

Utilization of Public Health Surveillance Data for Early Detection and Mitigation of Drinking Water Contamination

Kathy Clayton¹, Katie Gavit, M.P.H.², Amy Prestanski, M.P.H.³,
Jessica Pulz¹, Cynthia Yund, P.h.D.¹

¹U.S. Environmental Protection Agency, ²Computer Science Corporation, ³Oak Ridge Research
Fellow with U.S. EPA Office of Water Internship Program

Objective

This poster describes the integration of public health surveillance data as a component of an early warning system for detection of a drinking water contamination incident.

Background

Safe drinking water is essential for all communities. Intentional or unintentional contamination of drinking water requires water utilities and local public health to act quickly. The Water Security (WS) initiative of the U.S. Environmental Protection Agency (EPA) is a multi-faceted approach involving water utilities and local public health officials (LPH) to identify, communicate, contain, and mitigate a drinking water contamination event [1]. Components of WS include: online water quality monitoring, enhanced security monitoring, consumer complaint surveillance, and innovative uses of public health surveillance data streams. LPH already use multiple surveillance data systems to recognize disease events in a timely manner. However, few of these systems can be integrated or specifically designed for detection of drinking water contamination incidents.

Methods

Public health surveillance (PHS) may be an early indicator of drinking water contamination through detection of an anomaly in one of several PHS data streams. The data streams may include: 911 calls; emergency medical service (EMS) run reports; infectious disease reporting; over-the-counter (OTC) drug sales; emergency department chief complaints; and poison control center (PCC) calls. Testing of 'water' syndrome categories applied to these data streams is currently occurring. A water syndrome includes symptoms that may result from ingestion, inhalation or dermal exposure to contaminated water.

Results

911 call data and EMS run reports may be the earliest indicator of a fast-acting water contaminant, such as a chemical release. SaTScan [2] is used to identify geographical clusters of 911 calls. EMS provider impressions have been categorized into a water syndrome analyzed by EARS [3]. C1 alerts identified by EARS are further investigated. Monitoring of

OTC data has been effective in detecting GI illness caused by waterborne outbreaks [4]. Syndromic surveillance of emergency department data are being used routinely by local health departments. The EPA is working with RODS and ESSENCE to enhance capabilities to detect a drinking water incident. These enhancements include: joint alerts to public health and water utility officials and a prototype 'water module' that fuses public health and water quality data. PCCs provide a resource for toxicological expertise to identify possible drinking water contaminants, provide medical information to exposed persons, and assist with communicating messages to an affected community. Figure 1 shows PCC's algorithm for evaluating a possible water contamination incident.

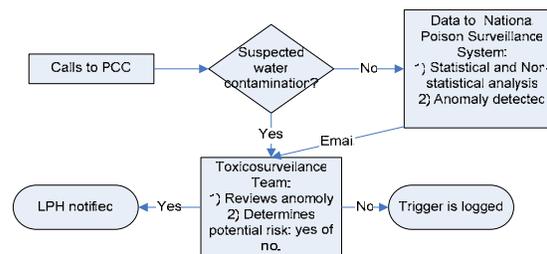


Figure 1 – Poison Control Center decision algorithm

Conclusion

In the event of a public health incident involving drinking water, coordination between LPH and water utility personnel is an important tool. EPA's WS initiative aims to expand collaboration between public health and the water sector. Benefits include earlier incident detection, timely coordination of crisis messages, and enhancement of the recovery process.

References

- [1] USEPA. WaterSentinel System Architecture, 2005.
- [2] SaTScan Software, 2006.
- [3] Early Aberration Reporting System (EARS), CDC, 2006.
- [4] Edge, VL, et al Syndromic Surveillance of GI Illness Using Pharmacy Over-the-Counter Sales. Canadian Journal of Public Health, Nov/Dec 2004, 95:6 446-450.

Further information:

Kathy Clayton, clayton.kathy-ci@epa.gov