

Lessons Learned

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Charleston health system refines disaster plans after four-day water loss

Charleston Area Medical Center – Charleston, West Virginia

In the late-morning hours of Thursday, January 9, 2014, the people of Charleston, West Virginia, began noticing a strong licorice smell in the local water.

Within several hours, investigators would identify the source of the smell as 4-methylcyclohexane methanol (MCHM), a coal-cleaning chemical stored by the company Freedom Industries in tanks on its property adjacent to the Elk River, which flows through West Virginia's capital city. A leak in a tank had sent an estimated 10,000 gallons of the chemical into the river, just upstream from where West Virginia American Water draws the city's water supply.

Shortly after 5 p.m., the administrators of Charleston Area Medical Center (CAMC) received a call informing them that three of the system's four hospitals, accounting for 838 total beds, were in an area that was now banned from using tap water for human consumption, including drinking, cooking and bathing. Within 10 minutes, the state health department's message was also aired on the evening news and Lillian Morris, CAMC's Chief Safety Officer, was on her way to CAMC General Hospital, which would host the health system's command center for this response.

The first tasks for the state's largest health system included dispatching facilities personnel to shut off tap water, cover faucets and disconnect ice machines, processes that took between three and five hours at each facility. Meanwhile, the communications department informed staff of the situation and advised them on how to answer patients' questions. Infection control personnel made rounds to ensure staff were following appropriate procedures, like washing hands in pairs so that one person could pour bottled water while the other lathered.

Per its disaster plans, CAMC had a stored supply of bottled water that it believed would keep the three facilities operating in such a scenario for 72 hours at an estimated usage of about 5,000 gallons per day. But over the next several days, the system's planners would learn that the actual amount needed was more than double their estimates. Their connections with other regional hospitals, vendors and local authorities would prove invaluable in helping the three affected CAMC hospitals continue most of their services without interruption for the four days it would take for tap water usage to be restored.

Leveraging experience and relationships

On June 29, 2012, a derecho wind storm swept across 700 miles of the northeastern United States and left 450,000 Charleston-area residents and all four of CAMC's hospitals without power. Like this water disruption, the power loss had affected nearly every operation in the hospitals, from their cafeterias to laundry to sterilization, and proved to be useful preparation for this event. CAMC General Facility Manager Dan Brown says that in his 35-year career, water has consistently proven to be the most important utility and the many drills in which CAMC had practiced for a water disruption also paid off.

As they had trained, the command center at CAMC General began conducting frequent conference calls to coordinate the response among CAMC's four hospitals.

"I can't say enough about the people who work here," Brown says. "You train for it, but it worked so well in the command system and each hospital called in and everybody heard the same information at the same time. You can't practice that enough."

On Thursday night, non-essential staff were directed to stay home from work the next day to help lighten the water usage burden. Dialysis services were temporarily suspended. Non-emergency surgeries were cancelled for Friday, but CAMC still had to come up with a way to maintain sterile surgical trays for emergency procedures, particularly at General, which is a Level I trauma center. Extra staff from the affected hospitals were sent to the system's fourth and unaffected location, 70-bed Teays Valley Hospital. With the help of the extra staff, this facility that usually sterilized 20 trays a day processed 460 over the next two and a half days to meet the demands of its sister hospitals.

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CAMC received swift assistance from many of its vendors, who made available items like disinfectant wipes for cleaning and disposable serving trays for the kitchen since CAMC decided to use bottled water for cooking and keep its food services open during the incident.

"We have written in our contracts with the different vendors that in a time of crisis, we do request that they step up and give all the help that they can," says Joe Tucker, CAMC Director for Housekeeping and Waste Management. "We certainly used that to our advantage."

The Kanawha County emergency services coordinator for this event had previously worked at CAMC and was familiar with its needs in this situation. County representatives were involved in each command center conference call and served as the coordinating point between CAMC and outside agencies. By 7 a.m. Friday, the county had positioned a 7,000-gallon water tanker outside of CAMC General and made other tanks available to haul some of it to CAMC Memorial Hospital and CAMC Women and Children's Hospital. Despite the availability of the additional water, challenges remained in distributing it through the multi-story facilities since their pipes could not be used until they were thoroughly flushed of contaminants. While facilities staff rigged up pumps to help move the water, others purchased coolers and other smaller containers for hauling water and ice between floors.

"This emergency wasn't like a Hurricane Katrina where you couldn't get supplies in to people," Morris says. "The stores could be resupplied, that was ongoing, and then the community and state and local government agencies stepped up and provided free water, as well."

CAMC also benefited from having conducted planning and drills with the West Virginia Hospital Association's (WVHA) Disaster Preparedness Task Force. The relationships built among the 15 hospitals in this region of West Virginia created a natural support system when the water crisis occurred. For example, Highland Hospital, a mental health facility that was under the do-not-use order but had

recently installed a water-recycling wash system, was able to do thousands of pounds of laundry for other affected facilities that did not have the capability to recycle non-contaminated water.

“The cooperation between the hospitals was already there in our coalition,” says CAMC Safety Manager Nanci Keenan.

Offers of assistance with laundry and other services came from as far away as neighboring states. CAMC was able to successfully manage the high volume of calls because each department stuck to the

protocol for routing all offers through a single point in the ICS structure, Tucker says. Staff only accepted assistance that was approved and distributed through that system.

CAMC tips for water disruption planning:

- Base emergency water stores on departmental usage.
- Drill utility disruption scenarios with your coalition.
- Minimize staff numbers during water outages.
- Leverage your website, intranet and social media.
- Track financial details to facilitate reimbursement.

Within 24 hours of the tap water ban, DaVita Healthcare Partners, the company that runs the dialysis unit at CAMC General, had supplied an additional water tanker that was hooked up to the unit to be able to resume its services. There had been no patients who needed dialysis

during the 24-hour down period. By late Saturday night, the hospitals were allowed to start sterilizing equipment with steam from tap water and all suspended surgeries were resumed. To maintain endoscopy services, facilities staff had to rig up a system connecting a potable water tank directly to the sterilization equipment.

Consistent messaging

With 300,000 people in the Charleston area directly affected by the tap water ban, CAMC’s leadership anticipated a surge of patients concerned about exposure to MCHM. Material Safety Data Sheets did not provide much guidance on the chemical’s impact on humans.

“It was a material that really didn’t have much testing on it,” Morris says.

The Poison Control Center advised healthcare providers to monitor people who presented with concerns and treat them symptomatically. In the two weeks following the spill, CAMC’s hospitals saw 285 patients who presented with concerns related to the contaminated water. Only eight were admitted. While the number of patients did not stress CAMC’s medical resources as it expected, the health system did experience a high demand for information about the effects of the chemical and the hospital’s water usage.

“The public confidence in water was just not too high,” says Dale Witte, CAMC Director of Marketing and Public Affairs.

Witte’s team developed a strategy for keeping the public, employees and media informed. In an effort to maintain transparency and reduce the number of phone calls, each time the command center held a conference call among the four hospitals – at least twice a day – the communications team updated

the employee intranet, the hospitals' external websites and social media with relevant information on the status of the facilities. Public and media phone calls about operations and issues at CAMC were answered by Witte's team, while specific questions about the health impacts of the chemical were referred to the county and state health authorities to ensure prompt response and a consistent message for the entire community.

Improving plans for the future

At about 10 a.m., on Monday, January 13, CAMC's hospitals and the other healthcare facilities in the affected area were directed to begin flushing their water lines. The process was complete by 4:30 p.m., and all three were soon able to use tap water again.

A review of water usage found that the three affected CAMC hospitals had used about 7,000 gallons of water each weekend day, and 11,000 gallons on Monday. In the months after the incident, facilities staff conducted detailed surveys of water usage in each department, capturing specific needs like extra bottled drinking water for radiology patients and distilled water for laboratory procedures. Among the many changes CAMC planned to make going forward would be to increase its 72-hour bottled water supply to 33,000 gallons, stored in containers of various sizes to make for more efficient emergency distribution.

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In the past, area hospitals had not worked with the Federal Emergency Management Agency (FEMA) to recover any of their disaster-related costs. But in this event, CAMC learned that FEMA could be responsible for reimbursing some of the costs since a state of emergency had been declared. After an initial conversation with FEMA, CAMC's financial department helped establish a process for documenting certain expenditures that might be eligible, such as costs for using personnel who were not already scheduled to work and the cost of purchasing extra equipment and supplies like linens.

"That was helpful and it's something that hospitals may not be aware of," Morris says. "Making sure that you've got a way to capture those costs so that you can submit them later is important."

CAMC has since learned that to meet FEMA's requirements it will need to keep more detailed records in the future. CAMC identified about \$230,000 worth of expenses for which it applied for reimbursement. Although not all of those requests were approved, the hospitals anticipate that they will receive more than \$100,000. Some other expenses have been submitted to the health system's insurance, but those requests are pending.

Other departments have made improvements, as well. The facilities staff has redesigned some water input connections to make it easier to isolate certain areas during a disaster. For example, Brown's crew installed outside taps at the new emergency department (ED) at CAMC Memorial to make it easier to continue supplying water to the ED in an emergency that affects the hospital. Brown has also made sure that everyone on his team, not just plumbers, knows where water shut-off valves are located and how to use them. The housekeeping and waste management staff has kept and stored the

equipment it used for water distribution in case it is needed again in the future. Witte's department has modified permissions so that anyone with web access on the communications team can quickly override the intranet main page and the internet home page to change content in an emergency rather than having to call on a vendor to do it.

Morris and Keenan, who serve as regional coordinators for the WVHA's Disaster Preparedness Task Force, say that in future disasters they plan to establish a schedule of periodic conference calls that all regional hospitals will be invited to. They expect this to mitigate some of the inefficiencies experienced during the water crisis when they fielded individual calls from hospitals that had questions about CAMC's status or wanted to offer assistance.

For Morris and Keenan, who share the responsibility of updating the system's disaster plans, one of the key indicators of the success of this response was that patient satisfaction scores for the system were higher in January and February 2014 than they had ever been. They attribute this largely to the additional contact between patients and staff and the fact that despite the community struggle reported in the news, the tap water ban did not impact patient care.

"Once they realized what was going on outside, I think they had a new respect for what was going on inside," Keenan says. "It seemed, at least to me, seamless."

*For comments about this article, or to share an idea for a future **Lessons Learned** feature, please contact info@novaha.org. This article was compiled by Jessica Brown based on interviews with the quoted CAMC staff, as well as information printed in the following sources:*

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