

# sounding board



## Why Train Physicians in Disaster Medicine? Management of 1,000 Injuries Following an F5 Tornado in Tuscaloosa, Alabama

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On April 27, 2011, the City of Tuscaloosa, Alabama, suffered the worst natural disaster in its history. A mile-wide F5 tornado with 200 mile an hour winds damaged or completely destroyed a significant portion of Tuscaloosa. There were 43 casualties and more than 1,000 injuries. Hospitals prepare for disasters of all types but often not the large number of injuries sustained in this disaster. Well-developed disaster plans can be adapted to much larger numbers of injuries. A previously well-thought disaster plan, although not rehearsed for a thousand patients, was able to be expanded to that number and implemented quickly. At the time of the tornado, no one had any idea of the number of injuries or casualties. The hospital received only a single complaint during this disaster.

Many streets were neither identifiable nor negotiable; subsequently, all roads were closed except to emergency vehicles. There was no electrical power, land line, or cellular telephone service, and the water supply was contaminated. Large neighborhoods were leveled. Complete buildings were relocated to areas where there had been no buildings before, such as the middle of the interstate highway. Portions of buildings were found on the opposite side of the state. Bodies were strewn into streets, yards, and shrubbery. People were blown by the tornado into other cities and counties. A few of these people were even reported to have survived, although most did not.

People described having their automobiles picked up by the twister and then falling 150 feet to the ground. Children were found in refrigerators. Cows were reported hanging from the tops of trees. Debris was found in other states. The mayor declared a state of emergency, and the National Guard was called to police the streets and guard neighborhoods. A curfew began at dusk and ended at daybreak.

DCH Regional Medical Center is a large 583-bed hospital and trauma center, which serves as the tertiary care referral center

for West Alabama. The Emergency Department can easily accommodate 47 patients in rooms and bays and then another 10-20 on stretchers in the hallways. The hospital was in the direct line of the tornado until the last 60 seconds, when it turned east. The hospital sustained some broken windows on the two top floors and two small internal fires, which were easily extinguished. The two power substations supplying power to the hospital were completely destroyed. The hospital operated on emergency-generated power with no air conditioning. The water supply to the main operating room sterilization area was damaged.

Most life-threatening injuries were brought to the hospital by paramedics and ambulances, although emergency travel was hampered by blocked streets. Most less injured patients walked to the hospital from all parts of town, and most of these patients and families were barefoot. Other seriously injured patients were brought to the hospital on make-shift stretchers made of doors from destroyed homes. Some injured never made it to the hospital.

The number of injuries and casualties was unknown but estimated to be much greater than the number usually planned for in disaster drills. A regularly rehearsed disaster plan was quickly implemented and expanded to care for many other patients. A smaller general hospital in town was placed on alert. About 200 of the 300 physicians on active staff showed up at the hospital to help care for patients in the first hour following the tornado without even being summoned. This number included every specialty along with most of the residents and many of the medical students. Many retired physicians, medical school faculty, and community physicians not on the hospital staff presented to care for injured patients. At several times, there were almost as many physicians as there were patients. Medical students served as first assistants to surgeons in the

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Operating Room. Medical students sewed until their hands were sore. Every surgical specialty that could sew tissue did so.

Patients were triaged into two categories: those seriously injured and life-threatening and those injured but not life-threatening. Physicians were divided into two groups to work in the two treatment areas. Those patients with serious, life-threatening injuries, those needing immediate surgery, those with CPR in progress, and seriously injured children were treated in the Emergency Department. This area was staffed by emergency medicine physicians and fellows along with general, trauma, vascular, plastic, orthopedic surgeons, neurosurgeons, and pediatricians. Those less-injured were triaged to make-shift treatment areas including the hospital auditorium, cardiac catheterization laboratory, endoscopy laboratory, outpatient surgery, and the hospital cafeteria. The make-shift treatment areas were staffed by OB/GYNs, ENTs, internists, family physicians, general practitioners, and pediatricians, along with obstetric fellows, family medicine residents, and medical students. Essentially, all hospital employees that were off duty, including administration, housekeeping, and maintenance, found their way to the hospital to help despite closed roads. Even administrative secretaries served as the transport service.

Most patients only wanted the worst injuries treated so that others could receive timely care. Common, less serious injuries included lacerations, extremity fractures, contusions, crush injuries, and embedded glass. Dissection of head injuries from the intense wind speed was seen. Many discharged patients had no place to go, no transportation, no clothes, no food, no home, and no relatives. Children could not find their parents; parents could not find children. Babies and very small children could not tell their names or any other identifying information. There was no reason to write prescriptions because drug stores were closed. So, the hospital pharmacy dispensed medications for those leaving the hospital. The hospital cafeteria was opened in the areas not occupied by patients, and free food was available for anyone. Large conference rooms were used to temporarily house those who had no place to go.

Additional patient care areas were available at the smaller general hospital in town, the medical school clinics two blocks from the main hospital, University Student Health Service, and the University Recreation Center. Some 127 very seriously injured patients were transferred to University of Alabama in Birmingham Medical Center and The Children's Hospital in Birmingham 45 miles away. Several psychiatrists cared for psychiatric needs at the hospital, especially for those who had lost family members and those who had lost children. Ninety mental health professionals provided free psychological care at multiple locations for several weeks following the tornado.

Initially, casualties were placed in the DCH Regional Medical Center morgue. When it was filled to capacity, the VA Medical Center morgue was used, and then an elementary school was converted into a temporary morgue. Identification of the deceased was difficult. Body parts were often scattered over large areas including other counties and cities.

Only a few of the x-ray machines were on emergency power; thus slowing the wait time for patients who needed x-rays and those awaiting x-ray reports. Other obstacles to care were the lack of power, lack of air conditioning, slow elevators due to limited power, limited or no medical records, compromised sterile technique, inability to get prescriptions filled, and management of families. The cafeteria was not a good location because it was a long distance from the ER and required the use of elevators, since it was on another floor. In retrospect, the cafeteria was not a good choice for patient care. There was only one complaint, and it did not come from a patient.

An adult neurosurgeon had to perform an emergency craniotomy on a child. There were two near cardiac arrests in the less-injured areas. OB/GYNs had to run "codes." Physicians of every specialty ended up having to sew lacerations. Family medicine residents with minimal supervision had to care for patients.

Several lessons were learned. There was an incredible outpouring of physician and healthcare professionals. Most physicians saw the funnel cloud, assumed the worst, and headed for the hospital without being summoned. No one knew exactly what instruments were available on emergency power. Disaster plans and drills are everything. Well-rehearsed disaster plans and drills can be expanded to accommodate much larger numbers of injured. Competent physicians trained in emergency medicine and disaster medicine are essential. Organization and planning can be expanded to care for much larger numbers of patients than usually planned for. Physicians and staff trained in disaster medicine and emergency care are essential for any size hospital. Disaster plans and drills are priceless.

The entire medical community untiringly rose to the occasion of rendering impeccable assistance to very large numbers of injured patients without hope of reimbursement, recognition, or reward, but rather for the goodness of mankind and the highest personal reward of medicine . . . care of the sick and injured.

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