

# BIOTERRORISM WATCH

Preparing for and responding to biological, chemical and nuclear disasters



## Harsh lessons of Katrina may help in future disasters, attacks

*National tragedy seen as ultimate training drill*

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The bitter lessons of Hurricane Katrina continue to inform public health and hospital preparations for natural disasters or bioterrorism attacks. Disaster management problems in the wake of Katrina have been well documented at the local, state, and national levels. The question is will Katrina's lessons be learned before the next natural or intentional calamity besets us?

In late August 2005, the catastrophic hurricane devastated the Gulf Coast, leaving New Orleans flooded and some 1,300 people dead. It was, according to the official government report, "the most destructive natural disaster in American history."<sup>1</sup>

"The lessons that we learned are not just those that deal with infection control or hospital issues," said **Dan Jernigan, MD**, a medical epidemiologist at the Centers for Disease Control and Prevention. "They are across the board in terms of [the need for] increased communication between federal agencies. That is something that clearly came out. There have been [government] reports recently that point out that there needs to be improvement at the federal level among the different agencies and better coordination with the state health departments and emergency management systems. That is something that we learned."

The section of the White House report dealing with the medical and public health response cites swamped hospitals and displaced people with chronic conditions and no medication. (See related story, p. 20.) The report emphasized the need to "strengthen the federal government's capability to provide public health and medical support during a crisis. This will require the improvement of command and control of public health resources, the development of deliberate plans, an additional investment in deployable operational resources, and an acceleration of the initiative to foster the widespread use of interoperable electronic health records systems," it stated.

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Indeed, the reported problems with dispensing medication to the chronically ill have led some to suggest including such drugs and treatments in the national strategic stockpile. "The strategic national stockpile does not have those kinds of meds currently," Jernigan said. There are ongoing discussions about whether it might be possible to stockpile such medications as part of pre-event preparations, "but whether that ends up as the strategic national stockpile I don't know," he recently said in Chicago at the annual meeting of the Society for Healthcare Epidemiology of America (SHEA).

The situation of treating the displaced chronically ill also was addressed by another CDC official during a "lessons learned" training broadcast on Hurricane Katrina held recently at the University of North Carolina School of Public

Health in Chapel Hill.

"Katrina taught us that special needs are a major area of concern," said **Richard E. Besser**, MD, director of the CDC office for terrorism preparedness and emergency response. "Before an event happens we need to assess what the burden of chronic disease is in the community and anticipate what those needs are going to be. We need to make sure we are able to relocate the resources to manage chronic diseases. Things like dialysis machines, asthma medications — those have to be available where the patients are going to be moved to. We need to prepare the evacuation sites to be able to handle people with special needs and chronic conditions."

For all the criticism and controversy in Katrina's aftermath, it must be remembered that public health, state, and federal officials oversaw one of the largest mass migrations of people in United States history. Though it has been largely forgotten in the muddled aftermath — more than 1 million people fled the storm's path before it made landfall.

"The migration of individuals was one of the largest — if not the largest — mass migration that we have seen in the United States in many years," Jernigan reported. "In the week following Hurricane Katrina, there were at least 490 evacuation centers set up. So this was clearly one of the largest [public health] responses that we have ever had in U.S. history. Upwards of 229,000 evacuees were distributed to at least 14 states."

Lessons learned from the situation could serve disaster planners well when nature or terrorists strike again. "With every major event that we go through — certainly that [immediate] response is of primary importance — but it also is something that helps prepare us for the next event," Jernigan said. "Katrina was a very large event requiring lots of different parties. [It raised] not just infectious disease issues but also those to do with infrastructure and supplies. It was a very good learning experience and a good way for us to identify [problems]."

For example, if a "dirty bomb" was used to release radioactive contamination over a densely populated area, the lessons of Katrina would come immediately to bear if there were a rapid migration from the epicenter.

"We learned a lot about how to anticipate the problems that you would have in evacuation centers, how to anticipate the communications command and control problems that might arise," Jernigan said. "So for that reason, I think we are in much better shape after Katrina for any mass migration that we have in the future."

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### Editorial Questions

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Another speaker at the SHEA session on Katrina reminded that — as bad it was — the hurricane actually fell short of the worst-case scenario.

“The good news was that before it made landfall, it made a tiny jog eastward and came in over the border of Mississippi and Louisiana,” said **Sandra A. Kemmerly**, MD, a hospital epidemiologist at Ochsner Clinic Foundation in New Orleans. “Had this storm come up the Mississippi River, [its] levees would have probably have been topped by a 30-foot storm surge and we would probably still be under water. So this is not the worst [scenario]. That is somewhat sobering if you happen to live there.”

Through some combination of planning, providence, and geography, the hospital managed to remain open during and after the storm. “A key to our success was adaptation and the decision 30 years ago to build a well in case the Mississippi levee broke,” she said. “Even though it was not drinkable water it gave us the ability when the temperatures exceeded 100 degrees in the buildings for people to have showers, cool off and get clean. Everybody felt that the well was probably our biggest asset.”

The decision was made not to evacuate the hospital as the storm approached, as the facility was designed to withstand a Category 5 hurricane. “But when the electricity went out and the temperature exceeded 100 degrees by day three, we did start having to evacuate [some areas],” Kemmerly said. “Certainly from an infection control perspective in a hospital that was still open, we were worried about the air conditioning, potable water, food, sterility in the OR. All of that was an ongoing day-to-day crisis management and concern.”

The problem for many New Orleans hospitals was not so much the initial storm but the subsequent flooding when levees broke. The latter development flooded generators and left many facilities without power. The crisis was vividly recalled during the aforementioned “lessons learned” broadcast at UNC.

“We had always planned and we were always told . . . that you need to be prepared to sustain on your own for 72 hours,” said **Coletta C. Barrett**, RN, MHA, FAHA, vice president of resource development and member services at the Louisiana Hospital Association. “We planned that in our scenario, and that’s why we had supplies and things like that. What we didn’t plan for was loss of generator power.”

It goes without saying that backup plans for generators and other redundant energy sources now are under review by disaster response planners. In

general, hospitals should consult their local engineers and determine what pre-disaster adjustments they can make, emphasized another speaker at the UNC broadcast.

“Hospitals need to analyze their vulnerability in advance, but it is not just medical personnel who need to be included in disaster planning,” said **John H. Morrow**, MD, MPH health director for Pit County, NC. “Engineers for example, can be a critical component when making sure that things go right when disaster strikes. During Hurricane Floyd, some ingenious engineering allowed our hospital to use the swimming pool in the rehab unit as a water tank to pressurize the water system for the whole hospital. This provided flushable toilets and potable water for the hospital while the rest of the surrounding area was without. So the lesson here is [to] identify locally what you consider as critical infrastructure in your community and then include the people who are responsible for maintaining that infrastructure in your emergency plan.”

### ***Expect truth to be the first casualty***

Expect truth to be the first casualty as rampant rumors surface about all manner of infectious disease outbreaks. “There were tons of unbelievable rumors about cholera, malaria, typhoid, hepatitis A, B and C, West Nile virus, toxic water, and snakes, alligators and sharks,” Kemmerly recalled.

Likewise, rumor control was an ongoing issue at the evacuation centers. “It was important to rapidly address these fears of workers and evacuees,” Jernigan said. “Our team was on call for a lot of things but one of them was for rumor control.”

Yet it was exceedingly difficult to set the record straight at the disaster sites because communication breakdowns were rampant. “I don’t really have any way to tell you how bad this was,” Kemmerly said at SHEA. “The land lines were inoperable; the circuits were overwhelmed if the lines weren’t down. Cell phones did not work. The towers did not have any electrical power and did not have generators. It turned out that the old ham radio systems worked, so people were able to communicate that way.”

Despite the atmosphere of chaos and fear, relatively few infectious disease problems occurred. Somewhat surprisingly, that generally held true at the evacuation centers as well, Jernigan added. There were respiratory infections at some centers, and an outbreak of norovirus hit primarily children at the Astrodome in Houston.

“The ‘Katrina cough’ was something that a number of people had, and we were never able to find a [etiologic] reason for that,” he said. “We had a few cases of pertussis, a few cases of TB, but really there was not a lot of infectious disease transmission in the evacuation centers.”

Some credit for that result must be ascribed to the infection control measures put in place at the evacuation centers. Those included infection control education, distribution of alcohol hand disinfectant, and daily evaluations of food service and restrooms.

“We found that about 50% of folks [in shelters] were washing their hands, which is not the greatest but is not terrible,” Jernigan said. “We did make sure that alcohol based hand gels were prevalent throughout the evacuation centers to the point that they smelled like alcohol all the time. I think we were able to maintain infection control probably [at a level] that you don’t normally have at home.”

But the lack of outbreaks may also reflect the absence of endemic infectious diseases in the displaced population. “These people did not have the burden of disease similar to what you might find in some other countries,” Jernigan said. “For that reason, we started off at a better place, and were therefore probably less likely to have outbreaks of these kinds of explosive diseases that you might see in [Third World] countries.”

## Reference

1. The White House. “The Federal Response to Hurricane Katrina: Lessons Learned,” February 2006. On the web at: [www.whitehouse.gov/reports/katrina-lessons-learned/index.html](http://www.whitehouse.gov/reports/katrina-lessons-learned/index.html). ■

## Katrina’s lessons: Feds see much to improve

*“This government will learn the lessons of Hurricane Katrina. We are going to review every action and make necessary changes so that we are better prepared for any challenge of nature, or act of evil men, that could threaten our people.”*

— **President George W. Bush**, Sept. 15, 2005

The official government report on the impact and aftermath of Hurricane Katrina emphasizes that the disaster must be used “to identify systemic gaps and improve our preparedness for the next disaster — natural or man-made. We

must move promptly to understand precisely what went wrong and determine how we are going to fix it.”<sup>1</sup>

Summarized below are some of the report’s critical challenges and lessons learned from Katrina:

### • **Critical Challenge: Public Health and Medical Support**

Hurricane Katrina created enormous public health and medical challenges, especially in Louisiana and Mississippi — states with public health infrastructures that ranked 49th and 50th in the nation, respectively. But it was the subsequent flooding of New Orleans that imposed catastrophic public health conditions on the people of southern Louisiana and forced an unprecedented mobilization of federal public health and medical assets. Tens of thousands of people required medical care. More than 200,000 people with chronic medical conditions, displaced by the storm and isolated by the flooding, found themselves without access to their usual medications and sources of medical care. Several large hospitals were totally destroyed and many others were rendered inoperable. Nearly all smaller health care facilities were shut down.

**Lesson learned:** In coordination with the Department of Homeland Security and other homeland security partners, the Department of Health and Human Services should strengthen the Federal government’s capability to provide public health and medical support during a crisis. This will require the improvement of command and control of public health resources, the development of deliberate plans, an additional investment in deployable operational resources, and an acceleration of the initiative to foster the widespread use of interoperable electronic health records systems.

### • **Critical Challenge: National Preparedness**

Our current system for homeland security does not provide the necessary framework to manage the challenges posed by 21st century catastrophic threats. . . . While we have built a response system that ably handles the demands of a typical hurricane season, wildfires, and other limited natural and man-made disasters, the system clearly has structural flaws for addressing catastrophic events. During the federal response to Katrina, four critical flaws in our national preparedness became evident: Our processes for unified management of the national response; command and control structures within the federal government; knowledge of our preparedness plans; and regional planning and coordination.

**Lesson learned:** The federal government should work with its homeland security partners in revising existing plans, ensuring a functional operational structure — including within regions — and establish a clear, accountable process for all national preparedness efforts. In doing so, the federal government must:

- ensure that executive branch agencies are organized, trained, and equipped to perform their response roles;
- finalize and implement the National Preparedness Goal.

• **Critical Challenge: Communications**

Hurricane Katrina destroyed an unprecedented portion of the core communications infrastructure throughout the Gulf Coast region. The storm debilitated 911 emergency call centers, disrupting local emergency services. Nearly 3 million customers lost telephone service. Broadcast communications, including 50% of area radio stations and 44% of area television stations, similarly were affected. More than 50,000 utility poles were toppled in Mississippi alone, meaning that even if telephone call centers and electricity generation capabilities were functioning, the connections to the customers were broken. Accordingly, the communications challenges across the Gulf Coast region in Hurricane Katrina's wake were more a problem of basic *operability*, than one of equipment or system *interoperability*. The complete devastation of the communications infrastructure left emergency responders and citizens without a reliable network across which they could coordinate.

**Lesson learned:** The Department of Homeland Security should review our current laws, policies, plans, and strategies relevant to communications. Upon the conclusion of this review, the Homeland Security Council, with support from the Office of Science and Technology Policy, should develop a National Emergency Communications Strategy that supports communications operability and interoperability.

• **Critical Challenge: Logistics and Evacuation**

The scope of Hurricane Katrina's devastation, the effects on critical infrastructure in the region, and the debilitation of state and local response capabilities combined to produce a massive requirement for federal resources. The existing planning and operational structure for delivering critical resources and humanitarian aid clearly proved to be inadequate to the task. The highly bureaucratic supply processes of the federal government were not sufficiently

flexible and efficient, and failed to leverage the private sector and 21st century advances in supply chain management.

**Lesson learned:** The Department of Homeland Security, in coordination with state and local governments and the private sector, should develop a modern, flexible, and transparent logistics system. This system should be based on established contracts for stockpiling commodities at the local level for emergencies and the provision of goods and services during emergencies. The federal government must develop the capacity to conduct large-scale logistical operations that supplement and, if necessary, replace state and local logistical systems by leveraging resources within both the public sector and the private sector. The Department of Transportation, in coordination with other appropriate departments of the executive branch, must also be prepared to conduct mass evacuation operations when disasters overwhelm or incapacitate state and local governments.

• **Critical Challenge: Human Services**

Disasters — especially those of catastrophic proportions — produce many victims whose needs exceed the capacity of state and local resources. These victims who depend on the federal government for assistance fit into one of two categories: 1) those that need federal disaster-related assistance; and 2) those that need continuation of government assistance they were receiving before the disaster, plus additional disaster-related assistance. Hurricane Katrina produced many thousands of both categories of victims.

**Lessons learned:** The Department of Health and Human Services should coordinate with other departments of the executive branch, as well as state governments and nongovernmental organizations, to develop a robust, comprehensive, and integrated system to deliver human services during disasters so that victims are able to receive federal and state assistance in a simple and seamless manner. In particular, this system should be designed to provide victims a consumer-oriented, simple, effective, and single encounter from which they can receive assistance.

• **Critical Challenge: Mass Care and Housing**

Hurricane Katrina resulted in the largest national housing crisis since the Dust Bowl of the 1930s. The impact of this massive displacement was felt throughout the country, with Gulf residents relocating to all 50 states and the District of Columbia.

**Lessons learned:** Using established federal core

competencies and all available resources, the Department of Housing and Urban Development, in coordination with other departments of the Executive Branch with housing stock, should develop integrated plans and bolster capabilities for the temporary and long-term housing of evacuees. The American Red Cross and the Department of Homeland Security should retain responsibility and improve the process of mass care and sheltering during disasters.

## Reference

1. The White House. "The Federal Response to Hurricane Katrina: Lessons Learned," February 2006. On the web at: [www.whitehouse.gov/reports/katrina-lessons-learned/index.html](http://www.whitehouse.gov/reports/katrina-lessons-learned/index.html). ■



## Could biodefense meds be used against H5N1 flu?

*Former Soviet bioweaponer urges FDA approval*

Alibek K, Liu G. **Biodefense shield and avian influenza** [letter]. *Emerg Infect Dis*. 2006 May. On the web at [www.cdc.gov/ncidod/EID/vol12no05/05-1480.htm](http://www.cdc.gov/ncidod/EID/vol12no05/05-1480.htm).

The former chief scientist in the old Soviet Union's bioweapons program emphasizes that the treatments being developed for biodefense could prove to be valuable weapons against avian influenza A virus (H5N1).

Lead author **Kenneth Alibek**, MD, PhD, DSc — now a distinguished professor in the department of molecular and microbiology at the National Center for Biodefense at George Mason University in Washington, DC — wrote in a letter to the editor that FDA approval of biodefense agents for H5N1 "might save many lives."

Biodefense medicine primarily concerns respiratory infections because bioweapons in their deadliest form disperse *Bacillus anthracis* and *Yersinia pestis*, the causes of anthrax and plague, and highly contagious viruses such as smallpox, Ebola, and Marburg as aerosols. The National Institutes of Health and Department of Defense have funded developing novel biodefense medications designed

to stimulate innate mucosal immunity by using interferons (IFNs) and interferon inducers. "We suggest that studies begin immediately to explore the potential of IFNs to prevent infections and reduce deaths caused by avian influenza viruses in animal models and humans," Alibek and co-author urged.

Modulating innate mucosal immunity is promising as a rapid-acting, broad-spectrum approach to combat bioterrorism. Innate immunity, the initial response to a pathogen, is potentially capable of eradicating infection. Even when the innate immune response cannot eliminate a virus, it may substantially reduce viral load, reduce pathology, facilitate clearing of the virus by the adaptive immune response, and slow the spread of infection. As biodefense medications, IFNs and IFN-inducers are under development for aerosolized delivery to the lungs.

Medications being developed to prevent infections caused by viral bioweapons and other diseases include: 1) Oral IFN- $\alpha$  or Alferon low-dose oral (LDO) (Hemispherx Biopharma Inc., Philadelphia); 2) inhalable IFN- $\gamma$  (InterMune, Brisbane, CA); 3) dsRNA [Poly (ICLC)] or Ampligen (Hemispherx Biopharma Inc.); 4) ssRNA (Aldara and Resiquimod from 3M Pharmaceuticals, St. Paul, MN); and 5) CpG7909 and CpG10101 oligonucleotides (Coley Pharmaceutical Group, Wellesley, MA). These drugs have either been approved by the Food and Drug Administration (Aldara); are in clinical trials (Alferon LDO, inhalable IFN- $\gamma$ , Resiquimod, CPG7909, and CpG10101); or at a preclinical stage of development (Ampligen).

"Aldara is approved for genital warts, actinic keratoses, and basal cell carcinoma," the authors note. "Other drugs are being tested for aerosolized delivery to modulate mucosal immunity of the respiratory tract. All could be expeditiously tested with inhalational or intranasal administration in H5N1 models with mice, ferrets, pigs, and monkeys." ▼

## Public health support staff may no-show in pandemic

*Does not bode well for all-hazards response*

Balicer RD, Omer SB, Barnett DJ, et al. **Local public health workers' perceptions toward responding to an influenza pandemic.** *BMC*

*Public Health* 2006; 6:99. On the web at: [www.biomedcentral.com/content/pdf/1471-2458-6-99.pdf](http://www.biomedcentral.com/content/pdf/1471-2458-6-99.pdf).

In findings that do not bode well for bioterrorism or all-hazards response, researchers have found that many public health care workers may abandon their posts if an influenza pandemic begins.

In a survey of Maryland public health workers that netted 308 (58%) responses, researchers found that 46% of respondents indicated they would not likely report to work during such an emergency. The U.S. pandemic influenza plan released last November lays out a critical role for local and state public health agencies during a pandemic, including: providing regular situational updates for providers; providing guidance on infection control measures for health care and nonhealth care settings; conducting or facilitating testing and investigation of pandemic influenza cases; and investigating and reporting special pandemic situations.

Moreover, the all-hazards approach currently taken in disaster planning entails an ability and willingness to respond to a broad spectrum of situations, ranging from the intentional (e.g., chemical, biological, or radiological terror) to the naturally occurring, the authors note. Current national pandemic contingency plans account for possible personnel shortages within the health care and public health settings, mainly due to the expected influenza morbidity among workers.

"Yet our data suggest that regardless of the expected morbidity among personnel during an influenza pandemic, nearly half of the local health department workers are likely not to report to duty during such an extreme public health crisis," the authors state. "In fact, most of the workers (and nearly three out of four technical/support workers) do not believe they will even be asked to report to work."

Indeed, they found that the willingness to report to duty during a pandemic varies considerably according to the individual's job classification. The likelihood of reporting to duty was significantly greater for clinical (e.g., nurse,

## CE/CME questions

9. The reported problems with dispensing medication to the chronically ill in the wake of Hurricane Katrina led some to suggest including such drugs and treatments in the strategic national stockpile.  
A. True  
B. False
10. Sandra A. Kemmerly, MD, credited which of the following as the primary reason her hospital was able to remain open during and after the hurricane?  
A. Surrounding sea wall  
B. Never lost air conditioning  
C. Phone service was not interrupted  
D. The hospital well
11. Which of the following were cited as possible explanations for why so few infectious disease outbreaks occurred in hurricane evacuation centers?  
A. Distribution of alcohol hand disinfectant  
B. Daily evaluation of food service and restrooms  
C. Absence of endemic infectious diseases in evacuees  
D. All of the above
12. A survey of public health workers found that the willingness to report to duty during a flu pandemic varied considerably according to the individual's job classification. The likelihood of reporting to duty was significantly greater for which of the following types of workers?  
A. Computer entry  
B. Nurses  
C. Clerical  
D. Receptionists

**Answer Key: 9. A; 10. D; 11. D; 12. B.**

## COMING IN FUTURE MONTHS

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■ A closer look at inducing mucosal immunity by using interferon

■ Hospital pandemic plans — ready or not?

dentist, physician) than technical and support staff, (e.g., computer entry, clerical, receptionists). The perception of the importance of one's role in the agency's overall response was the single most influential factor associated with willingness to report. In general, they found that most of the workers wary about reporting for duty feel they will work under significant personal risk, in a scenario they are not adequately knowledgeable about, performing a role they are not sufficiently trained for, all the while believing this role does not have a significant impact on the agency's overall response.

"Current contingency plans account for possible personnel shortages due to influenza morbidity, but previous studies have shown that during extreme scenarios, a varying proportion of health care workers may be unable or unwilling to report to duty," the authors noted. "This may be even truer for health departments, where unlike more "traditional" first-responder agencies (such as law enforcement, fire services, and emergency medical services), the capacity and willingness to respond 24/7 to crises is not historically ingrained in the work forces' professional cultures and training. Even in the post-9/11 environment, recent data indicate inconsistent and sometimes slow after-hours response by health departments to urgent events involving communicable disease."

### **Each worker must know role**

Each public health worker must have a better understanding of the scenario and importance of his or her personal role within these settings, confidence that the agency will provide adequate protective equipment for its employees, psychological support and timely information, and a belief of being well trained to cope with emergency responsibilities including the ability to communicate risk to others, they concluded.

### **CE/CME instructions**

Physicians and nurses participate in this CE/CME program by reading the issue, using the provided references for further research, and studying the questions. To take the CE/CME test on-line, go to <http://subscribers.cmeweb.com/>. Each issue will test separately. If you have questions, please call customer service at (800) 688-2421. ■

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"In view of what is currently considered to be an impending influenza pandemic, a wide gap between these desired targets and current status exists, that may lead to significant hindrance in the ability of local health departments to function adequately," they noted. "We therefore believe further efforts must be directed at ensuring that all local public health workers, but most notably nonclinical professional staff, understand in advance the importance of their role during an influenza pandemic — otherwise they will fail to show up when they are most needed." ■

### **CE/CME objectives**

After reading each issue of *Bioterrorism Watch*, the infection control professional will be able to do the following:

- identify the particular clinical, legal or educational issue related to bioterrorism;
- describe how the issue affects health care providers, hospitals, or the health care industry in general;
- cite solutions to the problems associated with bioterrorism, based on guidelines from the federal Centers for Disease Control and Prevention or other authorities, and/or based on independent recommendations from clinicians and bioterrorism experts. ■