

UNIVERSITIES COUNCIL ON WATER RESOURCES
JOURNAL OF CONTEMPORARY WATER RESEARCH AND EDUCATION
ISSUE 129, PAGES 22-26, OCTOBER 2004

Linking Public Health and Water Utilities to Improve Emergency Response

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Intentional contamination of a drinking water system may be discovered in several ways. If the potential contamination is unannounced or covert, its first indications might be detected by the water utility operating the system or by the public health system. In contrast, if a terrorist group announces a contamination event (or the threat of one), water utilities and the health-care system both may learn about the event simultaneously through such channels as mass media. Various other scenarios are also possible, such as a threat being telephoned to a water utility. In all of these scenarios, water utilities and the public health system must work together to respond to real or threatened contamination of drinking water supplies.

Water Utility and Public Health System Responses to Drinking Water Contamination

If an event involves an obvious security breach related to drinking water, the water utility would likely be the first to uncover the possibility of contamination. Security breaches associated with vandalism such as cutting locks or fences, are not uncommon. However, recent terrorism events and increased awareness of terrorist intentions have highlighted the need to handle these situations differently than in the past. As stated by the Florida Department of Environmental Protection (DEP) in a letter to water plant owners and operators: “. . . we live in a new era. We must be much more vigilant and responsive about the security of our

water supply systems to protect the public. Incidents, that in the past may have been viewed as acts of mischief and vandalism, now need to be fully investigated and managed seriously” (Florida DEP 2003a).

One element of managing these situations is informing local and state health departments, and involving them in response efforts. This has not always occurred in a timely manner. For example, in a recent drinking water system security breach in Florida that involved forced entry into water system facilities, 36 hours elapsed between when the utility discovered the problem and when they notified the state health department (WaterTech 2003). Events such as this prompted a change in policy in Florida to require water utilities to notify a designated state emergency response hotline within two hours after any suspicious incident (Florida DEP 2003b).

Health departments need to know about potential drinking water contamination because they may need to be involved in responding to potential contamination incidents. Important elements of a response in the public health system include investigation of any unusual patterns of illnesses, dissemination of guidance to the public to safeguard health, and preparation of treatment for people affected by contamination (Fig. 1). Therefore, water utilities and the public health system must not only communicate but also actively work together to effectively respond to potential contamination events involving security breaches of water system facilities.

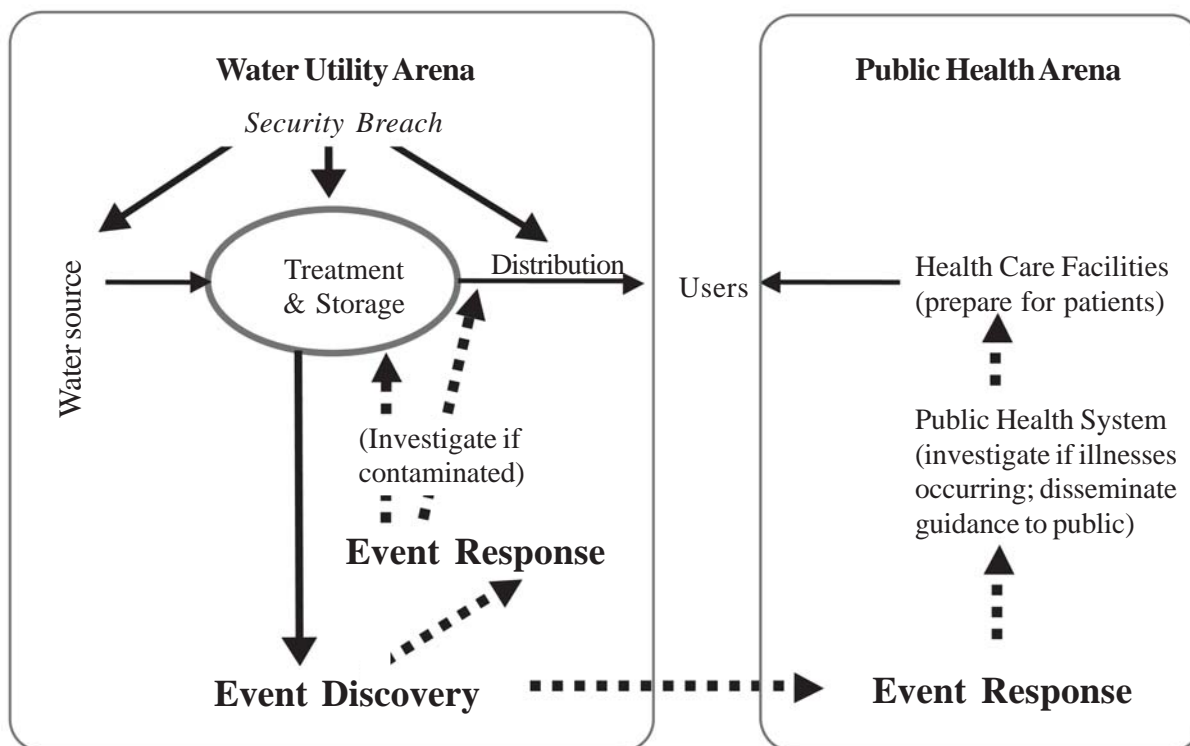


Figure 1. Response to a Water Contamination Event: Detection in Water Utility

Although methods exist for real time detection of some contaminants in drinking water distribution systems, such diagnostic tools are neither well developed for detection of multiple unknown contaminants nor deployed in a widespread manner. Therefore, if contamination does not involve an obvious security breach of drinking water system facilities, the first indication of contamination may be patients seeking medical assistance at health care facilities. The patients themselves may not know what made them sick. However, if multiple patients have similar symptoms, health-care facilities would notify public health agencies, which would begin investigating the cause and source of the illness. In the case of potential drinking water contamination, effective responses will require collaboration between water utilities and public health agencies. Although the public health system may discover the initial contamination, much of the response will take place in the water utility arena, including actions such as identifying likely locations where an agent may have been introduced into the water system, decontaminating the drinking water distribution system, and disposing of contaminated water (Fig. 2).

Although it was naturally occurring, *Cryptosporidium* contamination of the Milwaukee

drinking water supply in 1993 provided an example of a contamination event discovered in the public health arena (Centers for Disease Control and Prevention [CDC] 1995). During a heavy rainfall event, *Cryptosporidium* in the city’s surface water source passed through the municipal treatment system and into the drinking water distribution system. At that time, the city’s drinking water treatment plant was not operating at optimal levels for treatment of *Cryptosporidium*, and high turbidity levels caused by the rainfall as well as cold temperatures contributed to the treatment system’s lack of effectiveness against the organism. As people ingested the parasite, many became ill with gastrointestinal symptoms, especially diarrhea. Public health officials discovered the contamination because so many people sought treatment, especially over-the-counter anti-diarrheal medications. However, long-term response to the problem was the responsibility of the water utility who upgraded the drinking water treatment system to make it effective against *Cryptosporidium*.

If a terrorist group announces real or threatened contamination of drinking water in the media or directly to a water utility or public health agency, a solid partnership between water utilities and public

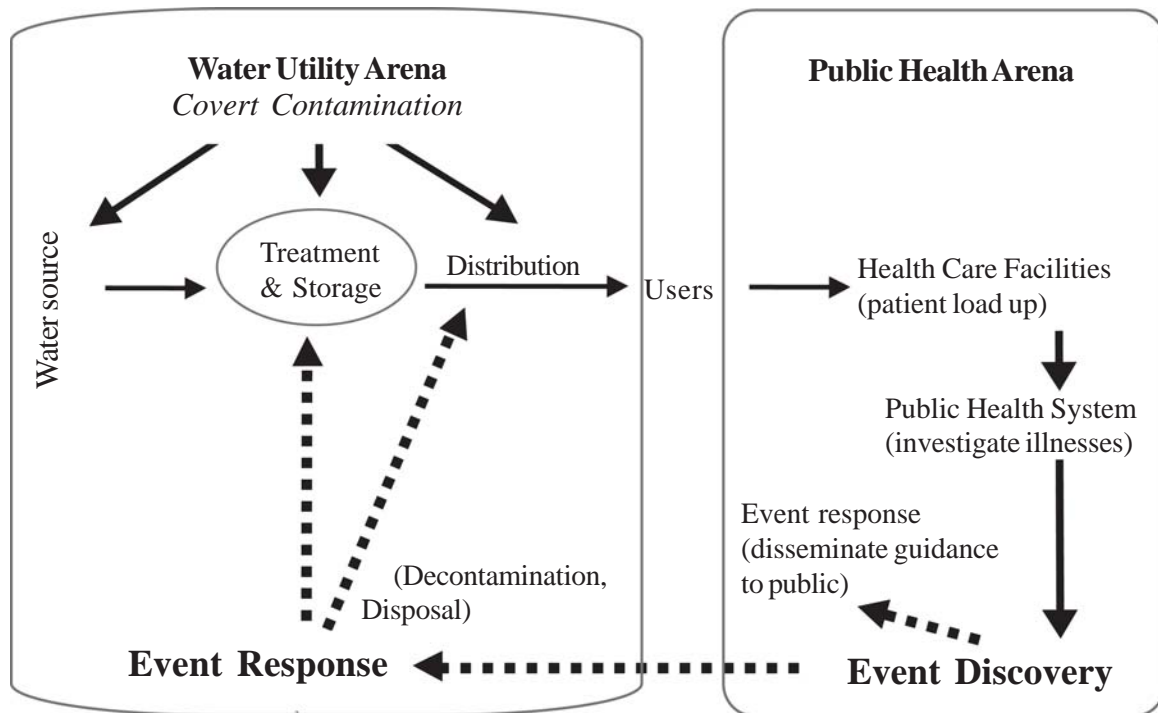


Figure 2. Response to a Water Contamination Event: Detection in Public Health System

health agencies also would be required to deal effectively with the event. To protect the public's health, decisions would need to be made quickly about, for example, whether chlorine is effective against the suspected agent, whether the affected area of the distribution system can be isolated, or whether a boil-water notice should be issued. Public health authorities can often provide credible messages to the public, but will need critical information from water utilities to craft the most appropriate messages. Quickly disseminating information to the public also will be an important element of a response, especially when terrorism may be involved. Confusing and potentially conflicting messages need to be avoided, especially regarding actions the public should take to protect itself, highlighting the need for coordination. Communication problems were an issue for some communities during the widespread electricity blackouts in the Northeastern and Midwestern United States in 2003, when utilities and public health agencies issued boil-water orders with conflicting information. The resulting confusion highlighted the need for better coordination between water utilities and the public health system in responding to emergencies.

Barriers to Collaboration Between Water Utilities and Public Health Agencies

Local public health agencies and water utilities have not always interacted and collaborated closely. Effective regulations and monitoring requirements have prevented large-scale public health problems in the United States related to drinking water except for occasional failures in disinfection. In addition, many health departments are not involved in the regulation and monitoring of water supplies, especially for larger municipal systems. State environmental management or environmental quality agencies (which generally are not part of state or local health departments) often monitor drinking water systems. Unless a disease outbreak involves water, these groups have little need to interact. Differing technical language used by public health agencies and water utilities also present barriers to effective communication, especially if these groups have not interacted in the past.

Private contractors operating water utilities may be reluctant to engage with local public health entities because disclosure of information may affect the status of their contracts with local government.

Additionally, funding is not targeted to facilitate and maintain relationships between public health agencies and water utilities. Both water utilities and public health agencies have limited budgets and lack resources to get involved with activities outside of their legal mandates.

Promoting Linkages Between Water Utilities and Public Health Agencies

Because of the potential for intentional contamination of drinking water supplies, water utilities and public health agencies are beginning to develop closer relationships. At the federal level, the Environmental Protection Agency (EPA), in conjunction with other federal partners such as CDC, is developing a response protocol toolbox for responding to drinking water contamination threats and incidents. The toolbox contains information to assist both water utilities and public health agencies in emergency responses related to drinking water (EPA 2003).

The Public Health Security and Bioterrorism Preparedness and Response Act (Public Law 107-188) requires drinking water facilities to conduct vulnerability assessments and prepare emergency response plans. Implementing or updating these emergency response plans will increase opportunities for public health agency involvement in planning and responses at the local level. EPA's newly released Response Protocol Tool Box also encourages involvement and inclusion of public health agencies in water utility response plans (EPA 2003). In addition, EPA is organizing water security training sessions to educate water utilities, public health agencies, law enforcement, and local governments about water security issues and the need for increased communication and partnerships. CDC and the American Water Works Association are piloting smaller workshops specifically designed to bring local health department and utility staff together to address problems related to water security.

Public health agencies in several major cities throughout the United States are implementing syndromic surveillance programs designed to detect anomalies in disease patterns through the collection and combination of multiple electronic data sources before confirmed diagnoses are made. Although not specifically designed to detect waterborne events, the data gathered through these sources may help

increase the speed at which events are detected and data are analyzed (Mandl et al 2003).

Conclusions and Recommendations

Water utilities and public health agencies need to develop stronger working relationships in order to prepare for potential drinking water contamination events. In some cases, these groups previously have collaborated to address specific problems such as *Cryptosporidium* in water, and those efforts can provide a template for collaboration related to terrorism preparedness, such as in the formation of local task forces (CDC 1997). Continued opportunities to collaborate also should be provided through ongoing training, planning, and joint exercises. For example, tabletop exercises can be useful for both water utilities and public health agencies in identifying gaps in preparedness, communication, and response.

Information sharing between utilities and public health agencies can enhance detection and response. For example, increased complaints to water utilities or public health agencies related to water could indicate a problem when coupled with other public health surveillance data. Cross-referencing information, such as water-distribution maps and locations of illness cases, also could improve responses. However, such sharing would require that agreements be in place to allow for information exchange without compromising confidentiality issues for patients or utilities.

Establishment of formal agreements may help ensure regular exchange between utilities and public health agencies. In some cases, requirements, such as the Florida policy requiring notification of security breaches at drinking water facilities, may need to be mandated. The actual mechanisms will vary among locations, but state and local governments should explore ways to ensure regular communication between these entities.

Some efforts probably will require funding dedicated to maintaining collaboration in planning and preparedness by water utilities and public health agencies. However, such collaboration will help ensure these entities are better equipped and trained to respond to both intentional and

naturally occurring drinking water contamination events.

Acknowledgements

The authors acknowledge Dennis Juranek and John (Jay) Watson of the National Center for Infectious Disease at CDC for their comments on this paper.

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