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When Hospitals Become Islands:

One Facility's Evacuation Story

Hurricane/Tropical Storm Harvey struck Houston and surrounding areas more than once, dumping close to 60 inches of rain over a wide swath of the area in just a few days. Hospitals became islands, roads were impassable, and military and public safety helicopters were brought in to evacuate people from their rooftops. Todd Senters (MHA, FACHE, Service Line Administrator and Facility Administrator at Baptist Beaumont Hospital's [BBH] Orange Campus) shares how staff in his facility worked tirelessly to care for existing patients (and those who were dropped off by helicopter) just prior to having to evacuate due to a breach in the City of Beaumont's water pumps.

John Hick (JH)

Please describe your background, your current role, and how that played out during the evacuation.

Todd Senters (TS)

I was actually born at BBH and raised in Beaumont. My schooling and work took me to different areas of the state, but I've been with BBH for the past eight years, serving as the Service Line Administrator. During Hurricane Harvey, I was the facility's administrator on call. We are a Level 4 trauma center (our facility's focus is more cardiovascular and neurology in nature); there is a Level 2 trauma center a few miles away from us.

JH

We know that there was tremendous investment in infrastructure after Tropical Storm Allison. Were there similarities between the storms?

TS

The storms took different paths but were similar in the fact that the rain came from an unexpected, unforeseen source and caught infrastructure off guard. The torrential amounts of rain were problematic in terms of getting supplies and personnel in and out in both storms. There was investment after Allison, but in Houston (90 miles away), there was more of a focus on installing storm doors in tunnels to block water flow. What had not been thought of before was that most of the switches and generators at Texas Medical Center were ground level. The newer buildings had them installed

on roofs, and those buildings maintained power. This type of rain-making event was a brand new experience for Beaumont.

JH

Please take us through the event from your perspective.

TS

We have more patients that come from our secondary service area than our primary service area. We support eight separate counties that surround Jefferson County (where Beaumont is located). Our immediate area weathered the storm pretty well. We had some water intrusion that had to be mitigated, but we were in better shape than other hospitals in our market. The surrounding counties, however, were under water and there wasn't a single major roadway that was not completely submerged after this event. Our airport reported over 58 inches of rainfall. We were literally an island and couldn't receive supplies, even through the SouthEast Texas Regional Advisory Council's (SETRAC) Catastrophic Medical Operations Center (CMOC). Once it became necessary to evacuate, we flew out more than 200 patients via helicopter. We actually had nine medical helicopters on the ground at one time evacuating patients.

> *Dialysis patients presented us with a new challenge. Dialysis is essentially an outpatient service, and all of these facilities were closed. Many dialysis patients came to our ER because they had not been dialyzed for several days and they were very ill. We decided to fly them out after we lost water, and several of them deteriorated very rapidly. We ended up working with CMOC to pull those most critical patients off of the FEMA manifest; local medical centers were willing to accept five backto-back renal patients who were in crisis via helicopters.*

JH

How were air operations managed?

TS

We have some ER nurses that were also flight nurses and they knew how to prepare and clear landing zones. We had security do a sweep and clear our parking lots closest to the ER. We had people move their vehicles as necessary and we were able to cone off separate landing zones and communicate with local helicopters using traditional channels. That said, we were not able to communicate with the military Black Hawks involved in high water rescue—they are on a separate channel that we could not

access. Sometimes they delivered patients and we weren't even sure what to expect, but we cleared the landing zones for them, too. Some evacuees they delivered had been rescued from their rooftops and had chronic medical conditions. We really didn't know until we triaged them. Sometimes we transported them to the FEMA shelters, and in some cases those shelters sent them back to the hospital for treatment. Some patients ended up sheltering in our facility for a bit.

JH

How did you maintain operations early on?

TS

Our communication (up to when we lost potable water) with SETRAC had been kept to a minimum because they were overwhelmed and we were able to manage on our own. Hurricane Harvey came on land as a Category 4 windstorm and did related damage, but as the high pressure pushed the storm to the Gulf and it hovered over the Gulf Coast and went back over the water, it began dumping bands of torrential amounts of rain onto Houston and the surrounding areas. It doesn't matter how prepared you are, or how these storms are classified—you can't be prepared for a storm that was never projected to behave that way. All the reservoirs and tributaries were already full, so the water had nowhere to go—it just sat there. It was a transportation nightmare.

We have a ride out team on campus made up of essential staff, including our management and senior teams and our Chief Operations Officer and CEO, to whom I report. We had strong representation from our medical staff on campus and had ride out teams in remote locations, too. The Level 2 trauma center up the road had become cut off from ambulance traffic and the roads to that hospital were not passable, so we had trauma traffic on top of our usual patient load (plus the Black Hawks delivering patients). At the time of the storm, our inpatient census was 287. We had been taking on more patients over the days leading up to the storm because of the closure of home health agencies and outpatient facilities. We transferred all 287 patients—including 12 neonatal ICU patients taken by jet to an academic hospital—while keeping the ED open. Our estimated patient evacuation totals were:

- 40 by ambulance bus (ambus)
- 210-220 by air
- 40-60 by ground

Over the first 24 hours, we had no access to anything or anyone by ground. Even the 18 wheeler carrying our pharmaceutical supplies stalled out in high water.

JH

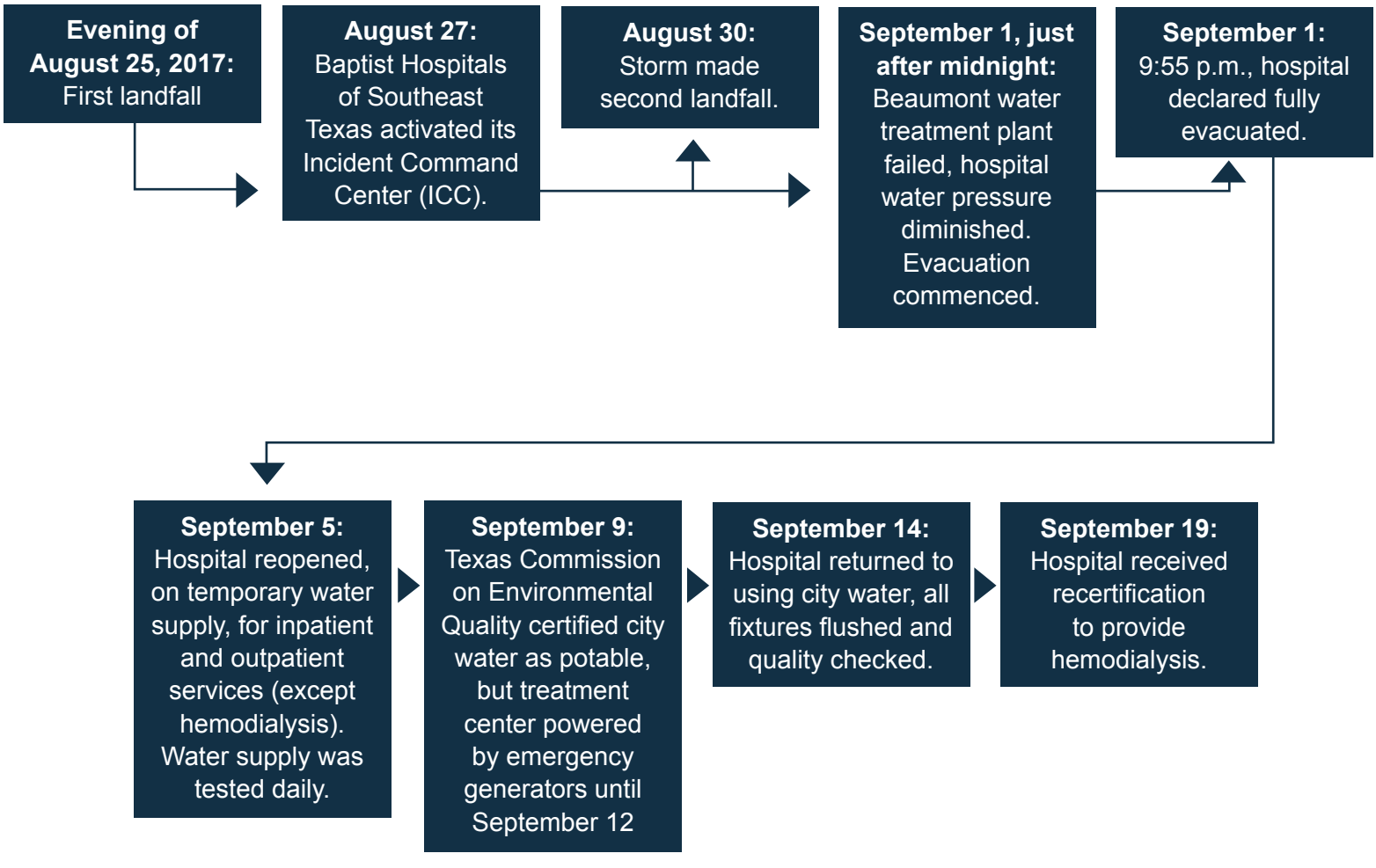
Walk us through your decision to evacuate.

TS

Until the storm made second landfall, we had been able to maintain operations. But once the city lost its backup feeder well, primary pump, and

secondary water pump in a few hours, the situation changed quickly. We were notified about the city's loss of water at midnight going into that Friday September 1st; within 30 minutes the hospital lost water pressure. We went into emergency response mode, and notified CMOC and our county emergency coordinators that we had lost potable water. We requested emergency water trucks, but CMOC was unable to secure a vehicle that could get through that much water. We knew we had deteriorating patients—we were sitting on top of one of the highest levels of acuity that this facility had ever seen. We had physicians round on the units and triage and categorize patients by severity. We notified CMOC of our pending evacuation, sent bottled water to the nurses to help them prep patients, but we were unable to dialyze patients or sterilize instruments, so we were unable to function as a higher-level care facility.

We were all gathered in one room, including the COO, CNO, and me, and we walked through the pros and cons of the situation. Had we known when we'd have operational water, we would have been able to hold off on the decision, but when you don't know, you can't put lives in peril and you have to make the decision to evacuate. It took us nearly 18 hours to evacuate the facility (this was not unexpected). Our initial hope was that we would begin the process and at some point, we'd receive potable water or the city could come back on line, but that never happened. We were without city water for 10 days. We were not operational for three days (but the ED was still open).



JH

Once the decision was made, what was the division of labor?

TS

During our initial communication with CMOC, we determined that we would use our resources to arrange for receiving hospitals for the majority of our patients and we would keep CMOC posted while they directed the air medical services. That's how things went for the first couple of hours. We notified hospitals with which we had standing affiliations/relationships. Most of them were able to provide beds, but we did run into some difficulty with communication channels. There were some storm-related challenges, and CMOC was not receiving our communication. We then had two individuals come in from leadership roles with State Emergency Medical Task Force Group 6. They helped us communicate with other facilities to help us evacuate our patients quicker. We stopped trying to identify receiving hospitals and CMOC took over that responsibility. Then the helicopters began to arrive, and we matched the patient with the flight crew's orders and paperwork before we released the patients.

What's interesting is that none of the hospitals were affiliated with Baptist Beaumont. Our parent company is Community Hospital Corporation (based in Plano), and we are one of their largest hospitals. We didn't have the right sister facilities close by so we made arrangements with other nearby facilities in a safe location (but not in our network). We learned that we should have turned that function over to CMOC earlier because they could have helped us place more patients at one time.

We would send over patient demographics and nurses would call the receiving facilities and provide reports. Someone there would be charged with taking reports (and arranging treatment and equipment ahead of time), the handoff, and resulting treatment.

> *"You can never forget about the human element in a disaster like this, and that includes not just the individuals you're caring for but your staff as well. They need intermittent breaks to check in with family and get reassurance that everything's ok."*

JH

Did triage move smoothly?

TS

Overall, it did, but we always have to take into account the human element—a patient who is stable at 9:00 may not be stable at 11:00. We repeatedly had to make changes to our initial triage effort—as time went on, patients' statuses changed. A patient we thought was more critical

might have become more stable later in the day. You find yourself having to change the order in which patients need to depart the facility, and you have to constantly reevaluate and adapt on the fly.

JH

How was this coordinated with the hospital command center?

TS

Our command center was communicating with CMOC who developed a list of flight arrangements per our patient manifest. Hard stop was at the ED—every flight crew that arrived checked in with the director of the ED and nurses from the floor brought the patients to the ED. The floor nurse handed the patient over to the flight crew and they performed a cross check to ensure the patient matched the manifest and process. This is what the ED is used to doing and does best, which is why we left this function with the director of the ED.

JH

Did you do 24/7 evacuations via helicopter or did you stop once it was dark?

TS

We did transport more critical patients after dark, but the majority took place during daytime hours. Some of the water had receded in the evening, so ambuses were able to make it through and we switched to ground transportation when we could.

JH

How did you address staff needs?

TS

Many of our staff don't live in Beaumont and many had homes that were under water and their families were evacuating. Cell service was not always reliable, so we did a good job rotating through staff pretty well. We had nursing directors whose units were closed who went to the ER to work and relieve staff. This allowed staff to work three or four hour blocks and then take a break to decompress. We created sleep rooms for staff where they could shower and change into fresh scrubs. Our dietary staff ensured staff had enough food, too. After the event, we provided staff with assistance filing claims for home damage and related issues.

JH

How did you address behavioral health needs of patients and staff?

TS

We have an acute psychiatric hospital on our campus (they lost resources at the same time we did). Social workers and counselors stayed behind to help walk our staff through their personal challenges, too. We have an incredible pastoral care team here who went above and beyond supporting staff. I saw more support among staff during this event than I ever have

during an emergency. If someone was emotionally struggling to do their jobs, one of their coworkers would encourage them to take a break to regain their composure and take over.

Our psychiatric hospital includes a detox unit and a child behavioral health unit. While we were able to discharge some patients before the storm, we had about 35 patients there afterwards. We also worked to ensure that those patients were transported to appropriate psychiatric treatment facilities. Most of them were evacuated later in the day by ground. They were evacuated by ambus to hopefully alleviate any potential concerns associated with air transport (such as claustrophobia, pressure changes, loud rotor and engine noises, and other potential triggers). Our clinical care team worked very hard to personalize the evacuation process for each patient to match them with other patients to ensure they could get along in the same vehicle. We sent staff trained in de-escalation with this group of patients to facilitate the evacuation.

JH

Had you participated in evacuation exercises prior to this incident? What lessons did you learn from this evacuation?

TS

Because of the industries close to where we are (a large port and petrochemical plants), we prepare more for external disasters, like maritime or plant explosions, and patients coming in. We're used to being the safety net, and taking in patients, but not having to send them out.

One of the most interesting aspects of this event was realizing that the coordination between the military and civilian sides is not where it needs to be. We need to be able to communicate with them so that both groups can adjust expectations—both from the receiving and transporting ends. Also when arranging for evacuation, you're dealing with state, region, and federal government. We see and exercise with these local and regional individuals every day. But communication with state and federal resources was also strained.

We also need better local capabilities to keep our facility open, for example, a quick turnaround emergency certification of our water source that could keep our facility running. Sometimes you have to reinvent policy on the fly and I'm not sure we were as prepared to do that as we could have been. We could have kept our facility running—which was our end goal—had we been able to get clean water and connect pumps to our main. It took a long time to be able to source those types of components. But once you declare an evacuation, your focus shifts to making sure it happens the right way.

Another lesson we learned was that having just one command center doesn't always work well when you're trying to fix the ship AND take care of people at the same time. Some are dealing with vulnerabilities in the roof system and others are categorizing the most critical patients and arranging for air transport. You've got four or five people conversing about each task and if they're both in the same room, it just doesn't work. There is a need to create a sub-command center to manage patient care and report numbers back to the overall operational command center.

JH

Were there any issues with reopening the facility?

TS

No, that process was seamless. We had been running reservoir water tanks through our main for several days, processing laundry and getting different parts of the facility back on line. Opening the facility was the easy part. We'd already had patients in the ER, and we had checked the instrumentation. One of the greater challenges was having the city environmental consultant oversee our water quality process. Every single fixture in the facility had to be tested—sinks, commodes, showers—and this was time consuming and resource intensive. You can't ever rest in the safety and assurance that things will go as expected, even if you've been through similar events. We write our plans by category and event, and everything on paper is mathematical and analytical. This storm threw that entire book about the window. By the time it hit us, it was a tropical storm, but it did more damage than other more severe (on paper) storms ever did.

Editor's Note:

Water is one of the basic necessities of a hospital – and one of the most vulnerable. In this case, the evacuation had to be conducted mainly by air – an unusual situation and one that similar facilities should consider in planning. Conducting large-scale air operations such as these create unique issues and hazards that should be planned for in advance, and coordinating this degree of helicopter support can be difficult without pre-planning. The role of the CMOC is worth emphasizing, as a well-functioning coalition can address patient destination as well as transport coordination needs, allowing the affected facility to concentrate on managing their environment of care and preparing for evacuation. For any hospital in an area vulnerable to flooding, these experiences offer a wealth of concrete planning information.