

Case Study -
Autumn 2005 in Upstate NY

- You work at a LHD
- The phone rings...
- It's the infection control practitioner from General Hospital
- 7 people recently presented at ED with severe GI illness; higher number than expected
- All admitted



Yes/No: Do you need to collect this information?

1. Mode of transportation to ED
2. Sex of each patient
3. Presenting symptoms
4. What treatment is being given
5. Patients' ages
6. How ill each patient is
7. Who will write final report
8. Laboratory test results
9. Number of deaths
10. If contacts were given antacids in ED
11. Common exposures
12. Onset of illness dates

What LHD Learned from Initial Call:

- Patient demographics:
 - Age range: 9 - 77
 - Sex: 5 women; 2 men
 - Illness onset began September 12
- Presenting symptoms:
 - Severe abdominal cramping
 - Sudden onset of watery diarrhea with visible blood in stool



And...

- Extent of disease:
 - No hemolytic uremic syndrome (HUS)
 - No deaths
- PCR test results:
 - *E. coli* testing: all positive for Shiga toxin Type 1
 - *E. coli* not O157
 - All negative for *Campylobacter jejuni*
- Common links:
 - 4 of 7 visited local Apple's Orchard
 - All consumed cider produced by Apple's Orchard



Q. There may be a disease cluster or outbreak;
who would you notify first in beginning an investigation?

1. The local tv station to issue a warning about drinking cider
2. NYSDOH Regional Office or District Office
3. Apple's Orchard
4. Wadsworth Center
5. All of the above
6. 1. and 3.

Yes/No: The following agencies need to be involved now:

1. UDSA
2. Center Office of NYSDOH Regional Epidemiology Program
3. Motor Vehicle Department
4. NYSDOH Public Affairs Group
5. Bureau of Community Environmental Health & Food Protection
6. NYS Department of Agriculture & Markets
7. Wadsworth Center
8. FDA

The Investigation Begins - The LHD:

- Obtains detailed clinical & lab information from hospital & healthcare providers
- Creates CDESS case from ECLRS report; uses case report form & *E. coli* supplemental
- Monitors ECLRS for additional/similar cases



The LHD Also...



- Responds to inquiries with preliminary information
- Obtains remaining cider samples from patients' homes
- Conducts site visit to Apple's Orchard
- Coordinates/obtains/ships human specimens to Wadsworth & cider samples to Ag & Markets



The Regional/District NYSDOH:

- Regional Epidemiology:
 - Assists LHD in investigation
 - Monitors ECLRS for additional/similar cases
 - Contacts neighboring counties
 - Obtains/helps develop case questionnaire
- Environmental Health & Food Protection:
 - Assists LHD sanitarians
 - Notifies Ag & Markets
 - Collects available information about Apple's Orchard
 - Conducts site visit to Orchard—with LHD and/or on own



Q. Which of the following is **not** part of verifying the diagnosis by the local & state DOH?

1. Interview patients and/or their family members
2. Review clinical info & lab results
3. Provide hand hygiene education
4. Consider possible etiologic agents
5. Count the number of cases with these symptoms

Define & Identify Cases

- Construct Case Definition:
 - Clinical criteria: GI illness
 - Restrict & sort by:
 - Time: onset on or after September 12
 - Place: Apple's Orchard
 - Person: exposure to Apple's Orchard:
 - Visited Orchard
 - Consumed products produced or purchased there
- Create line list:
 - Identify variables to include
 - Add suspect cases



Local & State Surveillance for Additional Cases



- 'Blast fax' health advisory to local healthcare providers & facilities
- Contact neighboring LHD & state DOH
- Notify local schools (field trips planned)
- Issue press release
- Post Epidemiological Problem Alert on HIN



Onsite Investigation Participation

- LHD & NYSDOH:
 - Communicable Disease
 - Environmental Health
- NYS Agriculture & Markets



Yes/No: The following elements are part of the onsite environmental assessment:

1. Evaluate cider production
2. Interview employees
3. Examine cider press
4. Obtain maintenance records
5. Collect customer lists
6. Tell owner that Orchard is causing illness
7. Collect environmental samples for lab testing
8. Recommend control measures

Form Hypothesis:

- Combine known epi & environmental information:
 - Orchard produces unpasteurized cider
 - Documented GI outbreaks associated with unpasteurized (raw) apple juice & cider:
 - *E. coli*
 - Cryptosporidiosis
 - Salmonellosis
 - Cases all PCR positive for Shiga toxin-producing *E. coli*
 - No soap & only cold water in employee restroom





Hypothesis:
GI illness is associated with drinking
unpasteurized apple cider from Apple's Orchard





New Information

- 16 new suspect cases identified in 2 neighboring counties
- 5 new suspect cases identified in neighboring state
- 9 of 21 hospitalized
- All positive for Shiga toxin Type 1
- All PCR negative for *E. coli* O157:H7
- 136 cases under investigation



Testing Results #1

Human Cases	Number	Laboratory Finding
Confirmed	0	?
Probable	28	Shiga toxin Type 1
Suspect	108	Pending or not done



Investigation Continues...

- Case finding:
 - Patient interviews
 - Phone bank set up to handle incoming calls
 - Ongoing active & passive surveillance
- State & local DOH revisit Apple's Orchard:
 - Assess implementation of control & prevention measures
 - Collect additional cider samples
 - Cider samples submitted to Ag & Markets for lab testing



Q. Which is not part of ongoing communications?

1. Regular conference calls between LHD, NYSDOH, WC & PAG
2. LHD press conference with updated data
3. Meeting with owner of Apple's Orchard
4. Conference calls with healthcare providers
5. State notifies CDC because OB appears to be multi-state
6. State sends the CDC an Epi-X posting
7. LHD notifies EPA
8. NYSDOH updating neighboring LHDs & states
9. PIO & PAG responding to media inquiries
10. Updating Problem Alert on HIN



New Information

- Human cases:
 - 23 patient specimens are culture-positive for *E. coli* O111
 - 182 cases under investigation
- Environmental:
 - One cider specimen tests positive for Shiga toxin Type 1
 - There is an informal petting zoo on the premises



Testing Results #2

Human Cases	Number	Laboratory Finding
Confirmed	23	<i>E. Coli</i> O111
Probable	15	Shiga toxin Type 1
Suspect	144	Pending or not done
Cider Specimen	Number	Laboratory Finding
Probable	1	Shiga toxin Type 1



Investigation Continues...

- Surveillance & testing:
 - Case finding continues
 - Ongoing descriptive epidemiologic analysis
 - Patient samples now tested for both bacteria & parasites
- Environmental:
 - Petting zoo calves' specimens sent for lab testing
 - Calves removed from premises
 - Cider samples now split between bacteriology & parasitology labs



Development of Case Control Study Begins

- Develop outbreak-specific questionnaire
- Case selection
- Control selection
 - Eligibility criteria
 - Determine # controls per case to achieve statistical significance
 - Identify method to identify controls





New Information

- Human cases:
 - Cases now reported in another neighboring state
 - 1 patient tested *Cryptosporidium* antigen positive
 - 199 cases under investigation
- FDA:
 - Is alerted by the CDC
 - Issues warning about Apple's Orchard cider
 - Posts the Orchard's cider recall on their website



<http://www.fda.gov/>





New Information, continued...

- Environmental:
 - Shiga-toxin type 1 identified in calf sample
 - Results from another visit to Apple's Orchard:
 - They stopped producing & selling unpasteurized cider
 - They cleaned & sanitized cider press
 - They closed the petting zoo
 - Soap now in employee bathroom; plumber to repair hot water line next day



Testing Results #3

Human Cases	Number	Laboratory Finding
Confirmed	29	E. coli 0111
Probable	16	15 - Shiga toxin Type 1 1 - Cryptosporidiosis
Suspect	154	Pending or not done
Cider Specimen	Number	Laboratory Finding
Probable	1	Shiga toxin Type 1
Animal Specimen	Number	Laboratory Finding
Probable	1	Shiga toxin Type 1





New Information



- Human cases:
 - 33 total hospitalizations
 - 27 newly confirmed *E. coli* 0111 cases
 - Cryptosporidiosis lab result is confirmed
 - 213 cases under investigation
- Environmental:
 - Confirmed *E. coli* 0111 in three cider samples
 - Site visit confirms hot water now in employee bathroom
 - Review of prevention messages to management & staff



Testing Results #4

Human Cases	Number	Laboratory Finding
Confirmed	57	56 - <i>E. coli</i> 0111 1 - Cryptosporidiosis
Suspect	156	Pending or not done
Cider Specimens	Number	Laboratory Finding
Confirmed	3	<i>E. Coli</i> 0111
Animal Specimen	Number	Laboratory Finding
Probable	1	Shiga toxin Type 1



Investigation Winding Down...Study Initiated

- Surveillance & case finding continues
 - No new cases of *E. coli* or cryptosporidiosis
 - No HUS or deaths reported related to outbreak
- Apple's Orchard control & prevention measures appear sustained
- Case control study initiated
- Final report begun



Study Completed; Final Summary

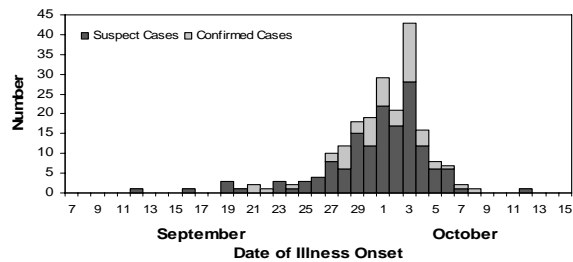
- 213 cases:
 - Confirmed: 57
 - Suspect: 156
- Illness onsets between September 12 – October 3
- Two causative agents identified:
 - *E. coli* O111
 - *Cryptosporidium parvum*
- *E. coli* O111 confirmed in cider sample
- Shiga-toxin type 1 identified in calf sample



Cider consumption was statistically associated with illness



Epidemiology Curve



Q. Which of the following would not present a challenge to the investigation:

1. Orchard could not provide sales records with consumers' names
2. Ill people did not seek medical care
3. Stool samples were not collected
4. Patients threw out remaining cider
5. Patient cider samples fermented
6. Positive Shiga toxin Type I cases by PCR reported on ECLRS
7. People didn't return phone messages for study interview
