WATERBORNE ILLNESS: SURVEILLANCE AND OUTBREAK DETECTION IN MINNESOTA

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Organizational Structure of Water Safety in Minnesota

Minnesota Department of Health

Environmental Health Division
- Food, Pools, and Lodging Section
  - Pool inspections
- Drinking Water Protection Section
  - Public water supplies
  - EHS-Net Sanitarian
- Well Management Section
  - Private wells

Infectious Disease Epidemiology, Prevention and Control Division
- Foodborne, Waterborne, Vectorborne, and Zoonotic Diseases Section
  - Waterborne Diseases Unit
    - Waterborne disease surveillance
    - Virus in Groundwater Study
    - EHS-Net Water Program
    - Lake Superior Beach Monitoring Program

Public Health Laboratory Division
- Infectious Disease Laboratory Section
  - Clinical samples
  - EHS-Net projects
- Environmental Laboratory Section
  - Water testing
Primary Waterborne Disease Outbreak Detection Mechanisms in Minnesota

• Reportable diseases
  – Individual reported cases are interviewed, exposures compared to other reported cases

• Notification by health care professional or patient of multiple illnesses from common event
  – e.g., camp, family reunion, birthday party

• Multiple individual complaints about same pool, beach, or drinking water system
Diseases Reportable to the Minnesota Department of Health

WATERBORNE DISEASES

Campylobacteriosis (Campylobacter sp.)*
Cholera (Vibrio cholerae)*
Cryptosporidiosis (Cryptosporidium sp.)*
Enteric Escherichia coli infection (E. coli O157:H7 and other pathogenic E. coli from gastrointestinal infections)*
Giardiasis (Giardia lamblia)
Hemolytic uremic syndrome
Salmonellosis, including typhoid (Salmonella sp.)*
Shigellosis (Shigella sp.)*

*Submit isolates or clinical materials to the Minnesota Department of Health
Reportable Bacterial Enteric Pathogen and *Cryptosporidium* Surveillance in Minnesota

- Clinical materials must be submitted to the Minnesota Department of Health
- Real-time PFGE or PCR subtyping on all specimens
- Routine, real-time interviews of all cases
Minnesota Surveillance Philosophy

• Interview all cases, ASAP
• Collect details on specific exposures
  – Dates
  – Names of restaurants, pools, resorts
  – Addresses
• Investigation of all PFGE and Crypto clusters
  – Intensity/resource expenditure depends on the nature of the cluster
  – Follow leads aggressively
Symptom and Exposure Questions

- Drinking water
- Raw milk
- Travel
- Gatherings
- Animal contact
- Daycare
- Ill contacts
- Recreational water
Student Workers

• MPH students from U of MN SPH
• Hired as temporary MDH employees
• ~20 hours/week
• Intensive training, oversight by MDH epidemiologists
• Person-power to rapidly interview all cases; do calls for cluster investigations
Selected Enteric Pathogens Reported to MDH, 2000-2013

- **Giardia**
- **Campylobacter**
- **Salmonella**
- **Shigella**
- **Cryptosporidium**
- **E. coli O157:H7**

Year:
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013

Number of Cases:
- 0
- 200
- 400
- 600
- 800
- 1000
- 1200
- 1400
Minnesota Foodborne & Waterborne Hotline

Call to report foodborne & waterborne illness

Toll free statewide: 1-877-366-3455
1-877-FOOD ILL

• Centralized at State Health Department
• Coordinated by one person
• Complaints received from public directly or from public via local health departments
Assessing Waterborne Illness Complaints

- Number ill
- Other common exposures?
- Incubation period and specific symptoms – do they fit together?
- Also get complete food history – complainant may not be targeting correct exposure
- Enter complaints into a database, and then continuously compare to identify independent complaints about same establishment
Other Waterborne Disease Outbreak Detection Mechanisms in Minnesota

• Notification of water events
  – Boil water notices
  – Low pressure events
• Media

Pool @HolidayInn Owatonna closed today after families say they became sick, cough, vomiting. No response from hotel.
pic.twitter.com/svDZ49GweX
Highlights of Waterborne Disease Surveillance Improvements in Minnesota, 1995-2014

- Crypto reportable to MDH
- Crypto genotyping began at MDH PHL
- Clinical materials required to be submitted from all Crypto cases
- MDH joined EHS-Net Water
- First Healthy Swimming Workshop
- Hired Waterborne Student Workers
- Started enhanced Giardia surveillance
- CSTE Water Fellow joined MDH
The Final Step...Reporting
Waterborne Outbreaks by Reporting Status, 1972-2010

Number of Outbreaks

Year


Unreported
Reported

Legend:

Number of Outbreaks

10

15

20

25

30
Number of *Cryptosporidium* Cases in Minnesota by Year and Species, 2000-2013

- **C. hominis**
- **C. parvum**
- Other species
Recreational Water Outbreaks in Minnesota, by Venue, 2000-2013
Cryptosporidium hominis and C. parvum Subtypes, Minnesota, 2000-2010

C. hominis Subtypes (n=30)
- IbA9G3
- IdA22
- IdA17
- IdA15G1
- IaA24R4
- IeA11G3T3
- IdA15G1
- IaA22R3
- IaA14R3
- 19 additional subtypes

C. parvum Subtypes (n=31)
- IIaA15G2R1
- IIaA17G2R1
- IIaA15G2R2
- IIaA16G3R1
- IIaA16G3R2
- IIaA16G2R2
- 25 additional subtypes