

PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Pediatricians' Experiences 80 Miles up the River: Baton Rouge Pediatricians' Experiences Meeting the Health Needs of Evacuated Children

David E. Thomas, Stewart T. Gordon, Jamar A. Melton, Christopher M. Funes, H. Jay Collinsworth and Roberta C. Vicari

Pediatrics 2006;117;S396-S401

DOI: 10.1542/peds.2006-0099K

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://www.pediatrics.org/cgi/content/full/117/5/S2/S396>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2006 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



Baton Rouge Pediatricians' Experiences Meeting the Health Needs of Evacuated Children

David E. Thomas, MD, PhD, FAAP, FCCP^a, Stewart T. Gordon, MD, FAAP^{b,c}, Jamar A. Melton, MD, FAAP^d, Christopher M. Funes, MD, FAAP^d, H. Jay Collinsworth, MD, FAAP^d, Roberta C. Vicari, MD, FAAP^e

^aPediatric Pulmonary and Sleep Medicine, ^bOur Lady of the Lake Regional Medical Center Children's Hospital, Baton Rouge, Louisiana; ^cLouisiana State University School of Medicine, Baton Rouge, Louisiana; ^dEarl K. Long Medical Center, Baton Rouge, Louisiana; ^ePrivate Practice, Baton Rouge, Louisiana

The authors have indicated they have no financial relationships relevant to this article to disclose.

ON AUGUST 29, 2005, the Gulf Coast experienced one of our nation's most devastating natural disasters in modern history with the landfall of Hurricane Katrina. Heavy damage was inflicted from Louisiana to Alabama, causing Katrina to become the most destructive and costliest natural disaster in the history of the United States and likely the deadliest since 1928. This article documents the preparations, responses, experiences, and lessons learned from the point of view of just a few of the practicing general pediatricians in Baton Rouge and New Orleans, Louisiana.

Baton Rouge is the state capital, located approximately 80 miles northwest of New Orleans and situated on the east bank of the Mississippi River. The 2000 census data list the city's population as 227 818, with the metropolitan population being 602 894. It is the closest urban area to the region of Louisiana impacted by Hurricane Katrina. Medical care is supplied to a 7-parish area of approximately 1 million people. In the days before Katrina, the population of greater Baton Rouge was estimated to have doubled.

It is interesting to note that almost 13 months to the date before Katrina, a statewide hurricane exercise involving a category 3 strike on New Orleans was rehearsed.

PREPARATIONS: 1 YEAR BEFORE LANDFALL

In July 2004, in the State Emergency Operations Center in Baton Rouge, officials from 50 state, federal, and volunteer organizations and Louisiana parishes participated in a mock scenario almost identical to the reality of Katrina. During the tabletop exercise, more than 250 planners used the scenario to develop a recovery plan for

the 13 parishes in the New Orleans area. This exercise was known as "Hurricane Pam."

The Hurricane Pam exercise envisioned sustained winds of 120 mph and up to 20 inches of rain to parts of southeast Louisiana and a storm surge that topped levees in the New Orleans area. More than 1 million residents evacuated from the 13 parishes in the surrounding area. Hurricane Pam destroyed 500 000 to 600 000 buildings.

The exercise used weather and damage predictions developed by the National Weather Service, the US Army Corps of Engineers, the Louisiana State University (LSU) Hurricane Center, and other state and federal agencies to help officials develop joint response plans for a catastrophic hurricane in Louisiana.

The Hurricane Pam scenario focused on 13 parishes in southeast Louisiana: Ascension, Assumption, Jefferson, Lafourche, Orleans, Plaquemines, St Bernard, St Charles, St James, St John, St Tammany, Tangipahoa, and Terrebonne. Representatives from other areas other than the primary parishes participated also, because hurricane evacuation and sheltering involve communities throughout the state and into Arkansas, Mississippi, and Texas.

Even knowing such a storm was approaching New

Key Words: Hurricane Katrina, disaster planning, pediatrics, evacuees, displaced persons

Abbreviations: LSU, Louisiana State University; PMAC, Pete Maravich Assembly Center; IMERT, Illinois Medical Emergency Response Team; FEMA, Federal Emergency Management Agency

www.pediatrics.org/cgi/doi/10.1542/peds.2006-0099K

doi:10.1542/peds.2006-0099K

Accepted for publication Jan 25, 2006

Address correspondence to David E. Thomas, MD, PhD, FAAP. E-mail: DThoma01@ololrnc.com
PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275). Copyright © 2006 by the American Academy of Pediatrics

Orleans, officials expected evacuation to be only half successful. According to the Hurricane Pam scenario, only a third of the population would leave New Orleans before the storm hit, because upward of 100 000 live in households in which no one owns a car.

A list of anticipated problems to be addressed with action plans was developed from the exercise and included (1) clean up, (2) sheltering, (3) search and rescue, (4) schools, and (5) medical.

The medical care group reviewed and enhanced existing plans. The Baton Rouge medical mission was to maintain the integrity of the hospital and care systems in the community while simultaneously manning the emergency evacuation hospital to be located in a basketball stadium (see Fig 1), the Pete Maravich Assembly Center (PMAC) at LSU. In addition, a medical special-needs shelter would be established adjacent to the PMAC in a field house. Two other shelters were established to have resources to respond to more minor medical needs. Unfortunately, there were no real specific plans to deal with the medical needs of pediatric evacuees.

The group determined how to implement existing immunization plans rapidly for tetanus, influenza, and other diseases likely to be present after a major hurricane. Tactics to resupply hospitals around the state that would face heavy patient loads were developed.

The medical action plan included patient-movement details and identified probable locations at which individuals would receive care and then be transported to hospitals, special-needs shelters, or regular shelters as necessary. However, specific details and processes regarding development and implementation of medical emergency-response teams were not addressed. As a result of this exercise, a second Hurricane Pam exercise was planned for the summer of 2005 but did not take place because of a lack of funding. Agencies had anticipated expanding on aspects of medical emergency response and recovery that were not explored in the 2004



FIGURE 1
The PMAC clinic.

exercise. Ironically, the exercise for 2005 became the reality known as Hurricane Katrina.

AUGUST 27: 2 DAYS BEFORE LANDFALL

A command center was created at one of the local regional medical centers. Communication by telephone was established between local hospitals, the Louisiana Office of Emergency Preparedness, and the Louisiana Hospital Association. At the same time, the Louisiana Department of Health and Office of Emergency Preparedness began planning for the PMAC and other medical shelters in anticipation of the pending storm. The PMAC was undergoing renovation, which added complications to the plan.

To witness the size and potential destructive nature of this storm bearing down on the Gulf Coast was simply scary. No one comprehended the magnitude of what would follow.

AUGUST 28: 1 DAY BEFORE LANDFALL

Many of the 80 area pediatricians began transferring perishable vaccines and other medical supplies to community hospitals for refrigerated storage. Provisions were made to transport pediatric patients who were technology-dependent and in vulnerable areas into the pediatric hospital for shelter if they were unable to find acceptable and safe facilities in the community or unable to evacuate to the care of friends or families out of the immediate strike zone. Most of these children were ventilator-dependent.

The only existing pediatric emergency department was overwhelmed with the routine medical needs of evacuees, in addition to the usual responsibilities of providing care for local children on a busy weekend.

AUGUST 29: LANDFALL

At 6:05 AM, Hurricane Katrina began its journey through Louisiana. Pediatric offices were closed as wind ravaged the greater Baton Rouge area. Trees were down, roofs and other structures were damaged, many roads were blocked, and electricity was off for the major portion of the community. Surprisingly, there was not a great amount of rain. Plans were made for the pediatric community to return to their practices on the next day in anticipation of the increased need of evacuees. Those plans could not be implemented, because many offices remained closed as a result of power outages and traffic lights were out in most of the community.

AUGUST 30: 1 DAY AFTER LANDFALL

This day was not without predictable stress and adventure; the number of newborns in our area surged from nursery and obstetric patients who had evacuated or were transferred from hospitals in New Orleans, which was sitting in rising water. A rotating call roster for pediatricians was established to handle the surge of hos-

pitalized patients. Pediatricians also volunteered for extra shifts in the emergency departments to accommodate the increased pediatric demand.

Meanwhile, in New Orleans, Sam Solis, MD, a general pediatrician, and his family had ridden the storm out at his office near Memorial Hospital, a hospital that later would be closed because of the flooding. He was the on-call person for his group and was attempting to be available for the group's patients. His office was situated on the 9th floor of an office building from which he observed the torrents of water entering the city. Later in the day, barely escaping the raging water, he and his family evacuated to Baton Rouge.

Clemente Mendoza, MD, a general pediatrician from Kenner, Louisiana, was fortunate to be in an area that did not flood and remained in New Orleans. He was a lifeline at East Jefferson General Hospital, one of the few surviving hospitals, and cared for many of the community's newborns during the period of mandatory evacuation.

AUGUST 31: 2 DAYS AFTER LANDFALL

By the next morning, it became apparent that there was an impending mass-casualty event occurring in New Orleans, a city sinking between the Mississippi River and Lake Pontchartrain along with a suspected 100 000 people who had not evacuated and were left in the flood zone. Pediatric care was needed in anticipation of a massive influx of patients.

Physicians lost their practices, and hospitals became progressively nonfunctional, especially after the storm and as flooding continued. Roads became impassable, and resources to maintain the rescue and medical missions within the strike zone dwindled. As a result, Homeland Security Secretary Michael Chertoff described the aftermath of Hurricane Katrina as "probably the worst catastrophe, or set of catastrophes" in the country's history, referring to the hurricane itself plus the flooding of New Orleans.

One thousand four-hundred seventy-nine primary care physicians, including pediatricians, were unable to care for their patients. Tertiary health care for children decreased by 70% as a result of Katrina.

Hospital resources in both emergency department capacity and beds decreased by approximately 6000 beds immediately after the storm, which represents a decline of 40% of the entire state of Louisiana health care resources in the midst of an enormous, growing need that was well documented by the various news media outlets.

Emergency Facility and Staff

Pediatric medical directors from the area assembled a conference call and decided to centralize emergent pediatric care into a single facility (the PMAC), which was in the process of an unprecedented transformation into

a field hospital to perform hospital care including triage and emergency and intensive care. This concentration of pediatric resources into the logistic operation of a field hospital, which had at least been practiced on paper, seemed most appropriate.

It is important to note that it was decided that the field hospital would not provide inpatient pediatric care other than immediate stabilization. Children would be triaged to appropriate levels of care: a pediatric inpatient facility, medical shelter, or nonmedical shelter.

The local command center would coordinate staffing of pediatricians and ancillary personnel and assist the PMAC and pediatric medical director in matters regarding pediatric patients. Plans were to provide pediatricians for 8 days at shifts of either 8 hours (3 per day) or 4 hours (6 per day). This schedule was created to allow pediatricians to continue meeting the demands of their usual outpatient practices.

Medical care at the shelters and the PMAC field hospitals in the first 2 days was provided completely by a combination of local volunteers, interns, and residents from the LSU-New Orleans and Tulane University training programs and the local LSU Health Sciences Center/Earl K. Long Medical Center teaching hospital.

Pediatric Command

A command center for pediatrics was created as a subunit of the main hospital command center. It was decided to set up a separate, exclusively pediatric area within the PMAC including a pediatric supply area. This would allow expansion or contraction of the pediatric area on the basis of need.

The pediatric commander of the day would provide daily operational guidance to the pediatric staff and brief the PMAC clinical operations officer. The pediatric commander of the day would wear a fluorescent green hat that identified him or her as the "go-to" person for local action items. The pediatric nursing commander was identified with an orange hat. All information started and passed through these field commanders, who had complete autonomy to operate their respective areas within the PMAC field hospital on the basis of the needs of the pediatric unit and the situational mission. This included expansion or contraction of service on the basis of need. A disposition transfer desk was established to locate beds and arrange transportation.

Supplies and Logistics

Unfortunately, there were initially inadequate supplies for pediatric patients. The strategic national medical stockpile contained many useful items, but some were missing. For example, there were no nebulizers and no Pedialyte. There was no pediatric crash cart or immediate resuscitation equipment. We did not have the ability to provide medication to patients who were treated and did not require additional medical care. There were no

antibiotics, no bronchodilators, or many other items for discharge. Local pharmacies could not fill prescriptions, because patients did not have any Medicaid or other insurance identification.

In an effort to solve the supply problem immediately, a call went out to the local pediatric and pediatric subspecialty offices and hospitals. Local radio and television stations asked people to provide formula, disposable diapers, clothing, and other basic items. A Broselow cart, with colored-coded, sized resuscitation equipment, was provided by a local subspecialist's office. The response was outstanding, and within hours our supplies were plentiful.

However, resupply became a problem. The PMAC medical director contacted or was contacted by several national and international medical aid charities, all of which provided additional support for both pediatric and adult patients. Pharmaceutical and medical-device companies provided supplies as well. This influx of supplies presented another problem: where to store, dispense, and inventory the items. The University Reserve Officers' Training Corps (ROTC) initiated a command and control of supplies and performed an outstanding service. LSU provided storage.

The important issues of security and transportation within the medical response zone were also coordinated by LSU. The track stadium adjacent to the PMAC was designated a landing zone where many helicopters arrived carrying victims of this tragic event.

Pediatric Patients

Outside of usual pediatric illnesses, most of the pediatric patients from the evacuation zones were suffering from exposure and dehydration. There were a few minor snake and rodent bites, some minor trauma, and an infant near-drowning. The infant was dropped accidentally into the murky flood waters as the mother attempted to pass the infant to a person driving by in a boat in the flood-ravaged area of East New Orleans. The infant was effectively resuscitated in the field, helicoptered to the PMAC, stabilized, and transferred to the local PICU. The infant was reunited 5 days later with the mother and was later discharged in good condition.

SEPTEMBER 1: 3 DAYS AFTER LANDFALL

In the early morning, the PMAC medical facility was augmented with the Illinois Medical Emergency Response Team (IMERT). This was certainly timely, because most of the PMAC medical personnel had been at work for 48-plus hours. This was followed immediately by the arrival of the Federal Emergency Management Agency (FEMA) New Mexico Disaster Medical Assistance Team (DMAT). The New Mexico DMAT had been "in the mouth of the lion" providing medical care in the Louisiana Superdome and had a keen awareness of what would transpire in the next several days (see "The Na-

tional Disaster Medical System Response: A Pediatric Perspective," pp S405-S411).

The teams from IMERT and New Mexico provided the needed additional operational organization to accomplish the mission. They provided experience in disaster management and improved the efficiency by focusing on incident command, supply, and coordination. The IMERT team also brought a 150-bed ICU setup complete with ventilators. Through the 8 days of the PMAC field-hospital operation, more than 15 000 patients were triaged, and more than 6000 were treated and dispositioned. There were 5 adult deaths, all of which were predictable on the basis of their presentation to the facility. It is incredible that there were no pediatric deaths in the forward-triage areas in New Orleans, the PMAC, shelters, or local hospitals as a result of Katrina.

SEPTEMBER 2 AND 3: 4 AND 5 DAYS AFTER LANDFALL

Sixty to eighty pediatric patients were seen. There was a great need for written instructions to educate each volunteer physician about the triage system. A protocol was created to orient each new physician to the flow of the pediatric area to establish some consistency of practice among the various volunteers. This allowed for smooth transitions from one shift to the next.

Communication to us regarding the imminent arrival of buses of children requiring care was unreliable, because "buses" of children in need never arrived. There is a need for communications to be improved.

FEMA medical teams began to arrive in the early evening hours. Their assessment of the recently established pediatric system was such that FEMA asked us to remain in charge of providing the pediatric services. This partnership worked well throughout the remainder of our time in the PMAC, which allowed for FEMA medical teams to concentrate their efforts on the massive amount of adults who required care.

SEPTEMBER 4: 6 DAYS AFTER LANDFALL

Pediatric patient visits began to decline to about 30 per day. One response to the nation's witnessing of this disaster was to send equipment. By day 6, much of this equipment began to arrive. Although the outpouring of support was uplifting, the reality was that we were beginning to see a decline in the number of patients requiring service. Nonetheless, we were receiving a broad range of supplies and equipment including bilirubin lights, defibrillators, formula, antibiotic samples, toys, and books.

SEPTEMBER 5 (LABOR DAY): 7 DAYS AFTER LANDFALL

One pediatric patient was seen at the PMAC.

SEPTEMBER 6: 8 DAYS AFTER LANDFALL

Six days after its creation, the PMAC pediatric patient area was closed.

LESSONS LEARNED

In addition to the points made above, the greatest lesson learned from this group was the importance of decisions being made at the local level by the established medical community. Having the community designate a local pediatrician to be the point person/liason to work with the national responders was valuable. It gave the national responders 1 person to contact, who then communicated with the community's pediatricians.

Because of the efficient pediatric model already in place when FEMA arrived with their medical teams on day 3, FEMA asked the pediatric leaders to maintain and continue to administer the pediatric services. This proved to be an invaluable partnership. In streamlining and centralizing the pediatric resources in 1 location (the PMAC), we believe we increased efficiency in our system and improved our pediatric response.

In addition, existing pediatric facilities ramped up their operations to accommodate more patients during the post-Katrina time period. This enabled more capacity at known pediatric centers and allowed for less fragmentation and duplication of effort being established at new sites throughout the community.

COMMENTS

Planning and Logistics for Potential Pediatric Mass Casualty Should Include and Be Designed by Pediatricians and Pediatric Subspecialists

Medical casualties from Katrina were not massive trauma (ie, explosion, injury, etc) but were mostly semi-acute or need of medical therapies for chronic medical conditions. These types of casualties are what are likely to occur with the release of weapons of mass destruction, especially in the case of infectious or chemical weapons. Most chemical exposures do not result in death but require medical therapies. Pediatricians are capable of dealing with the emotional aspects of such trauma and are likely to recognize those needs.

The Pediatric Planning Stage Also Needs to Occur at the Grass-Roots Local-Community Level

1. Planning that occurs at the level of tertiary medical systems may become nonfunctional, as occurred during Katrina.
 - Tulane University and LSU-New Orleans became nonfunctional.
 - Residents were left in charge of relief operations in some instances, because staff members were displaced during the storm.
2. Logistics for an operation designed for mass-casualty management at a large medical complex may not be functional in another region.

Pediatric Emergency-Response Teams Should Be Established in Each State and Enhanced Nationally

1. Existing federal and state programs are slow and have multiple missions in disaster management, which forces each municipality to respond while waiting for assistance.
2. Incident command along with logistic and process development with standard operating procedures should be established before events.
3. Assured communication pathways with backup communication devices (noncellular) should be available for the emergency-response team.
4. Advance teams should be established to assess needs and assist local governments in organizing pediatric medical care.
5. Supply lists with specific needs for pediatrics should be established and revised annually.
6. Scenario-development and implementation exercises should be planned and providers certified just as occurs in advanced pediatric life support.

Data Collection Is Necessary

1. For process improvement and future design
2. To interface with present databases:
 - Red Cross
 - FEMA
 - State

The Role of the American Academy of Pediatrics

1. Convene a meeting with individuals with experience in mass casualty to interface with other pediatric professionals and model development.
2. Seek funding at the national level for development of national and international pediatric emergency strike teams.
3. Develop an emergency Listserv for professional communications.
4. Maintain a Web site for credible, timely, and easily accessible professional and lay information.

CONCLUSIONS

The official death toll stands at 1383, the third highest resulting from a hurricane strike in US history (behind the Galveston Hurricane of 1900 and the Okeechobee Hurricane of 1928). A total of 6644 persons remain unaccounted for, of which one fourth are deceased. The damage is estimated to amount to \$100 to \$200 billion, at least double from previously most expensive Hurricane Andrew, making Katrina the most expensive natural disaster in US history. More than 1 million people

were displaced, and a humanitarian crisis ensued on a scale unseen in the United States since the Great Depression.

Three months after Hurricane Katrina, the Baton Rouge region was still experiencing a strain on the local medical community (not unique to pediatricians) because of the tremendous influx of people now living in the Baton Rouge area. At the time of this writing, the local public school system was accommodating 6300 displaced students from affected areas. Many of these students will be enrolled in our school system throughout the 2005–2006 school year. Obviously, responsibility for these children's health care will need to be absorbed by our community. Some of the strain is beginning to be relieved by displaced physicians who are relocating their practices temporarily (and in some cases, permanently) to Baton Rouge.

During our work at the PMAC, we worked side by side with volunteer pediatricians who were displaced from New Orleans and had nothing but wanted to help. There were LSU and Tulane University/Alton Ochsner Foundation Hospital pediatric residents caring for patients. We met pediatricians from all over the United

States who were volunteering and willing participants here to make these patients' lives better. Pediatricians took care of the elderly, psychiatrists did their first pelvic examinations in years, and residents and medical students did heroic work beyond what anyone could have expected. The presence of the numerous local volunteer pediatricians was stellar; many of them left their offices to come straight to the PMAC after a full day in the nursery, office, and/or hospital. They still had more to give at the end of their "regular day."

The Baton Rouge community pediatricians met an unprecedented challenge and performed superbly, protecting children who were local citizens or displaced by the storm and floods. Now they are facing a longer-term challenge, but one of equal importance: helping those children grow in this environment so that they can become the best adults they can be.

ACKNOWLEDGMENT

We acknowledge the efforts of Dr Stephanie Mills (Director of Medical Information Services, Our Lady of the Lake Regional Medical Center) for her expertise and for coordinating the Katrina efforts of the local community pediatricians.

Pediatricians' Experiences 80 Miles up the River: Baton Rouge Pediatricians' Experiences Meeting the Health Needs of Evacuated Children

David E. Thomas, Stewart T. Gordon, Jamar A. Melton, Christopher M. Funes, H. Jay Collinsworth and Roberta C. Vicari

Pediatrics 2006;117;S396-S401

DOI: 10.1542/peds.2006-0099K

Updated Information & Services	including high-resolution figures, can be found at: http://www.pediatrics.org/cgi/content/full/117/5/S2/S396
Citations	This article has been cited by 1 HighWire-hosted articles: http://www.pediatrics.org/cgi/content/full/117/5/S2/S396#otherarticles
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): Emergency Medicine http://www.pediatrics.org/cgi/collection/emergency_medicine
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.pediatrics.org/misc/Permissions.shtml
Reprints	Information about ordering reprints can be found online: http://www.pediatrics.org/misc/reprints.shtml

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

