What Ails You? The Investigation Begins

Vocabulary:
- Dengue fever
- Endemic
- Epidemiology

Lesson Summary:
Students will use the first case report from the Key West 2009 dengue outbreak to complete an epidemiological report. This lesson begins with a patient’s initial symptoms and visit to her primary care physician. After a return trip and visit to the emergency room, initial testing for dengue will be conducted by the students in the next lesson.

Student Learning Objectives:
The student will be able to...
1. Interpret a case report
2. Articulate that investigating a disease cause is a detailed process
3. Identify some of the intricacies in investigating a disease cause
4. Recognize it can be difficult to diagnosis an illness

Florida Next Generation Sunshine State Standards (Science):
- SC.912.L.14.52
- SC.912.L.16.10
- SC.912.L.18.1
- SC.912.N.3.5

Materials:
- Copies of the case report per student
- Copies of the epidemiological log per student

Background Information:
Endemic dengue is rare in the United States. There have been cases reported along the Texas/Mexico border as well as an outbreak in Hawaii, and spotted reports usually as a result of travel to other countries. The outbreak in Key West was alarming as it served as a warning signal as to what was possible. Key West is rather removed from the rest of the Florida peninsula and fortunately, Aedes mosquitoes aren’t known to travel great distances. However, it is a distinct possibility that an infected mosquito or person could carry the virus into the rest of the state and allow dengue to establish itself in the mosquito population. Once established, it would be very difficult to eradicate, particularly in a state with such a high amount of tourist and global travel. The tropical disease dengue is often misdiagnosed since few cases are seen in the United States. Additionally, its early flu-like symptoms are often dismissed by the patient.
Advance Preparation:
1. Copies of the case report per student.
2. Copies of the epidemiological log per student (Students can work together to fill in their charts, but they will refer to these over the course of the week, so it is helpful for each student to have his/her own.)

Procedure and Discussion Questions with Time Estimates:

30 minutes
1. Distribute a copy of the Case Report per student.
2. Tell the students this is the actual case report as recorded by the CDC. Ask students to read the case report silently.
3. Tell the students they are now an epidemiologist on the case. They need to review her history and record her symptoms, tests ordered, and results as they are available. They will continue to fill in the epidemiological report as they move through the unit and more information is learned.
4. (5-10 minutes) Allow the students to work in pairs to complete as much of the chart as they can.
5. Circulate to check for understanding and remind them where the dictionaries are located should they need to look up a word.
6. When all student pairs have finished, go through the epidemiological report together, calling on student pairs to give answers.

Teaching tip: The students do not have all of the information in this initial report. Remind the students that patients are not always forthcoming with information and this can hinder diagnosis. Additionally, the nurse or doctor who took the patient history may not have asked appropriate probing questions to solicit needed information. Also, while some students may be knowledgeable of dengue, they can only use the information that is actually presented to them rather than filling in the blanks or guessing.

Assessment Suggestions:
• Participation grade may be given.
• Students will complete the first part of the Epidemiology Report, and these can be graded at the conclusion of the unit.

Resources/References:
The Centers for Disease Control has a wealth of information related to dengue including interactive maps and tutorials. [http://www.cdc.gov/dengue/](http://www.cdc.gov/dengue/)

This case report is based on the actual first case reported in the 2009/2010 outbreak. For the detailed account of the first three cases, visit: [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5919a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5919a1.htm)
Case 1.

On **August 11, 2009**, a previously healthy woman aged 34 years from Rochester, New York, went to her primary-care provider after 1 day of fever, headache, malaise, and chills. A urine analysis revealed bacteruria (bacteria in urine) and hematuria (red blood cells in urine), and she was treated for a presumptive urinary tract infection.

Two days later, on **August 13**, she returned to her primary-care provider with a worsening headache, retro-orbital pain exacerbated by eye movement, and complaints of feeling light-headed, although her fever had resolved. Physical examination determined that she was alert and oriented but had substantial discomfort from her headache; further neurologic evaluation determined that the patient had loss of balance when asked to close her eyes. She was referred to a local emergency department for further evaluation and management.

At the emergency department, she had normal vitals of a temperature of 98.8°F (37.1°C), heart rate of 85 beats per minute, blood pressure of 117/96 mmHg, and respiratory rate of 16 breaths per minute. A complete blood cell (CBC) count revealed a low white blood cell count of 3,900/μL (normal: 4,500–10,500/μL), a normal hematocrit of 43%, and a low platelet count of 115,000/μL (normal: >150,000/μL). Her evaluation included an unremarkable computed tomography (CT) scan of the head and a lumbar puncture. The patient's light-headedness resolved, and she was discharged after a 7.5-hour stay in the emergency department.

On **August 17**, the woman returned to her primary-care provider, saying, “I don’t feel right.” On examination she had a temperature of 98.8°F (37.1°C), heart rate of 76 beats per minute, blood pressure of 122/60 mmHg, trace pedal edema (swelling) bilaterally, and petechiae (small (1-2mm) red or purple spots on the body) on her lower extremities.
STUDENT WORKSHEET

<table>
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<tr>
<th>DATE</th>
<th>SYMPTOMS</th>
<th>SAMPLE SOURCE</th>
<th>TEST PERFORMED</th>
<th>RESULT</th>
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Other:
- Chills
- Malaise
- Fever
- Nausea/vomiting
- Headache
- Pain behind eyes
- Joint/muscle pain
- Rash
- Light-headed
- Swelling

EPIDEMIOLOGICAL REPORT

Patient Case #: 1
Gender: Male
Age: 35
Recent travel: Yes
Home address: 123 Main St., Anytown, USA

The Investigation Begins – Case Report

Draw or affix image of ELISA below.

Draw or affix image of PCR/gel electrophoresis on back.
### The Investigation Begins – Case Report

#### EPIDEMIOLOGICAL REPORT

**Patient Case #: 001**  
**Gender:** ☐ Male ☑ Female  
**Age:** 34

**Home address:** Rochester, NY  
**Recent travel:** One week in Key West

<table>
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<tr>
<th>DATE</th>
<th>SYMPTOMS</th>
<th>SAMPLE SOURCE</th>
<th>TEST PERFORMED</th>
<th>RESULT</th>
<th>DIAGNOSIS</th>
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<td>☐ Chills</td>
<td>☐ Malaise</td>
<td>Urine analysis</td>
<td>Bacteruria, hematuria</td>
<td>Urinary tract infection</td>
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<tr>
<td>08/13</td>
<td>☐ Chills</td>
<td>☐ Malaise</td>
<td>Lumbar puncture = cerebral spinal fluid</td>
<td>RT-PCR Positive for DENV-1</td>
<td>On 08/13 – unknown Later testing revealed Dengue fever serotype 1.</td>
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<td>☐ Fever</td>
<td>☐ Nausea/vomiting</td>
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<td>Positive for DENV-1</td>
<td>On 08/13 – unknown Later testing revealed Dengue fever serotype 1.</td>
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<td>09/3</td>
<td>Recovered</td>
<td>Serum (blood)</td>
<td>MAC ELISA</td>
<td>Positive for dengue IgM antibodies</td>
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Notes: