

15 against measles. Only after these needs have been addressed can curative care become operational.

Unfortunately, the skill set for such a response was not on the curriculum vitae of any of the health care workers who had shown up to volunteer. All the eager, superbly trained doctors and nurses who told me “I’m here to help” almost always meant that they were ready to deliver care in the same way they did at home. But the burden of the initial emergency response is on logistics, not on the provision of direct care. Indeed, attempts to

provide direct care in a setting with no coordination or infrastructure can distract from the urgent mission of establishing basic human security and meeting immediate needs.

Through those early days of frantically assessing the safety and needs of the population and planning the medium-term response, Joyce was one of the most valuable members of our team. Without question, without complaint, she made copies, gave directions, and ferried people around in her car. Her only expectation was to help. She had dropped everything to volunteer;

she had left her work, her daughter, and her grandchildren behind and, having missed the flight she planned to take, had driven alone across several states to Baton Rouge. At the end of her two-week session, she would return to her life, another of the many anonymous volunteers who responded to the crisis. Once back at home, she would resume her usual work — as a thoracic surgeon.

Dr. Cranmer is a physician in the Division of International Health and Humanitarian Programs, Department of Emergency Medicine, Brigham and Women’s Hospital, Boston.

HURRICANE KATRINA

Public Health Response — Assessing Needs

P. Gregg Greenough, M.D., M.P.H., and Thomas D. Kirsch, M.D., M.P.H.

Never before Hurricane Katrina has a disaster caused such a massive displacement of a U.S. population. Never before has the country seen so vividly the exposure and vulnerability of displaced persons — primarily the poor, the infirm, and the elderly. We know from experience that disasters take their greatest toll on the disenfranchised, but the distressing television images of our citizens stranded without basic human necessities and exposed to human waste, toxins, and physical violence awakened the public health community to a frightening realization: given the ineffective response mechanisms that were in place, Katrina could become a public health catastrophe.

The critical issues raised by Katrina’s devastation are straight from the public health textbook: sanitation and hygiene, water

safety, infection control, surveillance, immunizations, environmental health, and access to care.¹ A public health response was clearly needed; determining what it would look like was a bit more complicated.

The traditional focus on infectious disease in displaced populations is well supported. Because disaster shelters often lack potable (or any) water, are often crowded and unclean, and may house a population with limited knowledge about health, the risks of airborne and waterborne transmission of disease are increased. Educating sheltered evacuees — particularly children — about strict personal hygiene can aid in preventing outbreaks. Ideally, facilities with adequate numbers of toilets and enough water for washing and bathing should be sought; in places where the shelters them-

selves are damaged — as many were in the Biloxi and Gulfport areas of Mississippi — evacuees may need to travel greater distances for shelter or wait wherever possible until better facilities can be found.

Epidemics of vector-borne disease have occurred after other hurricanes.² Although there may be essentially no risk of malaria transmission on the Gulf coast, the presence of vast stands of stagnant water in any locale may increase the risk of other vector-borne diseases, particularly the viral encephalitides. The decision to initiate expensive spraying campaigns should always be based on solid knowledge of vector breeding and endemic disease. West Nile virus, St. Louis encephalitis, and even dengue have native ties to the Mississippi delta.³ There have been confirmed deaths from skin infec-

Aftershocks

When Hurricane Katrina hit, my wife and I responded in a fashion common to many New Orleans residents: we “vertically evacuated” to the lower floors of one of the city’s larger hotels. This had been a successful routine for many years. But when the storm blew out the windows in our hotel room, we were obliged to take up residence in an exhibit hall, along with more than 1000 other people, and to live there without power, air conditioning, and water for the next six days.

There, I witnessed some stressful medical situations. Elderly patients from nursing homes with physical illnesses and disabilities, including Alzheimer’s disease, as well as patients with emotional problems, had been evacuated to the same large exhibit hall. There were patients with cardiac disease and patients who had long required hemodialysis. There were two families with two-month-old babies. It was difficult, if not impossible, to obtain necessary medications — as I discovered firsthand when I tried unsuccessfully to get an ophthalmic steroid for my corneal grafts.

Eventually, most of the nursing home residents and patients with Alzheimer’s were transferred to relatively unaffected nursing homes.

Several patients were transferred to our hospital’s dialysis center, which could address their medical needs, if not the stress that arose from the lack of availability of their personal physicians and dialysis technicians.

The rest of us remained in the hotel, trapped by the flooding caused by the rupture of levees and by the rioting that spread from the nearby Superdome to the hotel and many areas in the city’s business district. Fortunately, the police protected the hotel from the rioting, but as the evacuees were brought through the ground floor from the Superdome to waiting buses, many relieved themselves on the floor, further fouling the environment.

Having experienced the trauma of this event myself, I am certain that social and behavioral problems will emerge in many victims of Katrina — owing to the displacement of families, the loss of family members and friends, the devastation of homes, the separation of people from their culture, the loss of income, and the disruption of community and social networks.

**Edward D. Frohlich, M.D.,
Ochsner Clinic Foundation,
New Orleans**

tions caused by *Vibrio vulnificus*, and wounds sustained during such disasters can result in infections that appear in the early days of shelter living.⁴ In the United States, tetanus is primarily a disease of the nonimmune elderly, so supplies for tetanus prophylaxis should always be kept on hand.

As shelters become stabilized and consolidated, surveillance based on syndromic case definitions should be implemented to identify potential disease transmission and to follow disease and injury trends. All data, whether collected by the Centers for Disease Control and Prevention (CDC), the state departments of health, the American Red Cross, or other nongovernmental organizations that sponsor shelters, must be coordinated if they are to be as useful as possible. Shelters are critical surveillance sites; however, since shelters are not staffed by physicians or public health experts, a simple, easy-to-use reporting mechanism that identifies sentinel symptoms (such as diarrhea, fever, acute respiratory infection, and hemoptysis) should be implemented as quickly as possible. In Mississippi, within 14 days after Katrina hit, the Red Cross and the state health department provided simple case definitions and set up a toll-free number for shelter staff members to report illnesses. As of September 22, 2005, only isolated cases of presumed chicken pox (in Mississippi), gastroenteritis (in Mississippi and Louisiana), and lice and scabies (in Louisiana) have been identified, but the threat of transmission is ever present.

Immunizations for vaccine-preventable diseases are re-



quired in these situations. Given the relatively low immunization rates in Louisiana, measles could become a problem.⁵ In addition, the influenza season is rapidly approaching, and crowded and elderly populations are at increased risk. In general, data on immunization coverage can be obtained at the time of registration in a shelter and should guide health care programming.

On the Gulf coast, environmental factors including stifling heat and humidity put the population at risk for dehydration and serious heat-related illness. Many people survived for days outdoors in sweltering heat, only to be evacuated to shelters without electricity and air conditioning. Floodwater laced with toxic chemicals, human waste, fire ants, rats, and water moccasins posed a distinct health risk for those attempting to escape to higher ground. The long-term effects of the environmental contamination will need to be evaluated, monitored, and alleviated.

The biggest health issue, however, was and will continue to be the inability of the displaced population to manage their chronic diseases. It remains uncertain how such a disruption of ongoing care will affect the long-term health of the population. Persons whose health depends on immediate medical care — hemodialysis, seizure prophylaxis, medications for diabetes or cardiac disease, or treatment regimens for HIV infection or tuberculosis — were and are at risk for potentially lethal exacerbations of disease. Those with special needs — hospice patients, the mentally and physically disabled, the elderly, and persons in detox pro-

grams — continue to endure life-or-death challenges beyond that of evacuation. Planning agencies are already struggling to build the sustainable procurement and distribution apparatus to address such long-term needs.

The economically disadvan-



tagged often have multiple medical conditions that may be in advanced stages.⁴ For the largely black population of New Orleans whose access to health care was limited before Katrina and who already bear a comparatively heavy burden of chronic disease, the situation is especially critical. As we have learned from previous disasters, a strong infrastructure is required to withstand such an onslaught. Katrina disproportionately affected the poorest residents of New Orleans, who did not have the health reserve or the access to care needed to absorb the blow of a breakdown of the local public health system. In the long run, the destruction of the public health and medical care infrastructure has the potential to be more devastating to the health of the population than the event itself.

The immediate response ef-

forts are only the beginning. Katrina, more than previous disasters, exposed the inequities facing our disenfranchised populations and laid bare the hard realities of the current state of health care for the poor. We are now faced with a tremendous social challenge: the physical displacement of hundreds of thousands of our most vulnerable and underserved citizens. If this crisis fails to redefine America's relationship to this population — if we revert to our accustomed passive avoidance — then the television cameras will document the same distressing scenes the next time a disaster strikes. The challenge for the health sector in the rebuilding effort will be no less than raising the level of care and easing the burden of disease for the entire population.

Dr. Greenough is an assistant professor of emergency medicine at Brigham and Women's Hospital and Harvard Medical School, Boston, and an assistant professor of international health at the Johns Hopkins Bloomberg School of Public Health, Baltimore. Dr. Kirsch is an assistant professor of emergency medicine at the Johns Hopkins University School of Medicine, Baltimore, and the medical advisor for the American Red Cross, Washington, D.C.

1. Noji EK, ed. The public health consequences of disasters. New York: Oxford University Press, 1997.
2. Saenz R, Bissell RA, Paniagua F. Post-disaster malaria in Costa Rica. *Prehospital Disaster Med* 1995;10:154-60.
3. Ehrenkranz NJ, Ventura AK, Cuadrado RR, Pond WL, Porter JE. Pandemic dengue in Caribbean countries and the southern United States — past, present and potential problems. *N Engl J Med* 1971;285:1460-9.
4. Centers for Disease Control and Prevention. Health alert network. (Accessed September 25, 2005, at <http://www.phppo.cdc.gov/HAN/ArchiveSys/ViewMsgV.asp?AlertNum=00233>.)
5. Health, United States, 2004, with chartbook on trends in the health of Americans. Hyattsville, Md.: National Center for Health Statistics, 2004.