>
<td>49</td>
<td>96</td>
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<tr>
<td>Mycosis, superficial</td>
<td>56</td>
<td>45</td>
<td>30</td>
<td>36</td>
<td>65</td>
<td>64</td>
<td>61</td>
<td>77</td>
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<tr>
<td>Animal bite requiring rabies postexposure prophylaxis‡</td>
<td>47</td>
<td>3</td>
<td>13</td>
<td>25</td>
<td>9</td>
<td>90</td>
<td>124</td>
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<tr>
<td>Leishmaniasis‡</td>
<td>38</td>
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<td>64</td>
<td>143</td>
<td>14</td>
<td>19</td>
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<tr>
<td>Myiasis‡</td>
<td>35</td>
<td>0</td>
<td>101</td>
<td>100</td>
<td>40</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Swimmer’s itch‡</td>
<td>28</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>14</td>
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<tr>
<td>Impetigo or erysipelas§</td>
<td>27</td>
<td>31</td>
<td>20</td>
<td>9</td>
<td>31</td>
<td>45</td>
<td>22</td>
<td>34</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Mite infestation (e.g., scabies)§</td>
<td>22</td>
<td>21</td>
<td>37</td>
<td>39</td>
<td>12</td>
<td>29</td>
<td>17</td>
<td>14</td>
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### Nondiarrheal gastrointestinal disorder (n = 1421)

<table>
<thead>
<tr>
<th>Condition</th>
<th>0-50</th>
<th>51-100</th>
<th>101-200</th>
<th>201-300</th>
<th>301-400</th>
<th>401-500</th>
<th>501-600</th>
<th>601-700</th>
<th>701-800</th>
<th>801-900</th>
<th>901-1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intestinal nematode infestation†</td>
<td>239</td>
<td>278</td>
<td>273</td>
<td>256</td>
<td>307</td>
<td>202</td>
<td>344</td>
<td>141</td>
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</tr>
<tr>
<td>Strongyloidiasis, simple intestinal‡</td>
<td>96</td>
<td>124</td>
<td>141</td>
<td>102</td>
<td>148</td>
<td>45</td>
<td>160</td>
<td>37</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Ascaris infestation§</td>
<td>52</td>
<td>52</td>
<td>30</td>
<td>66</td>
<td>60</td>
<td>84</td>
<td>18</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastritis or peptic ulcer disease‡</td>
<td>131</td>
<td>258</td>
<td>91</td>
<td>168</td>
<td>85</td>
<td>101</td>
<td>104</td>
<td>156</td>
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</tr>
<tr>
<td><em>Helicobacter pylori</em> status unknown</td>
<td>76</td>
<td>124</td>
<td>51</td>
<td>73</td>
<td>60</td>
<td>62</td>
<td>74</td>
<td>91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive for H. pylori‡</td>
<td>47</td>
<td>103</td>
<td>40</td>
<td>80</td>
<td>22</td>
<td>28</td>
<td>25</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute hepatitis‡</td>
<td>115</td>
<td>62</td>
<td>91</td>
<td>102</td>
<td>76</td>
<td>214</td>
<td>61</td>
<td>144</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemorrhoids or constipation‡</td>
<td>89</td>
<td>124</td>
<td>192</td>
<td>117</td>
<td>54</td>
<td>84</td>
<td>74</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Numbers may not total 1000 because patients may have had more than one diagnosis. The most common diagnoses are listed for each category.
† This category includes travel to West Asia, Northeast Asia, eastern Europe, Oceania, North Africa, or Antarctica (1868 travelers) or ascertainment of exposure impossible subsequent to travel to multiple developing regions (1649 travelers).
‡ P<0.01 for the comparison among regions.
§ This diagnosis was listed in fewer than 100 reports.
GeoSentinel
The Global Surveillance Network of the ISTM and CDC
a worldwide communications & data collection network of travel/tropical medicine clinics

GeoSentinel Home | Objectives | Surveillance Strategy | Historical Timeline | Project Staff
Current Advisory | Data Highlight | Site Directory | Network Members | Publications & Presentations

2 NEW GeoSentinel PUBLICATIONS:

"Illness in Children After International Travel: Analysis from the GeoSentinel Surveillance Network"
Pediatrics. Published online April 5, 2010.
click here to download PDF (596kB) of this article

"Sex and Gender Differences in Travel-associated Disease"
click here to download PDF (1211kB) of this article

GeoSentinel is a worldwide communication and data collection network for the surveillance of travel related morbidity. It was initiated in 1995 by the International Society of Travel Medicine (ISTM) and the Centers for Disease Control (CDC) as a network of ISTM member travel/tropical medicine clinics. GeoSentinel is based on the concept that these clinics are ideally situated to effectively detect geographic and temporal trends in morbidity among travelers, immigrants and refugees.

Current activities include:

<table>
<thead>
<tr>
<th>GeoSentinel Surveillance Sites</th>
<th>GeoSentinel Network Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>GeoSentinel Sites participate in surveillance and monitoring of all travel related illnesses seen in their clinics. Aggregation of this data across the network of 49 globally dispersed medicine clinics on all continents (15 in the United States and 34 in other countries) allows linking of final diagnoses in migrating populations with similar geographic exposures. In addition to formal surveillance, GeoSentinel sites also participate in enhanced surveillance and networking with public health partners.</td>
<td></td>
</tr>
<tr>
<td>Information on becoming a GeoSentinel Site</td>
<td>GeoSentinel Network Members are ISTM provider clinics that informally provide leads and contacts when they encounter any patient having a pre-defined alarming diagnosis or unusual event. Network Members also participate in brief e-mail queries for enhanced surveillance and response in potential outbreak situations. This program allows large numbers of individual members in many countries to be rapidly linked together to share clinical observations and facilitates direct interaction with health authorities.</td>
</tr>
</tbody>
</table>

Information on becoming a GeoSentinel Site
GeoSentinel Data Entry (Sites Only)
(Password Protected)
Table 1. Characteristics of returned ill travelers with and without fever (6957 patients with fever among 24,920 ill returned travelers).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%) of ill returned travelers with fever</th>
<th>No. of ill returned travelers without fever</th>
<th>Regional multiple logistic regression models in which variable is included as a significant predictor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>429 (31)</td>
<td>962</td>
<td>NS</td>
</tr>
<tr>
<td>20–64&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6230 (28)</td>
<td>16,152</td>
<td>...</td>
</tr>
<tr>
<td>&gt;=65</td>
<td>244 (24)</td>
<td>761</td>
<td>NS</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3995 (32)</td>
<td>8682</td>
<td>...</td>
</tr>
<tr>
<td>Female</td>
<td>2891 (24)</td>
<td>8967</td>
<td>A, B, C, D</td>
</tr>
<tr>
<td>Reason for travel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tourism&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3802 (26)</td>
<td>10,782</td>
<td>...</td>
</tr>
<tr>
<td>Business</td>
<td>1036 (29)</td>
<td>2477</td>
<td>...</td>
</tr>
<tr>
<td>Research/education</td>
<td>283 (27)</td>
<td>785</td>
<td>...</td>
</tr>
<tr>
<td>Missionary/volunteer</td>
<td>384 (18)</td>
<td>1734</td>
<td>B, C</td>
</tr>
<tr>
<td>Visiting friends and relatives</td>
<td>1431 (40)</td>
<td>2109</td>
<td>A, C, D</td>
</tr>
<tr>
<td>Duration of travel, days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;=30</td>
<td>4134 (31)</td>
<td>8994</td>
<td>A, C, D</td>
</tr>
<tr>
<td>&gt;=31&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2597 (23)</td>
<td>8572</td>
<td>...</td>
</tr>
<tr>
<td>Interval time from travel to presentation, weeks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;=1</td>
<td>2789 (37)</td>
<td>4750</td>
<td>A, B, C, D</td>
</tr>
<tr>
<td>1–6</td>
<td>2437 (30)</td>
<td>5762</td>
<td>A, B, C, D</td>
</tr>
<tr>
<td>&gt;6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1511 (18)</td>
<td>7012</td>
<td>...</td>
</tr>
<tr>
<td>Recorded pretravel encounter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2535 (30)</td>
<td>5857</td>
<td>...</td>
</tr>
<tr>
<td>Yes</td>
<td>3488 (27)</td>
<td>9577</td>
<td>A, D</td>
</tr>
<tr>
<td>Unknown</td>
<td>840 (27)</td>
<td>2309</td>
<td>A, D</td>
</tr>
<tr>
<td>Total</td>
<td>6957 (28)</td>
<td>17,983</td>
<td>...</td>
</tr>
</tbody>
</table>

**NOTE.** A, variable was significant in sub-Saharan Africa regression; B, variable was significant in Southeast Asia regression; C, variable was significant in Latin American regression; D, variable was significant in south-central Asia regression; NS, variable was not significant in any multiple logistic regression.

<sup>a</sup> Two-sided P< 0.05 determined using the Wald test is considered to be statistically significant.

<sup>b</sup> Reference group in multivariate logistic regressions.
# Infectious Disease Emergencies in Returning Travelers

Special Reference to Malaria, Dengue Fever, and Chikungunya

---

## Table 1
Top 5 illnesses in returning travelers

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Systemic illnesses</td>
<td>35</td>
</tr>
<tr>
<td>Malaria</td>
<td>21</td>
</tr>
<tr>
<td>Malaria due to <em>P falciparum</em></td>
<td>14</td>
</tr>
<tr>
<td>Malaria due to <em>P vivax</em></td>
<td>6</td>
</tr>
<tr>
<td>Malaria due to other species</td>
<td>2</td>
</tr>
<tr>
<td>Dengue</td>
<td>6</td>
</tr>
<tr>
<td><em>Salmonella enterica</em> serovar Typhi or Paratyphi infection</td>
<td>2</td>
</tr>
<tr>
<td>Rickettsia</td>
<td>2</td>
</tr>
<tr>
<td>2. Acute diarrhea</td>
<td>15</td>
</tr>
<tr>
<td>3. Respiratory illness</td>
<td>14</td>
</tr>
<tr>
<td>4. Genitourinary diseases</td>
<td>4</td>
</tr>
<tr>
<td>5. Gastrointestinal illnesses (other than diarrhea)</td>
<td>4</td>
</tr>
</tbody>
</table>
Infectious Disease Emergencies
Infectious Disease Emergencies

- Acute bacterial meningitis
- Meningococcemia
- Cranial subdural empyema
- Necrotizing soft tissue infections
- Toxic shock syndrome
- Neutropenic fever
- Sepsis in patients with splenectomy (actual/functional)
- *Plasmodium falciparum* malaria
- Cholera
- Rocky Mountain Spotted Fever
- Babesiosis
College student not feeling well with fever, develops MS changes, hypotension, respiratory failure, & the rash below – Diagnosis? meningococcemia
Medical History Informing Diagnosis
“It has been said that a good history – listening to the patient – allows a diagnosis 90% of the time. Nowhere is a complete and accurate history more important than when approaching a febrile traveler.”

Assumptions about your practice

• **Travel history:** you’ll know this well since you are deploying with your unit

• **Vaccination history:** you’ll know this well since your unit will generally be UTD

• **Activity based risks:** more of an unknown
  – Food intake/ingestions (crayfish, snails, slugs)
  – Animal contact (rabies, tularemia, lepto)

• **Vector exposure** and use of PPMs

• **Freshwater** exposure

• **Barefoot** exposure

• **Sexual** exposure

• **Adherence** to antimalarial chemoprophylaxis
Achitina fulica,
the giant African land snail

Vaginulus plebeius,
the intermediate host of
Angiostrongylus costaricensis
An Outbreak of Eosinophilic Meningitis Caused by *Angiostrongylus cantonensis* in Travelers Returning from the Caribbean


*N Engl J Med* 2002; 346 (9): 668-75, Feb 28
Generalizations about crawfish eating videos:

- Almost exclusively males

- Almost exclusively involve alcohol consumption

- Frequently on a dare
The importance of taking a careful history.

A medical mystery began one summer's day on a Missouri waterway when someone ate something that most Americans would never think of putting in their mouths — that is, not unless it had first been sauteed, baked, boiled or fried.

Before this illness was diagnosed at Washington University School of Medicine, only seven such cases had ever been reported in North America, where a parasite, *Paragonimus kellicotti*, is common in crayfish.
Dangerous Lung Worms Found in People Who Eat Raw Crayfish

ScienceDaily (May 26, 2010) — If you’re headed to a freshwater stream this summer and a friend dares you to eat a raw crayfish — don’t do it. You could end up in the hospital with a severe parasitic infection.

Physicians at Washington University School of Medicine in St. Louis have diagnosed a rare parasitic infection in six people who had consumed raw crayfish from streams and rivers in Missouri. The cases occurred over the past three years, but three have been diagnosed since last September, the latest in April. Before these six, only seven such cases had ever been reported in North America, where the parasite, Paragonimus kellicotti, is common in crayfish.

“Eating raw crayfish can result in a severe parasitic infection. (Credit: Robert Boston)

Related Stories
"MORE THAN HALF THE BATTLE AGAINST DISEASE IS FOUGHT NOT BY DOCTORS, BUT BY REGIMENTAL OFFICIALS"

GENERAL WILLIAM SLIM
Burma Theatre, WW2
QUININE PARADE IN GREECE
<table>
<thead>
<tr>
<th>Exposure Scenario</th>
<th>Distinctive Findings</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any exposure in any area with documented malaria transmission</td>
<td>Fever with or without any other finding</td>
<td>Malaria</td>
</tr>
<tr>
<td>Most tropical countries</td>
<td>Fever and altered mental status</td>
<td>Malaria, meningococcal meningitis, rabies, West Nile virus</td>
</tr>
<tr>
<td>Budget travel to India, Nepal, Pakistan, or Bangladesh</td>
<td>Insidious-onset, high, unremitting fever, toxic patient, paucity of physical findings</td>
<td>Enteric fever due to <em>Salmonella typhi</em> or <em>Salmonella paratyphi</em></td>
</tr>
<tr>
<td>Freshwater recreational exposure in Africa</td>
<td>Fever, eosinophilia, hepatomegaly, negative malaria smear</td>
<td>Acute schistosomiasis (Katayama fever)</td>
</tr>
<tr>
<td>Bitten by <em>Aedes aegypti</em> in Central America, Southeast Asia, or the South Pacific</td>
<td>Fever, headache, myalgia, diffuse macular rash, mild to moderate thrombocytopenia</td>
<td>Dengue</td>
</tr>
<tr>
<td>Bitten by <em>A. aegypti</em> or <em>Aedes albopictus</em> in India, Malaysia, Singapore, or an</td>
<td>Fever, headache, myalgia, diffuse macular rash, arthralgia, tenosynovitis often</td>
<td>Chikungunya fever</td>
</tr>
<tr>
<td>island in the Indian Ocean</td>
<td>followed by chronic polyarthritis after the fever resolves</td>
<td></td>
</tr>
<tr>
<td>Hunting or visiting game reserves in southern Africa</td>
<td>Fever, eschar, diffuse petechial rash</td>
<td>African tick typhus due to <em>Rickettsia africae</em></td>
</tr>
<tr>
<td>Travel to Southeast Asia</td>
<td>Fever, eschar, diffuse petechial rash</td>
<td>Scrub typhus due to <em>Orientia tsutsugamushi</em></td>
</tr>
<tr>
<td>Hiking, biking, swimming, rafting with exposure to fresh surface water</td>
<td>Fever, myalgia, conjunctival suffusion, mild to severe jaundice, variable rash</td>
<td>Leptospirosis</td>
</tr>
<tr>
<td>Summertime cruise to Alaska, elderly traveler</td>
<td>Influenza-like illness</td>
<td>Influenza A or B</td>
</tr>
<tr>
<td>Outdoor exposure anywhere in the Americas</td>
<td>Large, single furuncular lesion anywhere on body, with sense of movement inside</td>
<td>Myiasis due to <em>Dermatobia hominis</em> (botfly)</td>
</tr>
<tr>
<td>Clothing washed or dried out of doors in Africa</td>
<td>Multiple furuncular lesions around clothing contact points with skin</td>
<td>Myiasis due to <em>Cordylobia anthropophaga</em> (tumbu fly)</td>
</tr>
<tr>
<td>New sexual partner during travel</td>
<td>Fever, rash, mononucleosis-like illness</td>
<td>Acute human immunodeficiency virus infection</td>
</tr>
<tr>
<td>Travel to any developing country</td>
<td>Coryza, conjunctivitis, Koplik spots, rash</td>
<td>Measles</td>
</tr>
<tr>
<td>Longer visit to humid areas of Africa, the Americas or Southeast Asia</td>
<td>Asymptomatic eosinophilia or with periodic cough or wheezing</td>
<td>Strongyloidiasis</td>
</tr>
<tr>
<td>Sandfly bite in either New or Old World tropical area</td>
<td>Painless skin ulcer with clean, moist base in exposed area</td>
<td>Cutaneous leishmaniasis</td>
</tr>
<tr>
<td><strong>Resort hotel in southern Europe, ± exposure to whirlpool spas</strong></td>
<td><strong>Pneumonia</strong></td>
<td><strong>Legionnaires’ disease</strong></td>
</tr>
<tr>
<td><strong>Explored a cave in the Americas</strong></td>
<td><strong>Fever, cough, retrosternal chest pain, hilar adenopathy</strong></td>
<td><strong>Histoplasmosis</strong></td>
</tr>
<tr>
<td><strong>Ingestion of unpasteurized goat cheese</strong></td>
<td><strong>Chronic fever, fatigue</strong></td>
<td><strong>Brucella melitensis</strong></td>
</tr>
<tr>
<td><strong>Long trip to West/Central Africa</strong></td>
<td><strong>Afebrile, intensely pruritic, evanescent truncal maculopapular rash</strong></td>
<td><strong>Onchocerciasis</strong></td>
</tr>
<tr>
<td><strong>Long trip to West/Central Africa</strong></td>
<td><strong>Migratory localized angioedema or swellings over large joints, eosinophilia</strong></td>
<td><strong>Loiasis</strong></td>
</tr>
<tr>
<td><strong>Safari to game parks of East Africa</strong></td>
<td><strong>Fever, nongenital chancre, fine macular rash</strong></td>
<td><strong>East African trypanosomiasis</strong></td>
</tr>
<tr>
<td><strong>Travel to Australia</strong></td>
<td><strong>Fever, fatigue, polyarthritis</strong></td>
<td><strong>Ross River virus</strong></td>
</tr>
<tr>
<td><strong>Farming areas of India and Southeast Asia</strong></td>
<td><strong>Fever, altered mental status, paralysis</strong></td>
<td><strong>Japanese encephalitis</strong></td>
</tr>
<tr>
<td><strong>Forested areas of central and eastern Europe and across Russia</strong></td>
<td><strong>Fever, altered mental status, paralysis</strong></td>
<td><strong>Tick-borne encephalitis</strong></td>
</tr>
<tr>
<td><strong>Rodent exposure in West Africa</strong></td>
<td><strong>Fever, sore throat, jaundice, hemorrhagic manifestations</strong></td>
<td><strong>Lassa fever</strong></td>
</tr>
<tr>
<td><strong>Ingestion of sushi, ceviche, or raw freshwater fish</strong></td>
<td><strong>Migratory nodules in truncal areas with overlying erythema or mild hemorrhage</strong></td>
<td><strong>Gnathostomiasis</strong></td>
</tr>
<tr>
<td><strong>Returning Hajj pilgrim or family contact</strong></td>
<td><strong>Fever, meningitis</strong></td>
<td><strong>Meningococcal meningitis</strong></td>
</tr>
<tr>
<td><strong>Ingestion of snails, fish, or shellfish in Asia</strong></td>
<td><strong>Eosinophilic meningitis</strong></td>
<td><strong>Angiostrongylasis, gnathostomiasis</strong></td>
</tr>
<tr>
<td><strong>Summertime exposure to rodent droppings in Scandinavia</strong></td>
<td><strong>Fever with decreased renal function</strong></td>
<td><strong>Puumala virus</strong></td>
</tr>
<tr>
<td><strong>Ingestion of undercooked meat of any animal in any country</strong></td>
<td><strong>Fever, facial edema, myositis, increased creatine phosphokinase, massive eosinophilia, normal erythrocyte sedimentation rate</strong></td>
<td><strong>Trichinosis</strong></td>
</tr>
<tr>
<td><strong>Unvaccinated, returning from sub-Saharan Africa or forested areas of Amazonia</strong></td>
<td><strong>Fever, jaundice, proteinuria, hemorrhage</strong></td>
<td><strong>Yellow fever</strong></td>
</tr>
<tr>
<td><strong>Exposure to farm animals</strong></td>
<td><strong>Pneumonia, mild hepatitis</strong></td>
<td><strong>Q fever</strong></td>
</tr>
<tr>
<td><strong>Possible tick exposure almost anywhere</strong></td>
<td><strong>Fever, headache, rash, conjunctival injection, hepatosplenomegaly</strong></td>
<td><strong>Tick-borne relapsing fever</strong></td>
</tr>
<tr>
<td><strong>Poor hygienic conditions with possible body louse exposure in Ethiopia or Sudan</strong></td>
<td><strong>Fever, headache, rash, conjunctival injection, hepatosplenomegaly</strong></td>
<td><strong>Louse-borne relapsing fever</strong></td>
</tr>
</tbody>
</table>

*The table includes illnesses of travelers (listed first) as well as less common diseases with presentations that should suggest the possibility of the appropriate diagnosis. Many diseases have a spectrum of presentation and the table describes the most common presentations of these diseases. Many diseases have a spectrum of geographic origins and the table describes the most common exposures seen in daily practice.*
Common clinical findings and associated infections

- Fever + rash ➔ rickettsioses, typhus, Dengue, mening/GC, acute HIV
- Fever + chancre (or ‘tache noir’) ➔ ATBF, Trypanosomiasis
- Fever + abdominal pain ➔ Typhoid, amoebic dysentery/abscess
- Fever + myalgias/arthritis ➔ Dengue, Chickungunya
- Fever + hemorrhage ➔ VHF (YF, Dengue), mening, leptospirosis
- Fever + jaundice ➔ Yellow Fever, leptospirosis
- Fever + eos ➔ Katayama syndrome, Trichinellosis, other worms
- Fever + meningeal signs ➔ bacterial meningitis, Angiostrongylus
- Fever NOS + normal or low WBC ➔ malaria, visceral leish, Dengue, rickettsiae, Chikungunya, VHF
- Fever + tender lymphadenopathy ➔ Yersinia pestis (Plague)
- Fever persisting > 2 weeks ➔ see table
- Fever with delayed onset (> 6 weeks after return) ➔ P. malariae, P. vivax, TB, visceral leish,
Initial studies for diagnosis in returned travelers with unexplained fever

- Thick and thin smears for malaria (supplement with RDTs)
- Complete blood count with differential and platelet estimate
- Liver function
- Blood cultures
- Urinalysis
- Chest X-rays

Additional tests will depend on specific findings and exposures

Wilson ME. Fever in returned travelers. *CDC Health Information for International Travel*, 2010
Geographic Disease Distribution

CONUS / OCONUS
An Analysis of Fevers of Unknown Origin in American Soldiers in Vietnam

John J. Deller, Jr., LT. COL., MC, USA, and Philip K. Russell, Maj., MC, USA
Long Binh, South Vietnam

A number of febrile diseases endemic in Vietnam are characterized by the sudden onset of high fever, chills, and headache. Although the classical varieties of the arbovirus diseases, scrub typhus and malaria, as well as a number of other tropical febrile illnesses, have been well described (1-7), the differential diagnosis of these tropical diseases remains a real challenge.

In an attempt to define these “fevers of unknown origin,” 110 patients presenting in this fashion in whom a more precise diagnosis could not be made within 24 hr of admission to the 93rd Evacuation Hospital, Long Binh, South Vietnam, were studied. Serologic, virologic, and bacteriologic methods were used to confirm the diagnosis in all cases.

**Materials and Methods**

All patients admitted to the medical service from April 1, 1966, to August 1, 1966, with fever (over 101 F), chills (frank chills or chilliness), headache (of any degree), a negative malaria smear, and in whom a specific diagnosis could not be made were admitted to the study.

Patients were evaluated according to a standard clinical protocol that recorded epidemiologic data, a narrative history, and specific symptoms, physical examination, and laboratory checklists that were monitored daily for the first 7 days of hospitalization.

Received December 30, 1966; accepted for publication February 6, 1967.

From the 93rd Evacuation Hospital, Long Binh, South Vietnam.

Requests for reprints should be addressed to Lt. Col. John J. Deller, Jr., MC, USA, Department of Medicine, Letterman General Hospital, San Francisco, Calif. 94129.

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Dengue</th>
<th>Chikungunya</th>
<th>Scrub Typhus</th>
<th>Malaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidemiology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camp, urban</td>
<td>+++</td>
<td>+++</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Jungle</td>
<td>--</td>
<td>--</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Fever, degrees F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 104</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
<td>--</td>
</tr>
<tr>
<td>&gt; 104</td>
<td>--</td>
<td>--</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Arthralgias</td>
<td>--</td>
<td>+++</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Tender</td>
<td>++ (early)</td>
<td>+++</td>
<td>+++ (later)</td>
<td>--</td>
</tr>
<tr>
<td>adenopathy</td>
<td>--</td>
<td>--</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Tender</td>
<td>--</td>
<td>--</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>liver/spleen</td>
<td>--</td>
<td>--</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Rash</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>--</td>
</tr>
<tr>
<td>Petechiae/tourniquet test</td>
<td>+</td>
<td>--</td>
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</tr>
<tr>
<td>WBC, /mm³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5,000</td>
<td>++</td>
<td>++</td>
<td>--</td>
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</tr>
<tr>
<td>&gt; 5,000</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>SGOT &gt; 50 units</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>+++</td>
</tr>
</tbody>
</table>

Chikungunya

Waves of Transmission of Chikungunya Virus
- First Wave
- Second Wave
- Third Wave
Dengue
Dengue

Map showing the distribution of Dengue risk areas in the Americas.
Hepatitis A

Estimated Hepatitis A Virus Prevalence:
- High
- Intermediate
- Low
- Very Low
Japanese Encephalitis
Malaria: Mefloquine Resistant

*Note: In this map, countries with areas endemic for malaria are shaded completely even if transmission occurs only in a small part of the country. For more specific within-country malaria transmission information, please see the Yellow Fever and Malaria Information, by Country section in Chapter 3 and the CDC Malaria Map Application (www.cdc.gov/malaria/map).
Melioidosis
Middle East Respiratory Syndrome-Coronavirus

APRIL 2012 – 27 JUN 14

- Cases and deaths
  - 820 lab confirmed cases
  - 286 deaths (35%)
- Countries in or near Arabian Peninsula
  - Saudi Arabia, United Arab Emirates (UAE), Qatar, Oman, Jordan, Kuwait, Yemen, Lebanon, Iran
- Travel associated cases
  - United Kingdom (UK), France, Tunisia, Italy, Malaysia, Philippines, Greece, Egypt, United States of America (USA), Netherlands, Algeria
Schistosomiasis

Schistosomiasis-Endemic Areas
- Both (Hepatic-Intestinal and Urinary)
- Very Low Risk for Both (Hepatic-Intestinal and Urinary)
- Hepatic-Intestinal
- Very Low Risk for Hepatic-Intestinal
- Very Low Risk for Urinary
- Not Endemic
Tuberculosis

Estimated TB Incidence Rate (per 100,000 population):
- > 300
- 100 - 299
- 50 - 99
- 25 - 49
- 1 - 24
- 0 or No Estimate
Yellow Fever

Yellow Fever

Rocky Mountain Spotted Fever / Tularemia

American Dog Tick
(Dermacentor variabilis)
Anaplasmosis / Babesiosis / Lyme Disease

Blacklegged Tick
(Ixodes scapularis)
Rocky Mountain Spotted Fever

Brown Dog Tick
(Rhipicephalus sanguineus)
Rickettsia parkeri

Gulf Coast Tick
(Amblyomma maculatum)
Ehrlichiosis / STARI / Tularemia
Rocky Mountain Spotted Fever / Tularemia

Rocky Mountain Wood Tick
*(Dermacentor andersoni)*
Anaplasmosis / Lyme Disease

Western Blacklegged Tick
(Ixodes pacificus)
* Per 100,000 population, based on July 1, 2012 U.S. Census population estimates.

**Alternate Text:** The figure above shows the rate of reported cases of West Nile virus (WNV) neuroinvasive disease, by state, in the United States during 2012. States with the highest incidence rates included South Dakota, North Dakota, Mississippi, Louisiana, and Texas. Four states reported over half of the WNV neuroinvasive disease cases: Texas, California, Illinois, and Louisiana.
Key websites

- www.cdc.gov/travel/page/yellowbook-2012-home.htm = The Yellow Book
- www.cdc.gov/dpdx = Parasitic Diseases diagnosis
- www.istm.org/geosentinel/main.html
- www.promedmail.org = Searchable outbreak info
- www.tropnet.net = European Network on Imported Infectious Disease Surveillance
Additional websites

- www.fallingrain.com  elevation and rainfall data
- www.healthmap.org  outbreak information
- www.lib.utexas.edu/maps  *outstanding* map collection!
- http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm  the ‘Pink Book’ on vaccines
Take home point number one:

**ALWAYS** include malaria in the differential of fever in a returnee from a tropical locale
Keep in Mind that...

- Initial symptoms of life-threatening and self-limited infections can be identical.

- **Malaria** is the most common cause of acute undifferentiated fever after travel to sub-Saharan Africa and to some other tropical areas.

- Patients with malaria may be afebrile at the time of evaluation but typically give a history of chills.

- **Malaria, especially falciparum, can progress rapidly.** Diagnostic studies should be done promptly and treatment instituted immediately if malaria is diagnosed.

- A history of taking malaria chemoprophylaxis does not exclude the possibility of malaria.

- Patients with malaria can have prominent respiratory (including adult respiratory distress syndrome), GI, or central nervous system findings.

Wilson ME. Fever in returned travelers. *CDC Health Information for International Travel, 2010*. Page 288
Also Keep in Mind that...

- Viral hemorrhagic fevers are important to identify but are rare in travelers; bacterial infections, such as:
  - leptospirosis
  - meningococcemia and
  - rickettsial infections

  can also cause fever and hemorrhage and should be always be considered because of the need to institute prompt, specific treatment.

- Sexually transmitted infections, including acute HIV, can cause acute febrile infections.

- Consider infection control, public health implications and requirements for reportable diseases.

- Fever in returned travelers is often caused by common, cosmopolitan infections, such as pneumonia, influenza, or pyelonephritis.

  Common things occur commonly.
Take home point number two:

Consider empiric doxycycline
References


Any questions??