Use of Web-Based Surveys in Foodborne Outbreak Investigations

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The Old Outbreak Paradigm: Oswego Church Supper Outbreak

- Acute local outbreak
- High dose, high attack rate
- Detected by group themselves
- Local investigations
- Often a local food handling error, often egregious
- Local solution
The New Outbreak Paradigm

- Low dose, low attack rate
- Cases from many states or counties
- Often detected by lab-based subtype surveillance
- Complex and time consuming investigation
- Two scenarios
  - Food contaminated at farm/plant distributed to many states
  - People from many states congregate in one location, are exposed, and then return home
Outbreak of *Salmonella* Serotype Javiana Infections --
- Orlando, Florida, June 2002

On July 16, 2002, the Minnesota Department of Health identified two cases of *Salmonella* serotype Javiana infections among persons who had attended the 2002 U.S. Transplant Games held at theme park A in Orlando, Florida, during June 25--29. Isolates from both patients were indistinguishable by pulsed field gel electrophoresis (PFGE). The U.S. Transplant Games is a 4-day athletic competition among recipients of solid organ transplants (i.e., heart, liver, kidney, lung, and pancreas) and bone marrow transplants. Approximately 6,000 persons from the United States and five other countries, including 1,500 transplant-recipient athletes, participated in the games. This report summarizes the results of an ongoing epidemiologic and laboratory investigation that has identified 141 ill persons in 32 states who attended the games.
U.S. Transplant Olympic Games

- June 25 - 29, 2002
- Theme Park A in Orlando, Florida
- Attended by 6000 people
  - 1500 transplant recipient athletes
  - United States and five other countries
Need for New Tools for New Outbreak Investigations

- Contact 1600 participants and their family members
- Collect information on symptoms and food consumption
- Data must be collected in a secure fashion
- Find our answer quickly!
Key features of web-based survey tool

- Flexible
  - Use preset questions or create new ones
- User friendly, rapid set up
  - Little to no extra programming
- Secure
  - For respondents and overall data
- Report data in a useable way
  - Reports and tables in familiar formats
Example of web-based tool
Basic steps in using web-surveys

- Create a questionnaire
- Adjust web layout
- Post on web
- Send secure link to participants by email
- Generate reports and data
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Note no interview or data entry time!
Creating questionnaire
Outbreak Survey

The Centers for Disease Control and Prevention is conducting an investigation of an outbreak of illness among visitors to Orlando, Florida. To help us identify the source of the outbreak and prevent additional illnesses, we request that you please complete the questionnaire below. Please complete this survey even if you did not become ill. It is by comparing the responses of ill and well persons that we can identify the source of illness. The questions will take less than 10 minutes to complete. Again, you will not be asked your name. We realize that it is often difficult to remember events that happened a few weeks ago, but even your best guess can be very helpful.

Please select the appropriate answer. "DK" is "Don't Know".

*PLEASE ENTER YOUR UNIQUE SURVEY NUMBER
(YOU MUST ENTER THIS NUMBER IN ORDER TO COMPLETE THE SURVEY)

1. Was anyone from your household in Orlando, Florida between Tuesday, June 25th and Saturday, June 29th?
   ☑ Yes ☐ No ☐ DK
   IF You Answered "NO", CLICK HERE OR Scroll to Bottom And Then Press "Submit"
Data Security

mrInterview Security Architecture
Examples of Outbreak Investigations Using eQuest

- Initial and 2 follow-up surveys of transplant Olympic games participants

- Outbreak at FDA conference
  - 356 participants from 29 states

- Outbreak at national conference in Washington, DC
  - 442 participants from 50 states; >2000 persons attending conferences in center each week

- Outbreak at WV and Virginia Bike Tour
  - 1549 participants from 32 states and Canada
Benefits of using eQuest: Get data quickly

Preliminary analysis to determine the source of the outbreak can begin within 2 days of emailing survey.
Cumulative Number of Responses by Hour after Survey Release (eQuest CTST Outbreak Survey 5-20-04)

Survey Release

80% of total after 4 hours

0 100 200 300 400
12:00 PM 1:00 PM 2:00 PM 3:00 PM 4:00 PM 5:00 PM Total Responses

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Outbreak of Parasitic Disease—State A, 2003

- Time to complete survey once respondent clicked onto link in emailed questionnaire

  - Median: 00:32:38
  - Mean: 00:36:01
  - Range: 00:05:37 to 1:48:02
## Limitations of Web Surveys

<table>
<thead>
<tr>
<th>Outbreak</th>
<th>Number of participants</th>
<th>Number responding to survey</th>
<th>% participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transplant games</td>
<td>1100</td>
<td>369</td>
<td>34%</td>
</tr>
<tr>
<td>FDA conference</td>
<td>356</td>
<td>175</td>
<td>49%</td>
</tr>
<tr>
<td>DC conference</td>
<td>442</td>
<td>140</td>
<td>32%</td>
</tr>
<tr>
<td>Bike tour</td>
<td>1549</td>
<td>545</td>
<td>35%</td>
</tr>
</tbody>
</table>
Email Reminders
Improved Participation

Days after survey site emailed

New Respondents

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

Reminders sent

Bike Tour

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New web-survey tool, mrlInterview available for demonstration
Summary

- Web survey development tools enable the user to collect and store data in a secure fashion

- Good ones have the following characteristics:
  - Flexibility (can create a new survey, use parts of previous surveys, or import standard questions stored within the system)
  - It can be used by people who traditionally develop questionnaires - the epidemiologists
  - A survey can be developed and posted quickly (days)
  - Data is stored in a secure fashion and is easy to access

- Demonstrated to work in outbreak investigations. Other potential uses...routine case surveillance?
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Additional Uses of eQuest, 2003

- SARS 2003
  - SARS transmission studies and Quarantine

- Multi-state cluster of *Salmonella* 4,5,12,i-
  - Hypothesis generating questionnaire (12 states)

- Botulism Preparedness plan
Cumulative Number of Responses by Hour after Survey Release (eQuest CTST Outbreak Survey 5-20-04)

Survey Release ~14% ill ~14% ill 14% ill

Responses

0 100 200 300 400

12:00 PM 1:00 PM 2:00 PM 3:00 PM 4:00 PM 5:00 PM Total

~14% ill 14% ill

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eQuest System-Architecture