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The ten-year anniversary of the disaster that befell New Orleans and its hospitals in the aftermath of Hurricane Katrina is approaching. In August 2005, as the Dean of Tulane University’s School of Medicine, I was monitoring the progress of Hurricane Katrina anxiously as it crossed Florida and entered the Gulf. On Saturday morning, August 27, 2005, as it seemed certain that New Orleans would take a direct hit from a damaging storm, the medical center and school leadership went into the hospital for a joint planning session. The city, state, and federal disaster plans all called for hospitalized patients to shelter in place, so it was important for me to ensure that all the inpatient units in our teaching hospitals had adequate coverage by clinical faculty and residents. These facilities included the New Orleans VA Medical Center, Tulane University Hospital and Clinic (TUHC), and the Medical Center of Louisiana New Orleans (Charity Hospital), a state facility managed by Louisiana State University (LSU) but jointly covered by Tulane and LSU faculty and residents. Medical teams were instructed to report on Sunday with the expectation that they would have to cover the services for two to three days until fresh teams arrived. In contrast to past storms, faculty, residents, and students and staff who were not on duty were told to evacuate the city and not use the medical center as a shelter. All of the ward services Tulane had responsibility for were fully staffed when the hurricane struck.

After the mayor called for the city’s first ever mandatory evacuation, I contacted Senior Vice President Paul Whelton...
on Sunday morning to discuss the situation. He told me that the university president was ordering academic administrators out of the city so that they could be in a position to reestablish the schools in the aftermath of the storm. My primary role was to reestablish the School of Medicine’s educational programs as soon as possible after the hurricane had passed. Although everyone hoped Katrina would wobble off its current course, it appeared Sunday morning that this was highly unlikely. The National Hurricane Center predicted that the city would take a direct hit from a catastrophic Category 5 storm.

On Sunday, TUHC security personnel were issued semi-automatic rifles and shotguns in the expectation that things would be chaotic once the storm had passed. That same day the hospital continued to prepare for the storm, nailing up plywood over glass windows and moving some essential functions such as pharmacy and food service from the ground floor to a higher level in anticipation of the flooding. Two large generators were trucked in because the emergency generators were on the ground floor and vulnerable to flooding. Arrangements were made for family members of those on duty to be housed in two nearby hotels. That evening, an official from the Office of Emergency Management (OEM) arrived and informed TUHC officials they would be sending in a Federal Emergency Management Agency (FEMA) Disaster
Surviving Hurricane Katrina

The Medical Assistance Team (DMAT) to Tulane University Hospital. Although the promised DMAT team never arrived, the fifty-eight patients from the Superdome that the DMAT team was supposed to take responsibility for did. These fifty-eight patients and their families became Tulane’s responsibility without the extra food, water, medical supplies, and equipment that should have accompanied the Federal DMAT. As just one example of the difficulties this transfer of patients caused, the need for bottled oxygen doubled when the power failed and piped oxygen was lost, which caused a near critical shortage of oxygen. Only one incomplete DMAT team ever made it into the city ahead of the storm and they had to take care of patients in the Superdome without their medical supplies, which arrived four to five days later because FEMA had decided to transport them by road from Oregon.

The strong winds and heavy rain Sunday night shook the medical center buildings and rattled windows but caused minimal damage. At about 4:00 AM on Monday morning, city power failed and the hospital’s emergency generators kicked in. On Monday morning, people were anxious to leave the hospital to assess the damage to their homes, but they would have to wait until the relief teams arrived. The rains stopped
early Monday afternoon and everything appeared to have returned to normal other than the lack of city power. Late in the afternoon, floodwaters started to appear in the streets surrounding the medical center and continued to rise. No one could understand where the water was coming from because the rains had stopped several hours earlier. We now know that the flood control system had failed at multiple sites as a result of design flaws, poor construction, and failure to properly maintain the floodwalls. Water started to enter the medical center buildings around 10:00 PM Monday night.

It became increasingly apparent to the hospital leadership that they were on their own and would have to organize the evacuation of patients themselves. We now know that the government had determined that hospitals had low priority for evacuation. The heliport Tulane usually used was at the Superdome, and besides being inaccessible because of the flooded streets, was being used by the Coast Guard and Louisiana National Guard to drop off people rescued from the rooftops of their homes. The hospital CEO decided to construct a makeshift helicopter landing site on the top floor of one of the visitor garages, taking down the non-functional lights that normally illuminated the top deck because they constituted a hazard for helicopters flying in for the evacuation. The CEO also communicated with Acadian, a private helicopter-ambulance service that was able to provide three helicopters that first day. In addition, HCA (Hospital Corporation of America) corporate mobilized other private helicopter ambulance services and several HCA hospitals were contacted to accept the transfer of the patients to be evacuated from TUHC.

By daylight Tuesday, the floodwaters in the streets had reached five to six feet in places and the ground floors and basements of the hospitals and school buildings were under water. At 5:00 AM Tuesday morning, the emergency generators had to be shut down before the flood waters reached the electrical switches; the back-up generators on the tractor trailers were activated. Power to the air conditioners and elevators was lost.

Twenty-one Tulane patients were considered critically ill, giving them priority in the evacuation. The first patient evacuated from TUHC that morning was a neonate in an incubator. Twenty-eight other infants and children required early evacuation, but the air-ambulances could not accommodate the children's parents. Marker pens were used to write parents' names, telephone numbers of relatives, and the names of the hospital the children were being transferred to on the children's torsos. By mid-afternoon on Tuesday all the neonates had been evacuated successfully.

Two patients who had undergone gastric bypass surgery the week before weighed well over 400 and 500 pounds. Two other patients awaiting cardiac transplant required 400 pounds of machinery to support their diseased hearts. These all had to be carried down six to eight flights of stairs in darkened stairwells with their medical equipment to be transported across an elevated walk-way to the garage, requiring a Herculean effort by their caregivers. The two patients awaiting heart transplants had to be temporarily disconnected from their left ventricular assist devices, which were carried down separately. The patients were transported down to the second floor with a nurse working a hand pump to support their heart function during the transfer. Limited height clearance in the visitor garage meant that ambulances could not be used to transport the patients to the top deck. It became necessary to load patients on the flat-beds of employees' trucks so they could be driven up to the top floor of the garage. Special helicopters had to be found to accommodate all the equipment necessary to keep the heart transplant patients alive. The evacuation continued that night despite the landing site being illuminated only by car headlights and flashlights.

Occasional gunshots were heard from somewhere in the darkened neighborhood. Anxiety increased when the hospital lost all power around 8:00 PM Tuesday evening, as the trailer-mounted generators ran out of fuel. Attempts to truck in fuel to Tulane had failed because they could not get an escort to help them maneuver through the crowds of people that were accumulating on the elevated highways leading to the medical center. Conditions in the hospital rapidly became intolerable, with temperatures approaching 110 degrees, accompanied by near-100 percent humidity. The city's sewer system backed up and overflowed, spreading sewage smells throughout the hospital. Plastic bags filled with kitty litter were used instead of regular toilets. People could not wash or bathe, raising the fear and likelihood of an infectious outbreak.

A number of visible explosions and fires in the city added to the war-like environment, while the lack of any accurate information increased everyone's fears. By midnight on Tuesday, sixty-three patients had been evacuated; the helicopter evacuation of all of Tulane's most at-risk patients was completed by late Wednesday. This timing was fortuitous because the federal government closed the airspace over the city to private helicopters that day. Claimed to be necessary for safety reasons, this order had tragic and lethal consequences for some patients at other hospitals in the city waiting for air ambulances, unaware of the federal government's order. The Homeland Security Operations Center compounded this error by sending out an order that same day that their Urban Search and Rescue Teams were to cease all rescue efforts in the city because of safety concerns that we now know were unfounded.

Although all of Tulane's patients were successfully evacuated without loss, there were still 340 patients at Charity Hospital awaiting rescue. They were told that FEMA would evacuate them on Tuesday; that did not happen. Charity Hospital was in even worse shape than Tulane because it had lost its emergency generators early on Monday night after floodwaters reached the electrical circuits. With no emergency power, patients had to be ventilated by hand for days by
staff working in half hour shifts to stave off exhaustion. When it became apparent that no one was coming to evacuate the patients in Charity, the head of their ICU crossed the street to TUHC in a Louisiana Wildlife and Fishery swamp boat to ask for Tulane’s help in evacuating their critically ill patients. Tulane was told to expect twenty-five patients, but fifty critically ill patients were boated over from Charity to Tulane on Thursday for evacuation, which was now dependent on a limited number of overworked Coast Guard and National Guard helicopter pilots.

One of these patients, H.R., was a twenty-three-year-old man who had been admitted to Charity with Goodpasture Syndrome. H.R. was in the ICU on the sixth floor of Charity when Katrina struck, and had been kept alive by caregivers manually ventilating him after his mechanical ventilator lost emergency power. H.R. was strapped to a spine board, similar to that used on the football field when a spinal injury is suspected, and carried down five flights of stairs with his mother lighting the way with a flashlight. A Tulane employee managed to paddle out in a canoe and by chance found a National Guardsman driving a rare high water truck. The trooper was reluctant to help without first contacting his unit commander. Once it was clear he could not make contact with any of his superior officers, he agreed to help. H.R. was put into the truck for the ride from Charity’s loading ramp over to Tulane’s garage.

As they neared Tulane, H.R.’s condition suddenly worsened. One of his lungs collapsed and developed a life-threatening tension pneumothorax. Air entering the pleural cavity lining his lung through a small tear in the lung itself acted as a one way valve, and the increasing pressure began to impair the function of his other damaged lung and heart. H.R. was dying. A resident, working under the supervision of LSU faculty member Dr. Ben de Boisblanc, stuck a needle in H.R.’s chest. The hissing sound as air escaped through the needle confirmed the diagnosis of a tension pneumothorax and H.R. now needed a chest tube to remove the air so his lung could re-expand fully or he would die. While four people held H.R. down, Dr. Ben and the resident opened up the skin between two of his ribs without any anesthetic, inserted the chest tube to release the air from his chest cavity, and stabilized his condition. H.R. was evacuated emergently to Earl K. Long Medical Center, the state hospital in Baton Rouge. He survived. Dr. Ben was the guest of honor at his wedding six months later.

The key educational administrators in the dean’s office evacuated ahead of the storm to different cities. Once I was sure buses would take students without transportation out of the city on the Sunday morning, I followed my family to Shreveport, Louisiana. Vice Dean Kevin Krane was in Monroe, Louisiana, Associate Dean for Student Affairs Marc Kahn was in Houston, Texas, and Dr. Ron Amadee, the associate dean for Graduate Medical Education, was in Dallas, Texas. We were fortunate to be able to establish telephone contact relatively quickly, and we set about discussing how we might continue the education of approximately 1,350 students and residents in the face of such a catastrophe. My immediate report, Senior Vice President Paul Whelton, had evacuated to Jackson, Mississippi. Reestablishing immediate contact with the senior vice president was not possible because Hurricane Katrina passed directly over Jackson, knocking out all telephone communications in that city. Contact with President Scott Cowen was also not possible because he had stayed in New Orleans and more than a week would elapse before a helicopter was able to take him out of the city to a place where he could reestablish reliable communications. As such, we were forced to make the best decisions we could without being able to discuss them with the president or his staff.

Reopening the school of medicine in New Orleans immediately after the storm was clearly not possible. Although we might have been able to distribute students and residents to other medical schools around the nation, there was no guarantee that we would find positions for everyone. It was my opinion that our only option was to move the school to a city outside Louisiana. LSU’s School of Medicine in New Orleans moved to the main LSU Undergraduate campus in Baton Rouge and the other LSU medical school was based in Shreveport. There was no city in Louisiana large enough to absorb a school the size of Tulane. Fortunately for us, Baylor College of Medicine and the University of Texas-Houston Health Sciences Center fully understood the disaster that had befallen us because they had had similar experiences when Tropical Storm Allison flooded Houston. A conversation between Dr. Marc Kahn and Dr. Nancy Searle at Baylor indicated that it might be feasible to transfer Tulane’s School of Medicine to Houston. This precipitated a conversation between me and Baylor’s President Peter Traber, who by good fortune is a fellow gastroenterologist and was well known to me. This led to an agreement-in-principle that Tulane would move its medical education enterprise to Houston, with the understanding on both sides that there were many details to be ironed out.

This was the first time anyone had attempted to move an entire school of medicine to another state, particularly under such conditions. The internet was deployed to alert students and faculty that the school might be moving to Houston. Dr. Ron Amadee alerted all the residency program directors to ensure that they and their residents knew the school was
working on plans to continue their residency training without interruption. Departmental chairs spread all over the country were located and asked to find and communicate with their faculty, many of whom had relocated with their families to distant parts of the country and were difficult to track down. Local New Orleans telephone area codes were not working; all of Tulane's computers and e-mail systems were down.

Based on the Baylor agreement-in-principle, I moved my wife, one of my college-aged sons, two cats, and two carloads of our most precious possessions and papers from the comfort of our relative's home in Shreveport into a single small motel room in Houston. We counted ourselves fortunate to find a room, given the large number of people from New Orleans who had already evacuated to Houston.

The preliminary conversations with Baylor were followed by a pivotal meeting on September 7, 2005, when Dr. Peter Traber invited Tulane's School of Medicine leaders, Dean Stanley Schultz of UT-Houston, Dean Michael Collenda of Texas A&M, and Dean Valerie Parisi of UTMB-Galveston and their senior leadership teams to Baylor. These four Texas institutions agreed there and then to form the South Texas Alliance of Academic Health Centers (STAAHC) that would constitute a new home for Tulane University's SOM until it could be reestablished back in New Orleans. Tulane's medical students and Tulane's administrative offices would be housed at Baylor and all first- and second-year classes would be held in Baylor facilities. Clinical rotations would occur at all four south Texas schools and the Houston VAMC named for Tulane's alumnus, Dr. Michael E. DeBakey. However, it was essential that Tulane maintain its own curriculum and that Tulane students be evaluated by Tulane faculty (who had to make their own way to Houston at my request) if students were scheduled for termination. I was deeply touched appropriately large number of my tenured and untenured faculty

The infrastructure for maintaining the functions of Tulane's medical school was nonexistent after the storm. Information technology, network communication servers, and e-mail were all down, and student, resident, and faculty record systems could not be accessed. Faculty, staff, students, and resident rosters no longer existed, nor was there any ability to confirm credentials or grades until Tulane University's computer systems were operational. None of these computer systems had been backed-up outside the city and all the school's record systems were inaccessible for many months. Despite these massive obstacles, the educational programs were able to resume with the help of Baylor, the STAAHC, the Association of Academic Medical Colleges (AAMC), and the accrediting bodies—proving that what appears impossible is possible when people pull together.

I learned much about leadership from these experiences. First, always work with talented, hard-working individuals who have a strong sense of commitment. Second, teams of such people are almost always much more productive and effective than individuals. Third, the impossible becomes possible with the right team. Last, but not least, make friends whenever you can, because you never know when you might need them. Indeed, the decision to reestablish the school in Houston, Texas was not just a fortunate accident. Tulane had many friends in that great city, not least of whom was Dr. Michael E. DeBakey, Tulane's most famous alumnus. I had previously visited Dr. DeBakey in Houston, and based on these visits knew the Texas Medical Center was large enough to accommodate the school if there was a will to do so.

Saturday, September 24, 2005, was picked as the date for orientation and we were prepared to start classes on the following Monday. But Hurricane Rita, which was projected to hit Houston that weekend, forced another evacuation, resulting in the postponement of the resumption of classes by one week. When orientation took place on the following Saturday, the Tulane School of Medicine and Baylor leaderships joined in welcoming the Tulane students. Dr. Michael E. DeBakey attended and gave a heartfelt address about the importance of Tulane and New Orleans that boosted the morale of all the students. Dr. DeBakey made a personal pledge of $100,000 to help replace computers, textbooks, and other materials lost in the storm.

As physician teachers, we are privileged in that the good principles and work habits we impart to our students live on in them and in the future generations they will in turn guide and mentor. In December 2005, I felt compelled to resign my position after a disagreement over what I perceived as an inappropriately large number of my tenured and untenured faculty who were scheduled for termination. I was deeply touched when the graduating students invited me back in May 2006 for their graduation in New Orleans, and awarded me the
Leonard Tow Humanism in Medicine Award. Despite losing my position as dean in the aftermath of the storm, there has been no better fulfillment of my calling as a medical educator than the time I worked alongside my students and my Tulane and Texas colleagues to transfer Tulane’s School of Medicine to Houston so that the school would continue its mission uninterrupted. The quality of student and resident education was maintained at a very high standard; most Tulane and Baylor students felt their education was actually enhanced by their interactions with each other. Another unexpected benefit of my time in Houston was the distinct honor of spending more time with one of Tulane’s and medicine’s great legends. I have never met a more generous, kind, and accomplished person than Dr. Michael E. DeBakey, and I count myself privileged to have known him. Had it not been that Hurricane Katrina blew the school and my family to Houston, I would not have come to realize the depth of human kindness that lay within the heart of this truly great human being and medical pioneer.

References

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Tulane University School of Medicine students and, from left, Dr. Ian L. Taylor, Tulane’s Associate Senior Vice President for the Health Sciences and Dean, School of Medicine and Dr. N. Kevin Krane, Tulane’s Vice Dean for Academic Affairs, give Dr. Michael E. DeBakey a standing ovation during Tulane’s orientation at Baylor College of Medicine. Courtesy Baylor College of Medicine.