

# Something in the Water: Hospital Responds to Water Crisis

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## ABSTRACT

Early on August 2, 2014, in the city of Toledo, Ohio, a media alert informed the public that traces of microcystin, a hazardous toxin, had been detected in the drinking water. The warning stated that residents should not drink, boil, or even touch the contaminated water. A water crisis of this magnitude was recognized to pose a potentially serious and significant impact on patient care and safety in health care environments. ProMedica Toledo Hospital's Emergency Operation Plan addressed 3 critical issues: safe water availability, alternate cleaning solutions, and preparations for a prolonged crisis. This report details some of the lessons learned throughout the response to the crisis: particularly, because the impact was county-wide which affected other hospitals who used the same vendors, alternate water sources should have been secured in advance; the courier service was vital to delivery of supplies and moving equipment to alternate areas for sterilization processes; and finally, communication with staff and patients was jeopardized by external media outlets. Changes to the emergency plan considering these unanticipated aspects proved useful in a later incident and should be considered by all health care facilities as water emergency policies and procedures are created and reviewed. (*Disaster Med Public Health Preparedness*. 2018;12:666-668)

**Key Words:** water crisis, disaster response, contamination, emergency operation plan

Early on August 2, 2014, the city of Toledo, in Northwest Ohio, issued a *Do Not Drink, Do Not Boil* water advisory; the initial media alert stated that residents were not allowed to even touch the water due to a toxic contaminant in public supplies. Microcystin, a harmful by-product of algal blooms in Lake Erie, had tested above safe levels causing safety concerns for ~500,000 residents.<sup>1</sup> It was later clarified that healthy adults could touch and even bathe in this water, despite the contamination.

Though Toledo's drinking water contamination was specific to cyanobacteria, recent events in Flint, Michigan, where lead was found in the drinking water and the 2014 chemical spill in the Elk River, leaving thousands in West Virginia without water, illustrate the need for hospitals to be prepared for disasters affecting the water supply.<sup>2</sup>

## NARRATIVE

ProMedica Toledo Hospital, part of ProMedica, a mission based, not-for-profit organization, is a 794-bed tertiary hospital located in urban Toledo, Ohio. ProMedica Toledo Hospital is the largest hospital within the system, which consists of 12 hospitals throughout Ohio and Michigan. ProMedica's Emergency Operations Plan (EOP) was adopted from the Federal Emergency Management Agency.<sup>3</sup>

When a crisis or disaster occurs, the administrator on call identifies the level of risk; degree of damage; period of disruption; consequence to the facility; level of danger to patients, families, and staff; and when to activate the disaster team. A water crisis of this magnitude could pose a serious and significant impact on health care and patient safety if not handled efficiently. The first step was to inform staff and patients about the water advisory and clarify any questions. Designated disaster team members disseminated information to unit leaders who communicated to staff through established safety huddles with frequent updates. Signage was posted throughout the facility on all water sources including ice machines and coffee makers. ProMedica's website and social media sites were kept up-to-date with the water advisory. Patient and staff communication was available through the intranet, media, and the incident command post. Educational materials specific to cyanotoxins were available to staff through the Ohio Department of Health, the Ohio Environmental Protection Agency, the Centers for Disease Control and Prevention, and the World Health Organization. The designated EOP Liaison Officer maintained ongoing communication with the Hospital Council of Northwest Ohio, City of Toledo, Lucas County Health Department, and Ohio National Guard to stay informed and maintain the safety of our patients and staff.

Individual hospital units contacted incident command with their drinking water needs for bottled water throughout the advisory. Trucks containing large amounts of bulk water, known as water buffalos, were available through the Lucas County Emergency Management Agency and local water distribution sites. Two water buffalos were on standby; truck rentals with lifts and pumps were necessary for difficult locations within the hospital requiring large quantities of water. Pallets of stored bottled water were brought to the hospital from off-site facilities and couriers were used throughout the hospital and ancillary sites for distribution. The cafeteria limited food choices, serving boxed lunches with disposable products to patients and visitors. All elective surgeries were canceled and equipment sterilization was performed at another system hospital unaffected by the water crisis due to geographical location. Additional shipments of alcohol-based hand sanitizer, patient bathing wipes, and anti-bacterial wipes were distributed by system couriers.

The inpatient dialysis unit's water filtration system runs on a reverse osmosis process. Reverse osmosis systems are known to be highly effective in removing bacteria, viruses, protozoa, and chemical contaminants from water.<sup>4</sup> As an additional safety measure,<sup>5,6</sup> a team including bio-medical engineers, the water purification company representative, medical director, and leadership staff performed serial testing of the water from multiple water ports within the dialysis unit. Water samples were sent to an outside laboratory for microcystin detection via ELISA, which tested negative for microcystin such that dialysis services continued throughout the crisis. The unit accommodated inpatients from clinics within the affected metro area; outpatient dialysis patients were referred to clinics outside the impacted area.

The water advisory was lifted on August 4, 2014 at 2:30 PM when the city mayor announced the "all clear," as testing showed the water was once again safe to use and drink. During the crisis, the emergency room saw 96 patients with complaints of diarrhea, nausea, and vomiting stating they had ingested the contaminated water. The hospital received over 40 phone calls with questions concerning the water advisory.

Although an "all clear" was issued to the Toledo community, the hospital began procedures to check, flush, and monitor equipment before an internal clearance of the hospital's water supply. Following the city's clearance of the water advisory, the surgical services team met to develop a recovery plan to return to normal operations. Three full cycles of flushing were completed in the surgery department before resuming standard operations.

## DISCUSSION

There were 3 important goals in this brief crisis event: focus on obtaining immediate safe drinking water for patients and staff, establish alternative cleaning processes, and forward planning in case of a prolonged crisis.

Although the water crisis occurred over a relatively short period, it provided a unique opportunity to observe the EOP in action. Modifications were made to the EOP when necessary, including essential staffing, social media, water supplies, dialysis process, and communications. Specifically, couriers became essential staff throughout the crisis, staff members throughout the hospital were required to communicate competitively with information received from social media, and serial testing of water treated via reverse osmosis in dialysis units was added for continued operations to occur.

ProMedica has an in-house courier service that was essential during the water crisis. Couriers moved bottled water from off-site storage areas, delivered water throughout the hospital, and helped move instruments for sterilization to designated sites. Because the couriers travel throughout the health system, they also helped identify departments outside of the affected campuses that might require water, including ambulatory services and outpatient laboratories. They also acquired the appropriate equipment and vehicles for transport of delicate and expensive equipment to off-site sterilization. The couriers were not originally included in the disaster plan but they were an integral part of the disaster team, and are now included in operations plans. The health system was also able to rely on other hospitals not affected by the water contamination to sterilize equipment and for any other needs that might arise throughout the crisis. We suggest that smaller facilities without employed couriers include a plan to contract with a service of this type; larger systems with courier services should include them in their EOP.

The effect social media had on the event was also more important than anticipated. Information shared by social media sites was accessed and disseminated by patients and staff more quickly than the updates from the hospital's emergency management team, causing confusion and interfering with internal policies for clearance. Patients and their family members often received real-time updates through their phones, tablets, and personal computers before information was disseminated to busy staff members who were tending to patient needs. This also occurred when the city of Toledo gave the "all clear" message that the drinking water was safe. Staff removed signs from the drinking fountains and other equipment before maintenance staff had the opportunity to flush and check equipment. Emergency management teams will need to compete with social media as patients and staff will receive real-time information before the emergency management team has time to react.

Nearly all hospitals in the Toledo area, as well as a number of non-health care facilities, utilize the same dietary services vendor that supplied bottled water. It was determined that a memorandum of understanding was needed with additional water suppliers for future events to ensure enough resources for all hospitals if any future water crisis occurred, especially if it lasted for a longer time period. Moreover, off-hours contact

information for vendors should be easily accessible to the disaster team, as this was a barrier in the initial response to the crisis.

Dialysis patients are particularly vulnerable to contaminated water and toxins. If the water crisis had lasted longer, all possibilities were being examined for inpatient and outpatient services. It would need to be determined if the hospital would provide dialysis services for the community or if additional patients would need to be transported to a community not affected by the water crisis. Specific plans and algorithms are being considered for dialysis patients to include additional portable reverse osmosis systems (with serial testing for specific contaminants), considerations of infrastructure to support increased needs during a crisis, and memorandums of understanding with water agencies for additional sources of water.

Notably, in January 2016, a sewer malfunction caused flooding within ProMedica Toledo Hospital affecting many departments including pharmacy and surgical services. Lessons learned from the 2014 water crisis were valuable in addressing the flood especially with the complexities of courier support, sterilization processes, ongoing communication, and procedures for resuming normal business operations.

### CONCLUSION

The importance of a comprehensive EOP, contacts for additional supplies, and manpower available during a crisis is crucial for safety of patients and staff. Because many facilities within an affected radius may use the same vendors for such services, backup sources should be identified, as should resources for delivery of products to difficult and high volume

use areas. All health care facilities should review their policies and procedures in order to be prepared in the event of a water emergency.

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