

Sometimes It Takes a Hurricane

How Premium Compact Ultrasound Became a Trauma Level I Facility's Imaging Modality of Choice

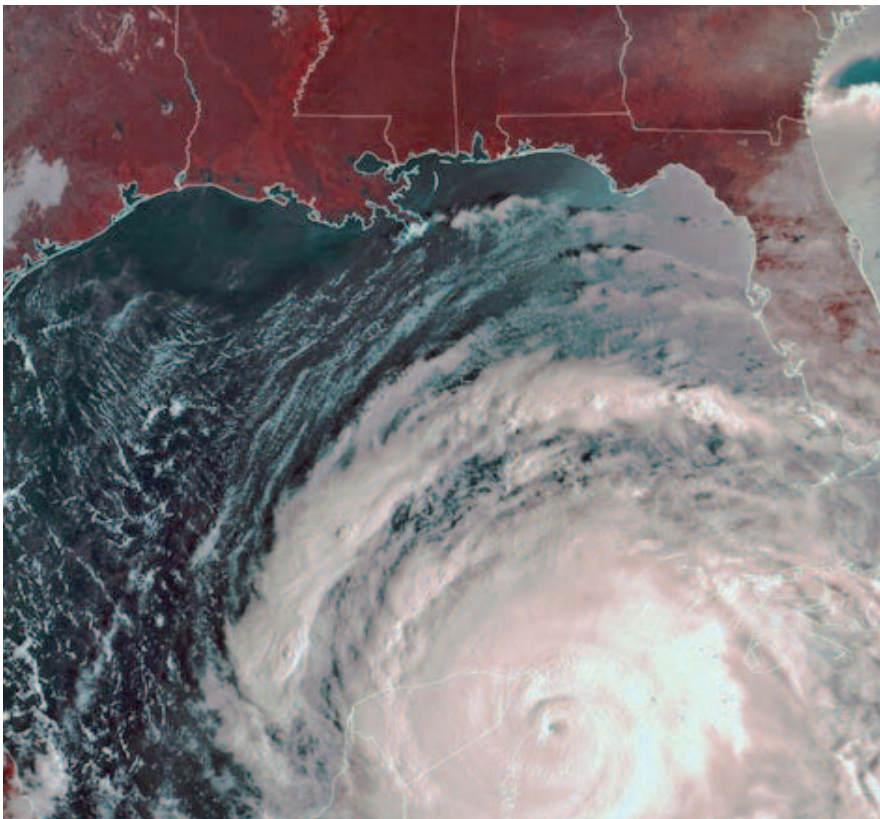
By Lisa Mills, MD

*Director, Division of Emergency Medicine Ultrasound
Assistant Professor Emergency Medicine
Louisiana State University at New Orleans*

Faced with one of the busiest emergency departments in the country in 2005, the emergency medicine faculty at Charity Hospital in New Orleans struggled to find time to master new technologies due to heavy workloads. As part of Louisiana State University Health Sciences Center (LSU), Charity's emergency department was a Level I trauma facility, one of only two in the entire state. Serving patients throughout southeast Louisiana, Charity was also the only public hospital providing medical care to those in need in the area.

Prior to Hurricane Katrina, the emergency department routinely treated more than 130,000 patients per year, 350 per day, for everything from flu, broken bones and gunshot wounds to heart attacks and strokes. The main imaging modality was standard x-ray, although PET, MRI, CT, ultrasound and several other imaging technologies were also available in the radiology department. The fast paced environment left limited time for emergency department residents or others to receive training on point of care imaging modalities, such as ultrasound. In late August 2005, this scenario changed.

Force of nature creates necessity for invention



Hurricane Katrina struck with widespread fury and its devastation resulted in one of the most extensive natural disasters in our nation's history. Charity was one of the hardest hit healthcare facilities in the area. In the immediate aftermath of the hurricane, LSU emergency medicine physicians practiced in isolated, makeshift medical stations evaluating scores of patients without labs, radiology equipment or other testing. However, hundreds of evacuees needed to be rapidly evaluated



by hospital personnel and those with emergent medical conditions evacuated by military helicopter to fully functional hospitals outside the area of devastation.

LSU emergency medicine personnel worked around the clock in these primitive conditions not willing to abandon any patient in need. In addition to lack of diagnostic equipment, the heat was oppressive and there was a severe lack of basic comforts such as fresh food, running water or sewage services. This was the scene for many weeks until the military finally arrived and

established a Combat Support Hospital (CSH) in a badly damaged parking lot outside of Charity.

The CSH came equipped with rudimentary x-ray capabilities and an older handheld ultrasound system. The staff practiced in this environment completely isolated from any expert imaging consultants who were several miles away. Initially, x-ray maintained its status as the preferred imaging modality. However, wheeling patients out of an environmentally controlled tent across a pock-marked parking lot in unbearable heat, record humidity and the occasional rainstorm in order to take x-rays in the “radiology” tent became demanding.

In addition, along with the CSH came ambulances bringing sicker patients – many with significant trauma and altered mental status. The increased acuity in a setting of extremely limited resources presented yet even greater challenges to the LSU emergency medicine doctors and staff. Quite often, power surges caused numerous x-ray system failures. Yet, functioning without the benefit of consultants and without the benefit of portable x-ray or CT systems, personnel still had to make rapid assessment and patient disposition decisions.

With so many obstacles, physicians who previously ordered plain films to evaluate pulmonary edema, foreign bodies and soft tissue infections, began to routinely rely on ultrasound for diagnostic decisions. In fact, ultrasound became the modality of choice in the initial evaluation of patients presenting with such symptoms as shortness of breath and hypotension. Emergency medicine residents performed their own focused assessment by sonography in trauma (FAST) exams and decisions were made based on these studies. The entire staff rose to the challenge and confidence in ultrasound skills grew by the day.

When the army moved out of New Orleans in early 2006, so did their radiology services. Although

LSU emergency medicine personnel were left with a portable x-ray system and CT scanner, the hospital still did not have a fully functioning radiology department. Consequently, interpretation of complex radiology studies was not consistently available and expert use of ultrasound became even more critical.

Premium compact ultrasound in the ED

At the annual American College of Emergency Physicians (ACEP) conference in October of that year, LSU emergency medicine physicians approached ZONARE Medical Systems for help in obtaining a compact premium ultrasound system. ZONARE responded by sending Charity the z.one system, the world's first Convertible Ultrasound™ platform, which can be used as a fully-featured, cart-based unit or a compact premium unit.

Since Katrina, the “tent” hospital moved from the pot-marked parking lot to the New Orleans convention center. A second move came a few months later to a washed out department store, tents and all. Finally, while still undergoing construction, University Hospital, located down the street from Charity, was opened. Along the way, the z.one system was wheeled over pot holes, granite ledges, through dirt and construction dust, and on and off moving trucks. More than a year later, the system still functions the same as the day it arrived.

Only one minor service issue arose, a failed transducer, which was remedied within 24 hours. Yet, in the makeshift hospitals, generators frequently failed and the CT scanner required a prolonged boot up process after these events, suffering frequent breakdowns as well. The portable x-ray machines began to fail after being wheeled over the irregular terrain of the makeshift hospitals and suffered frequent power surges when the generators would regain power. The z.one, however, retained power during generator outages and never overheated in spite of the grueling temperatures and even being dropped.

In addition, I rate image quality on this rugged system as superb. The short boot up and power down time is also extremely critical given the drastic environment where power surges and electrical failures are common. None of these affect the performance of the z.one system which tolerates such events routinely. Another key element is the ability of the unit to take human abuse whether from inexperienced operators or distraught patients. Plus, the anti-theft lock for the portable scan engine has completely negated any issues of theft.



Modality of choice

Most important, the residents have completely embraced the z.one system. As citizens moved back into the city, the health system was not prepared to meet the demand. Again, we became quickly overwhelmed with patients. Subsequently, the residents relied heavily on premium compact ultrasound for rapid diagnosis of patients. Today, it is the modality of choice and the LSU emergency medicine residents are experts in ultrasound, teaching other emergency clinicians the vast knowledge they have gained due to the paucity of resources caused by Katrina's massive destruction.

The New Orleans healthcare system is still far from fixed. The dedicated staff at Charity still work long hours committed to providing the best in patient care. Throughout this ordeal, no patients were abandoned or turned away. Yet, there is always a silver lining to every situation, no matter how dire the circumstances.

Katrina caused loss of life and hope for the future, but created many amazing heroes who ignored exhaustion and their own safety to serve the needs of New Orleans patient population. For the medical personnel at Charity's emergency department, it also brought an abundance of new knowledge accelerated by patients' needs and extremely adverse environment. Now, the department is filled with highly experienced ultrasound experts, something that was an educational goal prior to Katrina. Sometimes it takes a hurricane to empower human knowledge. Hopefully, though, there never will be another Katrina, but if there is, the lessons learned and knowledge gained have thoroughly prepared us for whatever cards are dealt. One thing is for certain – premium compact ultrasound will continue to play a powerful leading role now and in the future.



Dr. Mills is Director, Division of Emergency Medicine Ultrasound and Assistant Professor Emergency Medicine at Louisiana State University at New Orleans. Dr. Mills has practiced emergency medicine for four years. She is a graduate of MCP Hahnemann University in Philadelphia and received her board certification in emergency medicine at Parkland (UTSW) in 2002.
