Naegleria fowleri: An Emerging Pathogen; The Public Health impact of an Unusual Event

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The Situation

Child 1: 5 yr old Boy, from Peoria region

10/9/2002: Seen by local pediatrician, fever, vomiting, listlessness. Sent home

10/10/2002: admitted Children’s Hospital

Dx: meningitis, unknown etiology

Spinal Tap – negative for bacteria

10/11/02: Reported to MCDPH; Meningitis (?)

Child Died: 10/11/02: 11:43 PM

10/15/02: Autopsy by Medical Examiner

Naegleria seen on CSP slide,

MCDPH informed: Dx: **Naegleria fowleri**
The Situation

- **Child 2**: 5 year old boy from Peoria Region
  - **10/10/2002**: admitted to local hospital, fever: 101º, nausea, vomiting, headache, and nuchal rigidity
  - **Spinal tap**: no bacteria, white cells,
    - Preliminary diagnosis: Meningitis, r/o bacterial meningitis
  - **Child died**: 10/14/2002; 3:00 AM
  - **Postmortem** – St. Joe’s Hospital; no causal diagnosis at the time of autopsy
  - **MCPHD** informed of a Meningitis death
Community Situation
10/25/02

2 Meningitis deaths, both confirmed by County Med. Examiner: N. fowleri

CLINICAL REVIEW

PROBLEM

EPIDEMIOLOGICAL REVIEW
(Social and Demographic)

ENVIRONMENTAL ISSUES

In this case, Think ZEBRAS
Epidemiology

- Both children lived in or near city of Peoria but used a private water system: Rose Valley
Epidemiology

- Neither child had any exposure to surface waters, sprinklers or pools outside of their own home
- Neither child had any known contact with the other child
- Child #1 played in a Jacuzzi style bathtub, putting his head into the jets
- Child #2 played in the new pool as it was being filled PRIOR TO CHLORINATION
- Both children spent most of their time in homes served by a small non-chlorinated water company which drew its water from a deep aquifer: THEIR ONLY COMMON LINK
The Rose Valley Water System
Environmental Survey:

Surface waters in the community sampled for N. fowleri – all negative

The Rose Valley Water System

- System serves 2300 families/6000 people
- Water drawn from deep aquifer: 600 feet deep
- System is not chlorinated
- System has had no coliforms in its reported tests to MC Environmental Services Agency for over two years
- Several spot checks by MCES in late October showed coliforms but no fecal bacteria

We ordered chlorination of RVW immediately
Situation on October 28, 2002

No explanation for the Source of Naegleria
- The water system had good cleanliness Hx.
- Deep Aquifers never been associated with PAM
  (one surface system in Australia had cases)
- PAM not found at same time in same place

MCDPH & MCDES convened a Community Meeting to
discuss the event and attempt to quell rising concerns in the User community
The Community

1. **Terrified**: was their water going to kill their children and their pets?
2. **Angry**: how could the county allow the water system to do this to them?
3. **Ignorant**:
   - we didn’t know the water was Unchlorinated
   - We didn’t know the water company was private
   - We didn’t know about E. coli, or Naegleria, or other pathogens
4. **Hysterical**: you have killed our children
The Community (cont.)

5. And SUPPORTIVE: with spirit and cooperation:

“I want anyone from this community to work with me to resolve this issue and find the right solution for our future,”

said a community member unwilling to let the situation end in despair.
- We had a disease outbreak
- Our only link between the two children, was RVW.
- Deep water systems are not hazardous if maintained.
- PLAN: Monitor RVW for coliforms; check surface waters in the spring and summer of 2003
- And we might have chalked it off as another public health outbreak without a direct causal link

But this is not the end of the story
Friday Evening, November 1, 2002, at 10:00 PM I receive a Phone Call from the Rose Valley President:

“Dr. Weisbuch, We have had a private Lab test our system for Naeglaria. We have found Naeglaria in our system.”
Action

1. Open Emergency Operational Center
2. Contact Centers for Disease Control
4. Call a News Conference; Prepare Release
5. Political Contacts; Community Contacts
6. Initiate Full Testing Regime at Rose Valley
## Results:
From CDC in mid December

<table>
<thead>
<tr>
<th>Source</th>
<th>Result</th>
<th>Genotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVW Tank #1</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>RVW Tank #2</td>
<td>Positive</td>
<td>#1</td>
</tr>
<tr>
<td>RVW Tank #3</td>
<td>Positive</td>
<td>#1</td>
</tr>
<tr>
<td>RVW Well #2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>RVW Well #3</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Refrigerator Filter</td>
<td>Positive</td>
<td>#1</td>
</tr>
<tr>
<td>Test Well – Peoria</td>
<td>Positive</td>
<td>#2</td>
</tr>
</tbody>
</table>
What have we learned?

1. Zebras are out there
2. Complex problems require community involvement
3. Cooperation with partners still result in chaos; things go wrong
4. Communicate both what you know and what you don’t know; build TRUST
5. What we learn from everyday events may be helpful when a bio-catastrophe occurs
6. The EPA Honor System for Water is Flawed