



TRACIE
HEALTHCARE EMERGENCY PREPAREDNESS
INFORMATION GATEWAY

MANAGING THE STORM AFTER THE STORM: HEALTHCARE IN TEXAS RECOVERS FROM SEVERE WINTER WEATHER

March 2021



Related Resources

- [Challenges and Considerations for Healthcare Facilities and Residents Affected by Planned Power Outages](#)
- [Dialysis Checklists for Disaster Areas](#) (TA Response)
- [Going with No Flow: Coping with Hospital Water Supply Issues](#)
- [Utility Failures](#) Topic Collection

In February 2021, winter storm Uri unleashed severe weather across several parts of the U.S., and no state was more impacted than Texas. Communities and their hospitals withstood extended losses of power and water to over 4.3 million residents, in sub-zero temperatures, in structures built to repel rather than hold heat. ASPR TRACIE met with three subject matter experts to learn more about their experiences, challenges, and lessons learned:

- **Michael Wargo (MW)**, RN, BSN, MBA, PHRN, CMTE, Vice President & Chief, HCA Healthcare, Enterprise Readiness & Emergency Operations
- **Scott Cormier (SC)**, Vice President of Emergency Management, Environment of Care, & Safety for Medxcel (the largest provider of healthcare facilities services in the U.S.)
- **Toni Carnie (TC)**, EMT-P, CHSP, CHEP, Safety Officer/ Emergency Management Coordinator at HCA Houston Healthcare Tomball

■ ASPR TRACIE

Toni, please describe your facility and how you prepared for and responded to the winter storm.

■ TC

Tomball has 350 licensed beds, and our census typically runs between 150 to 200. Before the storm hit, we discharged as many patients as possible, and our census was about 160 throughout the event.

Fortunately, we prepared exceptionally well in terms of supplies. We increased our Periodic Automatic Replenishment (PAR) levels just before the storm, with extra emphasis on housing additional colleagues on-site throughout the storm. We were anticipating not being able to get supplies delivered Tuesday or Wednesday, so we requested those deliveries beforehand to ensure we had 96 hours of sustainability. We had no issues with these supplies.

Unlike other healthcare facilities, we were also able to maintain electrical power throughout. Harris County has a very robust emergency operations center (EOC), and a representative from CenterPoint (the local electric and natural gas power provider) was stationed at the EOC; they were able to pinpoint which grids our hospitals were on to try to prevent rolling facility power outages from affecting them.

■ MW

In the San Antonio market of HCA Healthcare, we experienced an unanticipated power outage when the local power company electively shut down power to a section of their grid that included one of our hospitals. This highlighted to us rather quickly that the TX power grid was much more complex than it is in the other U.S. regions we operate hospitals in. It is now our understanding that there are locally controlled sections of the TX grid. The unanticipated loss of power during this state-wide crisis just compounded the risk to the community. We were prepared to operate the hospital on emergency power however, during this “deep freeze” condition other utilities were at greater risk when the main commercial power supply was lost.

■ TC

We were already limiting elective surgeries due to COVID-19, but since we had advance notice that a storm was coming, we were able to cancel and reschedule outpatient procedures and appointments to minimize patient risk.

We were faced with a wide variety of obstacles, but the biggest challenge was when we completely lost water later in the week. We were unable to flush our sewage system and our fire suppression system was rendered inoperable due to burst pipes and very low water pressure in the municipal system. We activated contingency plans, including coordinating facility-wide fire watch, which took significant human resources. We used a bucket brigade for toilet flushing, got port-o-potties for staff, and used solidifiers and biobags to dispose of human waste.

Early on, once we lost water, we de-risked the facility. Our Chief Nursing Officer coordinated with HCA's Division (regional) Emergency Management Operations Center, and they did a phenomenal job relocating our in-house dialysis patients to North Cypress (another facility that is part of HCA Houston Healthcare). To try to get ahead of receiving additional dialysis patients, we updated our status in EmResource, our regional hospital status board, asking for dialysis patients and those who required emergent surgery to be diverted to other facilities that had full operational capabilities. Most facilities across the region were just as impacted as ours, making it difficult to mitigate the clinical risks in the community.

■ MW

Another component of our dialysis triage was reaching out to patients ahead of time to come in for earlier treatment prior to the storm. We provided them with copies of their dialysis records in case they had to go to other facilities to receive treatment. Even when they had city flow, water pressures were not high enough and many of our facilities were under boil water advisories, both factors that significantly limit or prohibit the ability to operate dialysis machines. We essentially created centers within our health system where we could safely carry

HCA Healthcare is comprised of more than 180 hospitals and 2,000+ sites of care in 21 states and the United Kingdom, with nearly 380,000 employees and contractors on staff.

HCA Houston Healthcare Tomball (referred to in this article as “Tomball”) is a Level III Trauma Center situated with four specialty centers on a 150-acre campus in Harris County, the most populous county in Texas.

out dialysis. Our staff created a dialysis triage algorithm, categorizing patients from “immediate” to “able to reschedule” based on symptoms and clinical factors.

■ ASPR TRACIE

Did you have any warning that the water was going to be an issue?

■ TC

We treat any large-scale winter weather event like a Category 5 hurricane. The potential for water disruption is there, and we did prepare. For example, we had sufficient PAR levels of bottled water on hand for drinking, but it wasn’t quite enough to flush our toilets. Whatever you think you’re going to need, triple that. We do not typically lose water pressure. There was one particular pump system within the City of Tomball that either lost power, froze, or burst, and this initially caused low pressure throughout the city. They thought it would take short amount of time to repair, so we did not immediately make additional requests. The outage actually lasted several days. Part of our contingency planning is to use well water, but wells froze, too.

■ MW

Part of the problem is that this area of the country is not accustomed to prolonged periods of freezing weather and external pipes are not insulated. Many pipes and fire suppression lines froze over and ruptured, draining the sprinklers and making them inoperable. Compounding the issue is that utility workers would do a repair at one site, but while the water was shut off for the repair the pipes would freeze before and after the repaired segment and burst when they reconnected them. It was like playing leapfrog. When the weather warmed up and pipes thawed, additional leaks were revealed. With no fire suppression and no water capabilities, facilities could not keep boiler systems and HVAC chillers running. If the wells didn’t have circulation pumps, they froze and ruptured. Water contingency plans were of top priority to the entire region.

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It wasn’t just our healthcare organizations that experienced these challenges; all of the facilities in the region were faced with difficulties managing power and water outages—some for several days. Not knowing when utilities would be restored, many hospitals chose not to take on more patients, let alone evacuate their facilities during an unprecedented winter storm.

- Michael Wargo

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■ ASPR TRACIE

Scott, how did your facilities manage the weather event and subsequent water- and power-related challenges?

■ SC

When the storm hit, we decided to hold our ground and not evacuate our facilities. We also prepared to take patients from other facilities. All outpatient dialysis centers were closed at one point. We knew the community would need this service, so we consolidated our own dialysis services to three of our hospitals. We had a checklist and a process to make sure we could even bring outpatients in and get them dialyzed as needed and move them back out.

Building construction in TX is designed to keep the heat out during the summer. Even though a winter storm like this is a low probability event, you have to prepare for that. With both of our agency's footprints in cold weather areas, we understand that. Four of our hospitals lost water pressure but we were able to bring water tankers in to pressurize our systems, and we used bottled water for potable water. At some sites throughout the US, we have installed water inlets to enable tankers to hook up to buildings. In our TX market, we have water holding tanks that help pressurize our system and allow us to fill the tanks so we can flush the system. We assembled a team of engineers to help us work through the data and pressurization challenges so we could achieve those goals.

■ MW

Many hospitals have "dairy connects," which are 3-inch inlets into the facility's main water supply. These have backflow valves, allowing us to direct water to the healthcare facility and not to the community. Most hospitals in our system have this. One neighboring hospital in Corpus Christi did not have the backflow feature, and the water they tried to get to the facility went into the municipal system.

More than a dozen 6,000-gallon tankers came in from FL, NC, and CO to help us with the water supply. This presented a significant logistics challenge—we had to plan safe travel routes based on when and where the storm was hitting. There are no circulating pumps or heaters on those trucks, so drivers were at risk of having the water freeze in transit, or once they arrived. Once the tankers emptied their load, more challenges arose. When the community has no working infrastructure—no pressurized hydrants or fill sites—where do they fill? For non-potable water, we partnered with the fire departments to use their fire engines to pull water from rivers and lakes. The potable water was the most difficult challenge because it must be filtered and treated. There were also some interoperability challenges between dairy connections and fire engine connectors.

Medxcel supports 161 hospitals, 2,600 sites of care, more than 22,000 beds, and 34,000 affiliate physicians across the country; 14 hospitals and 160 outpatient locations are in the Austin and Waco area.

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When you tell yourself that you are not evacuating and have to be open and available to the community, you come up with creative solutions. It's always great to have contingency plans for your contingency plans.

- Scott Cormier

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■ SC

We do a tremendous amount of construction every year, so we reached out to our large contractors in the Austin market, and they provided the tankers and the water. You might have a national contract with a vendor, but as Mike said, you might end up with a 6,000-gallon ice cube in a situation like this. Being able to use what I refer to as “muscle memory communications” (pre-established relationships with local, state, and regional partners) and reach out to non-traditional partners is key to a smooth response.

■ TC

Our Regional Catastrophic Medical Operations Center, or “CMOC” is located in the Harris County EOC. When hospitals needed water to flush lines and improve pressure for fire suppression, Harris County contacted river authorities who were able to fill up the water tankers on a rotation to help provide additional water. This was a key lesson learned—had we been able to arrange for this to happen sooner, many hospitals would not have shifted to using non-potable water for these functions and some recovery functions could have happened sooner.

■ ASPR TRACIE

Toni, how long did it take your facility to flush the non-potable water out of the pipes and return to using potable water?

■ TC

The boil water notice was cancelled on February 23rd and we finished flushing the lines on the 24th. As of February 25th, we were still replacing the water filters on ice machines and dumping the old ice. We have several temporary air supply units—my hospital looks like an octopus! We are replacing the coils that froze and ruptured on the air handling units to maintain appropriate temperatures in the building; there is a high demand across the state for this equipment. We still need to replace ceiling tiles and fire suppression plumbing and piping due to pipes repeatedly bursting. Once those are replaced and additional remediation is completed, we'll be back to normal operations. Overall, we recovered very quickly and efficiently.

■ MW

It is important to note that a water outage and boil water advisory not only affects drinking water, but it also impacts some laboratory functions and the sterilizers used to clean surgical instruments. We had to figure out who had the capability to sterilize instruments, then we had to arrange for bonded transportation of the sterilized instruments to ensure quality control.

■ ASPR TRACIE

Did residents come to the hospital for shelter?

■ TC

Some residents with functional access needs did come to the hospital, and this happens after every large-scale incident. People come to the emergency department (ED) because they have lost power and need

oxygen or have electricity-dependent needs for critical equipment such as home ventilators. We can't discharge these patients because they don't have these supplies at home. We need to address this challenge regionally because it can quickly overwhelm EDs in a large disaster. During the 2011 Tri-County Wildfires, I coordinated with the South East Texas Regional Advisory Council (SETRAC) and the City of Tomball to set up medical response tents for impacted residents with functional access needs. This may be one way to help address these challenges in the future.

■ MW

We operate over 50 acute care hospitals across TX and in the early stages of the storm, almost of them reported a few medically dependent patients showed up for care (the only market not affected was El Paso). When we reached out to our RAC, we realized they weren't aware of the overall volume of these potential patients in their communities. We worked with [HHS emPOWER Program](#) to get more detailed [de-identified data](#) totals, by types of equipment (versus the [publicly available map](#) that depicts an aggregated reported total) for all Medicare electricity-dependent individuals in TX and pushed that out to the RACs and regions so they could better plan for related patient volume. Had we been able to secure this data sooner, and had the level of detail been presented differently, it would have been more operationally helpful; this was another lesson we learned.

One thing remained constant: people needed emergency treatment. We saw quite a few patients in our EDs with carbon monoxide issues, dialysis challenges (some with cardiac arrest), and a pediatric hypothermia patient who went into cardiac arrest and survived resuscitation.

■ SC

We should also admire the resilience of healthcare workers—from doctors and nurses to housekeepers and facility managers—who have been battling COVID-19 for over a year only to be hit by this winter storm event. Many continued working from home, taking conference calls with blankets around their shoulders. We also housed some of our staff at our facilities. The key to success is not only having a great emergency management program, but also great emergency management staff.

■ ASPR TRACIE

Were there issues with the supply chain? Were facilities able to receive deliveries on time?

■ SC

Again, it goes back to muscle memory communication. Our liquid oxygen supplier is housed primarily in San Antonio, and when we needed more, we found out they were snowed in. Because of the great relationships we have cultivated, we called the Mayor of San Antonio, who then sent a plow to the liquid oxygen facility. State police then escorted the tankers carrying liquid oxygen so they could supply the hospitals in the region. Having these relationships really helped ensure supplies were delivered on time.

Another challenge many hospitals faced was related to disposing of medical waste and trash in general. Contracted medical waste disposal companies found it difficult to maintain their schedule due to the dangerous road conditions that made traveling dangerous for a period of time, and trash and medical waste began to pile up at our facilities. We used our landscaping and environmental services teams and equipment to move the overflow to a safe location until it could be picked up by our vendor.

■ ASPR TRACIE

How are staff handling the aftermath of the winter storm?

■ MW

I was in Corpus Christi TX a couple of days ago, in Houston yesterday, and today I'm in Dallas. Looking around, everything looks "normal," except for some trees that were damaged by the ice. But when you talk to folks in hotels, and you talk to first responders, they were away from their homes for days at a time. The psychological impact of this weather event is also significant.

The untold stories are really about our associates and colleagues, and I can't give them enough credit. We've heard about the infrastructure damage and utility outages related to healthcare facilities; these people had the same damage done to their homes.

Our company has a non-profit arm, the HCA Hope Fund, that allows staff to apply for grants to meet financial needs. We issued about \$380,000 to colleagues to help with home repairs after this storm. We all have relationships with construction companies across the country. Early in the response, we anticipated high numbers of pipe ruptures, so we worked to preposition skilled plumbers and other staff and resources to allow facility repair to begin as soon as possible. Many of these companies also have residential components, so we put them on retainer and directed them to provide repair services to employees that needed them. Employees were responsible for the cost of the repair through insurance and were also able to apply for grants as needed.

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Employees appreciate the amount of care that this organization has for them by in turn preparing their homes, coming to work, and providing amazing care.

- Toni Carnie

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There was also a run on gasoline; the pumps at the mini markets where many of our staff typically filled up were closed. We brought in a few unleaded fuel trucks, staged them in discreet locations throughout the state, and provided security so that employees could gas up and travel to and from work. This is something we have also done after hurricanes. We also increased our food distribution to our hospitals to help a large number of staff who didn't have enough food at home for themselves and their loved ones due to the loss of power and local grocery store closures.

■ ASPR TRACIE

In what percentage of hospitals in TX and across the U.S. would you estimate generators cover the entire HVAC system?

■ MW

We've learned that traditionally HVAC systems—specifically the chillers—were not on emergency generators at most U.S. healthcare facilities. With the number of recent hurricanes and other natural disasters, we are seeing a trend in modern healthcare construction in making buildings able to transition to generator power. This is a huge investment but it's increasing retroactively and is a must in any new construction.

■ SC

Across the industry, it is probably close to 20%. In the areas where we do not have a generator running the HVAC, we have a quick connect that

allows us to bring one in. Trying to generate heat is a bit easier than generating cool air. In this event, we did not need any additional generators.

In case of public power failure, hospitals are required to have an emergency power supply system (EPSS) as described in NFPA standard 110. The EPSS must be able to provide power for critical life support systems and infrastructure within 10 seconds. The red power outlets in healthcare facilities are connected to the EPSS. While HVAC systems are not required to be part of the EPSS, some generators do power them and other critical infrastructure (e.g., select elevator banks, IT servers, core lighting systems, and some building automation). This may vary by the year the facility was built and local and state codes that regulate emergency power requirements for healthcare facilities.

■ MW

Now that we know TX is the only state that runs its own completely isolated power grid, we better understand why and how this unique event had the impact it had. ERCOT warned of rolling power outages just hours before the storm hit, which most people took to mean several hours without power at a time, not days. Some communities experienced two or more days in sub-zero temperatures without power; this had life-threatening impacts on the communities. The infrastructure failures were a combination of poor engineering, lack of preparedness, and a series of elective decisions. For the grid, it is easier to shut down the AC for a short time through rolling power outages, and not stress the system. The opposite has a more significant impact on life safety when the power is out for an extended period of time. Cross-sector leadership have reported to us that plumbing valves, pipes, and other equipment needed to fix community infrastructure is on a 7-9 month delay because of such high demand across such a large region.

There is a significant public health component to these outages, too. People with chronic health conditions cannot access care due to the storm's impact on transportation, dialysis center closures, not being able to run traditional community warming shelters because of COVID-19, and a short-term lack of food and nutrition in grocery stores. You can't flush toilets in your house. You can't shower, and you don't have clean drinking water. Imagine all the food that went bad in homes and in stores because of lack of power. Imagine the grocery stores that ran out of food because of the delay in transportation. These were major public health challenges in the short term; in the longer term, we will probably see some additional impacts on our staff and the community at large.

2020 and the start of 2021 have proved challenging to the healthcare and public health systems and infrastructure and the staff who keep them running. We encourage our colleagues in this sector to review your plans, establish contacts in advance of a crisis, and continue to share your lessons learned so that we can transition our experiences into lessons applied.

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