Review

Direct patient care during an acute disaster: chasing the will-o'-the-wisp

Ijlal Babar[1] and Ronald Rinker[2]

[1]Pulmonologist and Intensivist, Ocean Springs Hospital, Ocean Springs, Mississippi, USA
[2]Chief of Staff, Ocean Springs Hospital, Regional Digestive Specialists, PC, Ocean Springs, Mississippi, USA

Corresponding author: Ijlal Babar, ijlalbabar2002@yahoo.com

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Abstract

Well developed disaster plans are essential in today's atmosphere of natural and man-made disasters. We describe the problems faced by a community hospital on the Mississippi Gulf Coast during and in the wake of Hurricane Katrina. Because of significant damage to surrounding health care facilities, this hospital was called upon to provide care to a large section of the affected population. In spite of a previously successful disaster plan, a number of unforeseen difficulties were encountered. These included staff shortages due to inability of relief personnel to re-enter the affected area, insufficient power generation by hospital generators, breakdown in communication, fuel shortage, limited mortuary space, and stretching of emergency room resources. These unexpected developments emphasize the importance of contingency planning as part of disaster preparedness.

Introduction

On 29 August 2005, Hurricane Katrina made landfall along the coasts of Mississippi and Louisiana. The entire Gulf Coast incurred extensive damage from this powerful category 4 hurricane. At the time of writing, more than 1000 individuals in the path of this hurricane have been reported dead. At least 200 deaths occurred along the Mississippi coast. In addition, innumerable coastal residents have been permanently displaced secondary to catastrophic damage to their homes.

Ocean Springs Hospital is a 135-bed hospital on the Mississippi Gulf Coast. Ocean Springs, which lies east of Biloxi, incurred significant damage during the storm. However, the hospital sustained only minor damage and was operational during and after the storm. The five hospitals in the adjacent two western counties sustained more significant damage and operated at limited capacities. Subsequently, Ocean Springs Hospital became the primary health provider for a large section of the affected population along the Gulf Coast. In spite of a well developed disaster plan that had been put to test a number of times previously in this hurricane prone area, we faced a number of unanticipated problems. This is an account of some of these problems and the steps taken to combat them at the level of a community hospital.

Staffing

The hospital was staffed by a group of physicians and nurses who comprised the 'Hurricane team'. This group of physicians, nurses, and ancillary staff is required to be in the hospital at least 12 hours before a predicted hurricane landfall. The hospital is subsequently secured and 'locked down' at this point. Under normal circumstances, this call team would be released within 24–48 hours after hurricane landfall. However, given the extensive damage to the surrounding community and the large number of staff members that evacuated, many relief nurses and physicians were not immediately available. Subsequently, many nurses and physicians were required to provide extended periods of in-house care without relief. A number of these individuals suffered significant personal losses and had to perform in spite of the severe psychological trauma they were experiencing. (To date, 40 Ocean Springs Hospital physicians and 250 ancillary/nursing personal have completely lost or suffered severe damage to their homes.)

A hospital social worker was utilized for crisis intervention and counseling. The social worker counseled 82 individuals during 52 hours after the storm. Most of the affected were hospital staff and family members of patients within the hospital.

Power

There was complete loss of power during and following the storm for a period of 5 days. A generator was used to supply electricity to run all essential equipment, including ventilators, lighting, laboratory machinery, refrigerators, and Pyxis

ER = emergency room.

medication systems. However, the generators did not have enough power to run the air conditioning system. Because of the rising temperature patients and staff suffered significant discomfort. Portable fans were brought in to cool the patients. Average temperatures in the laboratory area ran between 93 and 98°F, with peak temperatures as high as 105°F. Because of the elevated temperature, almost all of the laboratory equipment malfunctioned and only limited laboratory tests run on rapid point analyzers placed in the intensive care unit were obtainable.

Emergency department

Immediately after the storm, a large increase in emergency room (ER) volume was encountered. Within the next 3 weeks after the storm, the ER volume continued to rise as evacuated residents returned home. ER volume was highest the first week after the storm, reaching close to 250 total ER visits per day (almost triple the volume seen on busy days before the storm).

Within 24 hours after storm this need was anticipated and a 'fast track' was established in a 24-hour observation ward (approximately 10-bed capacity). As patients entered the ER waiting room, they were triaged by a dedicated nurse. Patients deemed to have relatively minor injuries or nonacute medical complaints were routed to the fast track. The first week after the storm the fast track service was staffed by approximately eight volunteer hospital staff physicians (representing family practice, internal medicine, and pediatrics) as well as a number of nurses reassigned from other nonessential positions (many were previously assigned to routine outpatient positions). These physicians were supplemented by volunteer physicians from neighboring states. The fast track was able to take care of approximately 50–60% of patient contacts, relieving the ER of a huge burden. By weeks 2 and 3 after the storm, total ER/fast track visits declined to 130–150 visits per day. After 3 weeks it was felt the ER could effectively accommodate the increased volume and the fast track was dissolved.

Communications

Communication was lost through both landline and cellular telephones after the storm. In addition, the hospital beeper system routed through the Internet was unavailable. Consequently, an alternative means of communication via a cellular provider with two-way radio capability was utilized. These radio phones were distributed to all physicians. However, during periods of high usage, even this means of communication could be disrupted. A program to monitor physician entry into the hospital after the storm was utilized to supplement communication with the medical staff. Access to the hospital was limited to two entrances, where clerical staff were positioned to sign in physicians and distribute information from administration and the Chief of Staff.

Mortuary

The number of dead bodies brought to the ED after the storm was unanticipated. Most of these bodies were brought in by family members or friends. The hospital morgue capacity was quickly filled and exceeded. Subsequently, a refrigerated truck was borrowed from a local company and was kept on hospital grounds for storage of the deceased.

Fuel

For 2 weeks after the storm, access to fuel along the Gulf Coast was extremely limited. There was significant concern that the hospital was going to lose essential nursing and physician staff within several days after the storm secondary to inability to acquire fuel for transportation. Subsequently, the county and a local refinery provided the hospital with a 500 gallon fuel tank, which was rationed to nursing and physician staff.

Discussion

Disaster medicine has come into the forefront since the events of 11 September 2001. Hospital preparedness is an essential requirement in the current atmosphere of man-made and natural disasters. The Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) requires that all hospitals prepare emergency management plans that should be tested at least twice a year. However, the effectiveness of these drills remains to be determined [1,2]. Regardless of predisaster preparedness training, it should be expected that unanticipated problems will arise and must be managed effectively.

Without warning a small community hospital may be called upon in a disaster to take a leading role. This may happen for a number of different reasons. As in our case, larger health care facilities in the surrounding area may be destroyed or severely damaged. Another scenario may be one in which, because of communication breakdown, the nearest health care facility (which may not be the largest or best equipped one) is accessed by the prehospital health care providers [2,3].

It is essential, then, that all hospitals be fully prepared, regardless of their size. It is also important that health care facilities do not respond to a crisis at an individual level. It is best to develop a coordinated plan with other health care facilities in the region to include, but not be limited to, alternative means of communication, transfer/exchange of essential drugs, and evacuation of patients [4,5].

A number of recent articles [5–7] have reviewed hospital preparedness in detail. Based on our experience at the community hospital, we have the following recommendations.

- With respect to personnel, strong leadership is of utmost importance and a well developed disaster plan is essential. A 'disaster team' should exist in areas that are at high risk for being affected by disasters. There should be an understanding at the leadership level that the staff themselves may be affected by the disaster [4] (as

occurred in our case) and, if possible, a backup group of individuals should be available in the area.

- The psychological toll of a disaster to hospital personnel can be significant, and psychological help during the post-disaster period should be provided.
- Regarding power generation, generators should have enough power to run all essential equipment including ventilators, refrigerators, and air conditioning/heating systems. Temperature control within the facility is of utmost importance.
- Fuel shortage can affect personnel traveling to and from the hospital in the post-disaster period. Fuel may also be required to run electricity generators, depending on the length of power outage. Fuel supplies should be part of the disaster plan.
- Communication is essential both within the hospital and outside with surrounding health care facilities, as well as with organizations such as the police and fire departments [5]. Radio communication was successful in our case but only within the hospital and with its associated staff. At times of high usage this mode of communication was overwhelmed and contact was lost with physicians outside the hospital. Alternative methods of communication need to be looked at, including utilization of the human element, as was done in our case.
- ERs can be overwhelmed in the post-disaster phase. Triage of patients with low severity complaints to a 'fast track' arrangement, with recruitment of available staff and volunteers, should be utilized.
- Hospital morgues may be filled sooner than anticipated, depending on the severity of the disaster. Temporary morgues should be incorporated into the disaster plan.

Conclusion

Disaster preparedness is essential in the current socio-political atmosphere. Hospitals that are situated in areas prone to natural disasters or that are at high risk for terrorist attacks must have plans formulated with these particular events in mind. There should be a clear understanding at the planning level that almost any part of the plan may fall through, and contingency plans should also exist.

Competing interests

Both authors are members of staff at Ocean Springs Hospital and Dr Rinker is currently chief of staff.

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