

Troubled Waters

Managing hospital risks associated with an interrupted or contaminated water supply

Interruption or contamination of a water supply can be caused by a range of incidents, including natural disasters, malfunctioning wastewater treatment systems, sewer overflows, manufacturing processes, and acts of terrorism.

Case in point: The Freedom Industries chemical spill in West Virginia in 2014 contaminated the drinking water for 300,000 residents and significantly impacted operations at area hospitals, forcing staff to use workarounds to address key systems such as hand hygiene; cleaning, disinfection, and sterilization of equipment and supplies; and laundry.¹

When water interruption disasters occur, hospitals must be prepared to handle the emergency with minimal disruption to normal patient care activities. According to the US Centers for Disease Control and Prevention, water may not be available in hospitals for hand washing and hygiene; drinking at faucets and fountains; food preparation; flushing toilets and bathing patients; laundry cleaning; sterilization of surgical instruments; reprocessing of medical equipment; patient care; fire suppression sprinkler systems; water-cooled medical gas and suction compressors; heating, ventilation, and air-conditioning; and decontamination/hazmat response.² Consequently, hospitals must have a plan in place to protect occupants from the harmful effects of contaminated water.

“Health care facilities are critical components of a community’s response and recovery during and following an emergency event,” says Mark Kaldahl, HSD, facility support director at Carilion Franklin Memorial Hospital, Rocky Mount, Virginia. “The resiliency of the community depends on the hospital’s ability to maintain normal operations and provide patient care throughout the emergency.”

Water contaminants

When a hospital’s water source becomes contaminated, the hospital is advised not to use the water unless it is first boiled or disinfected before use. This notification will often be made either by the facility’s water supplier or the local health department. The reason these warnings are issued can usually be summed up in one portentous word: coliforms.

“Coliforms are bacteria that are present in the digestive tracts of humans and animals and are found in their wastes,” Kaldahl says. “They are also found in plant and soil material (*see* “Defining the Dangers” on page 7 for further definitions).”

Other water contaminants include the following³:

- Organic compounds, such as pesticides, herbicides, insecticides, and fungicides; or volatile organic chemicals (VOCs);
- Inorganic compounds such as arsenic, barium, chromium, lead, mercury, and silver
- Radioactive elements such as radon or alpha/beta emitters

Distress signals

Government agencies issue advisories, notifications, and warnings, which are typically broadcast by the media. Advisories are generally issued if a break in a water main has occurred, or the system has lost pressure. An advisory does not mean bacteria have been found in the water. This is a precautionary statement issued before water testing has been completed. A boil water advisory means a problem may have increased the risk for the water system to be contaminated. A boil water notice, on the other hand, is a notice to the public that tests show coliform bacteria are present in the water system.

“When coliform bacteria are found, additional testing is conducted to see if the contamination includes fecal coliform bacteria. If fecal coliform bacteria are present, a warning will be issued that the water is contaminated with fecal coliform bacteria,” Kaldahl says.

“Do not drink the water” notifications can be issued for either bacteria or chemical contaminants, which indicate the water is so contaminated it should not be consumed, and boiling or disinfecting the water may not offer adequate protection.

Notifying hospital staff

After the hospital learns its water supply has been contaminated, the following steps should immediately be implemented:

1. The hospital’s Emergency Operations Plan (EOP) should go into effect.
2. Department leaders or their designees should meet in a predetermined meeting place to await instructions from leadership about the incident.
3. The incident commander should assign an individual to contact the local water department and/or water provider to determine the status of the incoming water.
4. After a determination is made about the water quality, the incident commander should brief leaders of the situation and outline a plan of response.

Danger zones

Careful preparations need to be made regarding the following activities and areas during a water contamination emergency:

- **Drinking water**—During a boil water notice or a “Do not drink the water” notice, discontinue the consumption of tap water. Turn off ice makers, soda fountains, drinking fountains, and any other equipment that requires water that might be

ingested. Label all remaining water sources, “Do not drink.” Provide bottled water, juices, or soft drinks for patients and staff. Use only bagged ice from a source unaffected by the contaminated water alert.

- **Food preparation**—During a boil water advisory or a boil water notice, food prepared using tap water must be heated to at least 165°F (73.9°C) before it can be served. Prepackaged foods and fruits that are normally peeled before eating can also be served. Food service workers should use hand sanitizers after washing their hands. During a boil water notice or a do not consume notice, discontinue food preparation activities that involve the use of tap water and serve only prepackaged foods obtained from approved commercial sources not affected by the boil water notice and fruit that is normally peeled before eating.
- **Dishwashing**—During a boil water advisory or a boil water notice for total coliform contamination, only commercial dishwashers equipped with hot water (180°F [82.2°C]) sanitizing cycles should be used for washing dishes. Facilities not equipped with 180°F dishwashers should use only single-service eating and drinking utensils. During a boil water notice for fecal coliform contamination or a “Do not consume” notice, use disposable single-service utensils and packaged foods.
- **Hand washing**—If contaminated water is used for hand washing, a further step must be taken to inactivate bacteria which the water might leave on your hands. For health care workers, this means using alcohol-based hand sanitizer. In situations in which the hands are heavily soiled and need to be washed with soap and water before they can be sanitized, staff should (1) if water is available, wash hands with soap and water, dry thoroughly, and then sanitize using

Defining the Dangers

Health care organizations should be aware of the following definitions:

Potable water: Water that is safe to drink and free from pollution, harmful organisms, and impurities.

Nonpotable water: Water that is unsafe to drink because it contains pollutants, contaminants, minerals, or infective agents.

Coliforms: Bacteria that are present in the digestive tracts of animals, including humans, and are found in their wastes.

Total coliforms: Bacteria that are found in the soil, in water that has been influenced by surface water, and in human or animal waste.

Fecal coliforms: The group of the total coliforms that are considered to be present specifically in the gut and feces of warm-blooded animals; fecal coliforms are considered a more accurate indication of animal or human waste than the total coliforms.

a alcohol based hand sanitizer; or (2) if water is not available, wash hands with soap and bottled water, dry thoroughly, and then sanitize using alcohol based hand sanitizer.

- **Bathing**—According to Occupational Safety and Health Administration (OSHA) 29 CFR 1910 General Industry Standards, nonpotable water shall not be used for washing any portion of a person, cooking or eating utensils, or clothing.⁴ This recommendation would also apply during a boil water notice or a do not drink the water notice. During contaminated water emergencies, patients should be bathed using disposable bathing washcloths or with a disposal cleanser that can be used without water.

Cleaning the hospital

Nonpotable water may be used for cleaning work premises, other than food processing and preparation premises and personal service rooms⁴ (rooms used for

activities not directly connected with the production of service function performed by the establishment; such activities include, but are not limited to, first aid, medical services, dressing, showering, toilet use, washing, and eating). However, this nonpotable water must not contain concentrations of chemicals, fecal coliform, or other substances which could create unsanitary conditions or be harmful to employees.

“Maintaining a clean sterile environment may be the biggest challenge hospitals face during a contaminated water emergency,” Kaldahl adds. “But hospitals can follow several strategies.” These steps include the following:

- General cleaning can be done in patient care areas using general disinfectant wipes commonly found in the hospital.
- Many of the vendors supplying cleaning chemicals to the hospital also have premixed chemicals available in their inventories. Keeping a small inventory of these supplies on hand could get the hospital through a short-duration water emergency.
- Hospital disaster plans often include a plan for responding to water emergencies. “These plans generally include a list of vendors that have already agreed to supply either bottled water for drinking or bulk potable water to the facility during a water emergency,” says Kaldahl. “This clean potable water could be used for a variety of things, including cleaning.”
- Hospital leaders can curtail certain services or transfer patients to other facilities until the normal water supply to the hospital has been restored.

Proper preparation is key

Although water emergencies are relatively rare, they do occur and hospitals must be ready to respond when they do.

“The secret to having a successful outcome is planning for the event before it ever arises,” says Kaldahl. “It’s better

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to have a plan in place, and never use it, than not having a plan and needing it when the event does occur.”

Joint Commission Standards require hospitals to address the provision of water as part of the facility’s EOP and to follow relevant Emergency Management (EM) standards and elements of performance (EP), including **EM.02.02.09**, EPs 3, 4, and 8: As part of its EOP, the hospital prepares for how it will manage utilities during an emergency. This

includes identifying alternative water sources, and the hospital implements the components of its EOP that require advance preparation to provide for utilities during an emergency.

Proper planning also includes adding water emergencies into your hazard vulnerability analysis, particularly if your facility is located in a community where water emergencies often occur. 

References

1. Newsweek. Hospitals Scrambled to Deal with Chemically Contaminated Water in West Virginia. Kloc J. Feb 13, 2014. Accessed Oct 2,

2015. <http://www.newsweek.com/hospitals-scrambled-deal-chemically-contaminated-water-west-virginia-229010>.

2. US Centers for Disease Control and Prevention. Emergency Water Supply Planning Guide for Hospitals and Health Care Facilities. 2012. Accessed Oct 1, 2015. <http://www.cdc.gov/healthywater/pdf/emergency/emergency-water-supply-planning-guide.pdf>.
3. Living Waters Engineered Water Treatment Solutions. Contaminants. Accessed Oct 2, 2015. <http://www.livingwatersway.com/water-contaminants>.
4. US Occupational Safety and Health Administration. (2014). 29 CFR 1910 OSHA General Industry Regulations. [1910.141 Subpart J - General Environmental Controls - (b)(2)(iii) pp. 231]. Davenport, IA: Mancomm.