Response to Challenges and Lessons Learned From Hurricanes Katrina and Rita: A National Perspective

Geographic circumstances: We participated intimately in disaster response after Hurricane Katrina’s landfall and other disasters since then.

About the lead author (Dr Weiner): I am a pediatric emergency medicine physician at Children’s Hospital Boston (CHB)/Harvard Medical School (HMS) and the CHB representative and a charter member of the HMS Section on Disaster Medicine. I have been a National Disaster Medical System member on the Disaster Medical Assistance Team, the International Medical Surgical Response Team, and the Pediatric Specialty Team since 1995. I am a member of the American Academy of Pediatrics Extended Disaster Preparedness Advisory Council Network. I have served as a domestic and international consultant in disaster planning and am developing technology-based resources for disaster training and response.

Hurricane Katrina was a disaster unlike others for which the US National Disaster Medical System (NDMS) had been deployed. Never before had the NDMS attempted to provide sustained disaster relief over a geographic area as expansive as the multistate region devastated first by Hurricane Katrina and then by Hurricane Rita.

There were challenges we anticipated and those that we did not. Lessons learned from Hurricanes Katrina and Rita, and subsequent disasters, have led and continue to lead to strategic conceptual, organizational, and operational modifications to improve care to disaster victims. Increased emphasis on the care of children in disasters is an important component of these initiatives, given that for most disasters more than one-third of victims are children. As demonstrated by the hurricanes in the Gulf Coast region, and again by the earthquake in Haiti in January 2010, the NDMS remains a critical asset for disaster relief and one of the few US disaster-relief organizations/agencies with the capacity to provide care for critically injured or ill disaster victims including children. Lessons learned from and actions taken since Hurricanes Katrina and Rita have implications not only for the NDMS but also for other health care agencies, organizations, institutions, and individual people involved in disaster preparedness and response.

In 2007, the National Commission on Children and Disasters was formed, and in 2009, the Children’s Working Group was formed to distinguish and integrate the needs of children across all governmental disaster organizations. Specific recommendations of the commission in its 2010, updated report emphasize contribution from the Department of Homeland Security/Federal Emergency Management Agency, and the National Disaster Recovery Framework addresses the unique needs of children and unification of plans across agencies. In alignment with these mandates and recommendations, the NDMS has increased its focus on and commitment to the disaster-related care of...
children and recently added a pediatrician to its federally based leadership, working closely with invested federal and civilian organizations and agencies. NDMS teams are rapid-response units designed to be able to deploy within 24 hours of notification, become operational within 48 hours, and remain self-sustaining for at least 72 hours. Teams were predeployed to the Gulf Coast before Hurricane Katrina made landfall. Additional teams were deployed immediately after the storm and levee breach. Damage and disruption to infrastructure including communication and transportation, however, posed challenges to identifying and reaching the areas most in need. Forced and voluntary evacuation of the local population added to challenges in determining where needs were the greatest. Social unrest and inadequate security in the region threatened the safety of disaster-relief providers, which forced the evacuation of some teams and prevented initiation of efforts of other teams.

Lessons learned from Hurricanes Katrina and Rita were applied to the Haiti earthquake response effort with appreciable success. Deployment sites were determined jointly. Tent cities had spontaneously sprung up near areas devastated by the earthquake and served as obvious sites for the NDMS to provide services. From a well-placed mobile field hospital NDMS members worked with Haitian health care providers, who in many cases knew those who were seeking help, in a collaboration that benefited all aspects of care and all involved. Patients were able to receive various levels of care at different, but more appropriate, facilities controlled by different agencies, including the hospital ship USNS COMFORT.

**DELIVERY OF CARE**

Pediatric providers including pediatricians and pediatric trained nurses, but also emergency medicine and family practice clinicians and pharmacists with pediatric knowledge and skills, are part of each 50-member NDMS team, 68% of whom report at least some pediatric training and 5.6% of whom report subspecialty training in pediatrics. Several publications that have detailed special considerations regarding pediatric vulnerabilities and disaster care and preparedness of children have been published since Hurricanes Katrina and Rita, including the American Academy of Pediatrics and Agency for Healthcare Research and Quality publication *Pediatric Terrorism and Disaster Preparedness: A Resource for Pediatricians*. Upgraded equipment, supplies, and pharmaceuticals specific for pediatric patients are included in the team cache. The Office of the Assistant Secretary for Preparedness and Response is now developing critical care transport teams with pediatric training as well as pediatric-specific critical care transport teams, including teams with neonatal transport expertise.

Hurricane Katrina also highlighted the need for pediatric trained providers to have knowledge and skills in the management of adult disaster victims. Adults who required care included both disaster victims and emergency workers.

Training programs for NDMS providers have been updated and enhanced. Recently, to prepare providers to deploy to Haiti, Children’s Hospital Boston–based NDMS personnel who had deployed to the Gulf Coast and Haiti worked with simulation experts to develop and teach a just-in-time simulation–based training course for disaster response in austere environments.

Hurricanes Katrina and Rita also emphasized the need for providers with pediatric expertise in areas that received disaster victims. Pediatric patients required transfer to more distant facilities more often than adults because of the relatively small numbers of hospitals equipped and staffed to provide care for high-acuity pediatric patients compared with adult patients. Demand that exceeded availability of transport teams with pediatric expertise contributed to the challenge of transfer of pediatric patients. Many victims, including children, separated from family, relocated to new communities, new states, or, with Haiti, to new countries, usually without health care records and often without health care coverage. Efforts to ensure care for relocated disaster victims have been ongoing and include education and tools for providers (available on the American Academy of Pediatrics Web site) regarding medical and psychosocial issues of disaster victims. It is important to note that mental health experts developed recommendations for inclusion of mental health–specific considerations and services at all phases of disaster preparedness and response. The NDMS is increasingly leveraging technology for disaster response in the care of pediatric disaster victims. Use of electronic medication ordering that calculates weight-based dosing guidelines reduces errors, especially for providers who do not routinely prescribe for pediatric patients. Routine use of sharable electronic medical records in the community will have obvious advantages in the care of disaster victims.

Basic point-of-care laboratory testing has markedly enhanced the capacity of the NDMS to provide care and was, in fact, the only option. In addition to providing information valuable for the evaluation and management of patients, bedside testing expedites care, thus increasing efficiency and, in turn, the volume of patients that can be seen.

In the Gulf Coast obtaining imaging was often time intensive and for pedi-
atriotic patients frequently required accompa-
companyment by team members. In Haiti, NDMS teams were equipped with both portable ultrasound and x-ray units, but ultrasound was found to be used extensively for pediatric patients and had a dramatic impact on diagnosis, treatment, disposition, and crisis resource management.

Technologies and systems that search for and detect disaster victims in rubble are starting to be used and will undoubtedly help to identify and facilitate the rescue of pediatric disaster victims. Noninvasive wireless devices that monitor vital signs are currently in development and might improve the efficiency and effectiveness of triage and resuscitation. Facial-recognition software being developed for the purposes of reuniting families, particularly children with their parents, will hopefully decrease the >6 months it took to reunite all 5192 pediatric victims of Hurricane Katrina with their families.

DURATION OF DEPLOYMENT

The geographic and demographic enormity of the disruption in health care caused by Hurricanes Katrina and Rita resulted in widespread and prolonged needs that exceeded the capacity of health care agencies/organizations that usually replace NDMS teams. Among the challenges created for the NDMS was backfill of positions. NDMS deployments require a 14-day commitment. Most team members have civilian jobs, and many are limited in the amount of time they can take from those jobs to deploy, although they are supposed to be protected by law.

PROVIDER HEALTH AND SAFETY

As a result of Hurricanes Katrina and Rita, the NDMS has greatly enhanced provider mental health screening and counseling services, with personnel trained in disaster-related provider mental health and excellent screening tools. Counseling before deployment is routine, as is mental health screening after deployment. In Haiti the teams were well prepared for infectious disease risks including tuberculosis, HIV, malaria, and dengue fever. All personnel were counseled regarding disease prevention, and prophylaxis was given. Treatment, which in some cases required evacuation, was provided. The US Army’s 82nd Airborne Division provided on-site security and protection for the field hospital, which was critical for patient and provider safety in our initiatives.

REFERENCES

2. Gausche-Hill M. Pediatric disaster preparedness: are we really prepared? J Trauma. 2009;67(2 suppl):S73–S76

DEPLOYMENT OPPORTUNITIES

Those who are interested in volunteering for the NDMS may obtain information on the NDMS recruitment information Web site (www.phe.gov/Preparedness/responders/ndms/Pages/recruitment.aspx). Information for those who are interested in being able to serve more efficiently in a disaster is can be found at an Office of the Assistant Secretary for Preparedness and Response Web site (www.phe.gov/esarvhp/Pages/default.aspx).

SUMMARY

The NDMS continues to learn from and evolve in response to each disaster. Although the exact role and structure of the NDMS and its interface with other government assets continues to change, what will not change, unfortunately, is that children will continue to be disaster victims, and pediatric expertise is essential for appropriate emergency preparedness and pediatric disaster response. The NDMS is committed to working with the American Academy of Pediatrics to assist in policy and program development and in pediatric training of disaster response personnel.
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Debra L. Weiner, Shannon F. Manzi, Susan M. Briggs and Gary R. Fleisher

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