Lessons from Hurricane Rita: Organizing to Provide Medical Care during a Natural Disaster

As the hurricane season for 2006 begins, people fear a disaster on the scale of Hurricanes Katrina, Rita, and Wilma. Although criticism of government response to those disasters will shape improvements in our system for managing future disasters, many relatively unheralded successes are equally important. We provided disaster relief in our roles as officers in the U.S. Public Health Service (PHS). In this editorial, we discuss some lessons to inform the future.

Following the landfall of Hurricane Katrina on 29 August 2005, the PHS deployed over 2500 Commissioned Corps officers and over 1200 unpaid federal employees across the Gulf Coast region. In addition to their regular jobs at various government agencies, the PHS officers were trained in emergency relief. When the need arose last summer, they received orders to leave their regular jobs and go to the Gulf Coast, where they served as physicians, nurses, pharmacists, dentists, engineers, administrators, environmental health officers, veterinarians, mental health experts, and mortuary experts. They treated people in shelters; triaged during evacuation processing; vaccinated against tetanus, hepatitis A, and influenza; brought safe drinking water; reestablished waste water systems; assessed public buildings for use as schools; evaluated hospitals, shelters, and nursing homes; ensured safe food and pharmaceuticals; treated sick and abandoned animals; and provided comfort and assurance. To provide these services on the scale necessitated by Hurricane Katrina required advance training, planning, and on-site improvisation. Our story, which unfolded in Alexandria, Louisiana, shows what happened on the ground.

As reports of Hurricane Rita emerged, Alexandria prepared for the hurricane itself and for an influx of evacuees from farther south. Because of Alexandria’s central location in the state, refugees went there when hospitals closer to home reached capacity after Katrina. A small community recreation center and a former YMCA gymnasium became the evacuation center for these patients. Anticipating the need for structure, leadership, and organization, the PHS implemented an incident command structure (ICS) in Alexandria (1, 2). The Louisiana Office of Public Health was the lead authority. Incident commanders representing the PHS, Cabrini Hospital of Alexandria, the Medical Reserve Corps of Oklahoma, the Health Crisis Response Network of Indiana, and the Louisiana National Guard (3) made up the medical team of the evacuation shelters. As the PHS leadership team, we provided organizational, medical, and disaster management expertise.

The most urgent priority was providing medical care. The patient population of the 2 makeshift Alexandria shelters rapidly expanded from approximately 40 to 250 evacuees within 24 hours. These patients were predominantly elderly, indigent residents of chronic care facilities. Many were bedridden and oxygen-dependent. Some were receiving hemodialysis or required gastric tube feedings. The volunteer medical staff comprised approximately 100 nurses, physicians, pharmacists, and support staff.

As our team stabilized the most seriously ill, we began to anticipate the medical and infrastructural problems that our evacuation center would face when Hurricane Rita hit Alexandria—loss of electrical power, water, sewage, air conditioning, and supplemental oxygen—and we improvised backup systems. Several logistical problems are illustrative. How does one provide supplemental oxygen to patients with chronic lung disease in shelters that lack wall-based central oxygen? How does one provide electrical power when a hurricane is about to cause power failure, or potable water when water pressure drops after electrically powered pumps fail? How does one avoid decubitus ulcers when bedridden patients must lie for long periods on military cots? How does one control the transmission of methicillin-resistant Staphylococcus aureus when separate rooms for infected people are not available? An incident command team must solve logistical problems before they happen.

Here is how we solved some of the infrastructure problems. As the canister oxygen that came with newly arrived evacuees ran low, we found local sources of tanks and O₂ condensers to replenish our supply. For backup, we strung together H-tanks to create reserves of oxygen and used T-pieces to distribute it from a central tank. Anticipating loss of electrical power when the hurricane struck, our team calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters. Anticipating loss of water pressure when the Alexandria pumping stations lost power, we calculated our electrical current needs and asked the state of Louisiana to provide logistical support from the Louisiana National Guard. Within hours, guardsmen were installing 60-kilowatt portable generators for the evacuation shelters.

Patient care problems presented other challenges. We improvised 2 nurses’ stations from tables, boxes, and stacked military cots and clustered the sickest patients around them. We obtained air mattresses, chairs, and patient lifts from local sources. We implemented 24-hour call

See also:

Web-Only
Conversion of table into slide
identify problems and develop potential solutions and then social work interventions. Every morning, the ICS met to command resources that no single agency could command. By cooperating, they could efficiently implement multiple simultaneous medical, nursing, pharmacy, nutritional, logistical, infrastructural, security, and social work interventions. Every morning, the ICS met to identify problems and develop potential solutions and then communicate the plans to the other staff members early in the day. The ICS concept is widely applicable to medical and nonmedical interventions in disaster situations at larger regional, state, and national levels.

Communication must be timely, clear, and specific in a disaster setting because events, problems, and priorities change rapidly. The facilities in Alexandria relied on cellular phones, landlines, walkie-talkies, facsimile machines, digital cameras, and computers, a communication infrastructure that was deliberately redundant to increase its reliability. Adherence to established communication routines is important: Morning ICS rounds and afternoon telephone conferences with PHS headquarters allowed exchange of key medical, logistical, and infrastructural information and sustained confidence at all levels of the mission. The principles of communication that we used in Alexandria—timeliness, inclusiveness, reliability, and incorporation into daily routines—are readily applicable to future disaster management.

In the end, training and planning can prepare strangers to function as a seamless team, but something else is needed. For us, it was the sight of sick older people who needed our best efforts. In his report to the PHS headquarters in Baton Rouge, Captain Walsh said that we were “caring for the grandmothers and grandfathers of Louisiana children. Many of these patients were the poorest of the poor . . . There is no greater honor than to care for those who have nothing left.”

**Table. Lessons Learned from Alexandria**

<table>
<thead>
<tr>
<th>General Categories</th>
<th>Specific Skills and Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness and training</td>
<td>Disaster training and deployment experience, Medical expertise suitable to the patient population, Ability to anticipate medical and infrastructural needs in rapidly changing environment</td>
</tr>
<tr>
<td>Command and control structure</td>
<td>Early institution of an incident command structure, Full engagement of all team leaders</td>
</tr>
<tr>
<td>Communication</td>
<td>Local (on-site) network, Regional network</td>
</tr>
<tr>
<td>Resourcefulness and adaptability</td>
<td>Local problem solving, Adaptability to evolving circumstances, Knowledge of local, regional, and national assets, Medically driven prioritization of problems when confronted with limited resources</td>
</tr>
</tbody>
</table>

Thomas J. Walsh, MD, CAPT, USPHS  
National Cancer Institute  
Bethesda, MD 20892

Susan Orsega, MSN, NP, CDR, USPHS  
National Institute of Allergy and Infectious Diseases  
Bethesda, MD 20892
Lessons Learned from Hurricane Rita

David Banks, RPh, PhD, CAPT, USPHS
U.S. Food and Drug Administration
Rockville, MD 20853

Acknowledgments: The authors thank those who contributed to the success of the mission in Alexandria, Louisiana: the USPHS Office of Force Readiness and Preparedness; the members of the Louisiana Office of Public Health, Louisiana Department of Social Services, Oklahoma Medical Reserve Corps, Indiana Health Crisis Response Network, CHRISTUS St. Frances Cabrini Hospital, Louisiana National Guard, and Louisiana Office of Mental Health; local Alexandria volunteers; the PHS officers; Medical Reserve Corps; and others.

Potential Financial Conflicts of Interest: None disclosed.

Requests for Single Reprints: Thomas J. Walsh, MD, National Cancer Institute, CRC 1-5750, 10 Center Drive, Bethesda, MD 20892; e-mail, walshr@mail.nih.gov.

Current author addresses are available at www.annals.org.


References
Current Author Addresses:  Dr. Walsh: National Cancer Institute, CRC 1-5750, 10 Center Drive, Bethesda, MD 20892.  
Ms. Ortega: National Institute of Allergy and Infectious Diseases, 10 Center Drive, Bethesda, MD 20892.  
Dr. Banks: U.S. Food and Drug Administration, 5600 Fishers Lane, Rockville, MD 20853.