Lessons Learned From Chicago's Emergency Response to Mass Evacuations Caused by Hurricane Katrina

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Objectives. We analyzed the response of the Chicago Department of Public Health with respect to its effectiveness in providing health care to Hurricane Katrina evacuees arriving in the city.

Methods. Between September 12 and October 21, 2005, we conducted a real-time qualitative assessment of a medical unit in Chicago's Hurricane Victim Welcome and Relief Center. A semistructured guide was used to interview 33 emergency responders in an effort to identify key operational successes and failures.

Results. The medical unit functioned at a relatively high level, primarily as a result of the flexibility, creativity, and dedication of its staff and the presence of strong leadership. Chronic health care services and prescription refills were the most commonly mentioned services provided, and collaboration with a national pharmacy proved instrumental in reconstructing medication histories. The lack of a comprehensive and well-communicated emergency response plan resulted in several preventable inefficiencies.

Conclusions. Our findings highlight the need for improved planning for care of evacuee populations after a major emergency event and the importance of ensuring continuity of care for the most vulnerable. We provide an emergency response preparedness checklist for local public health departments. (*Am J Public Health.* 2009;99:1496–1504. doi:10.2105/AJPH.2007.126680)

Hurricane Katrina made landfall near the Mississippi–Louisiana border on August 29, 2005, devastating the region and forcing more than 800 000 Gulf Coast residents to evacuate, the largest displacement of a population in recent US history.[1] Evacuation centers were initially established in the affected and neighboring states; in Texas, for example, an estimated 250 000 evacuees were provided services (shelter and other emergency relief services).[2] The response ultimately took on a national scope, with 45 states providing disaster relief services.[3]

By September 4, nearly 500 evacuees had been airlifted to Illinois,[4] and over the following 2 weeks more than 6000 displaced individuals were estimated to have arrived on their own, most settling in the Chicago area.[5] In response, the city of Chicago collaborated with the American Red Cross, the United Way, and the Salvation Army to provide housing and other social services to evacuees. On September 6, Chicago's Joint Operations Center, which is part of the Office of Emergency Management and Communications, established 2 relief centers: one at O'Hare International Airport and one at the Fosco Park Community Center, a new Chicago Park District facility.[6] The Fosco Park Hurricane Victim Welcome and Relief Center (hereafter "the center")—the focus of our study—was used primarily by evacuees arriving on their own. The Chicago Department of Public Health (CDPH) was charged with providing medical and mental health care at the center.

We summarize findings from a real-time assessment of Chicago's public health response and highlight lessons learned with respect to the center's provision of medical care. Our assessment was based primarily on qualitative interviews conducted during the center's operations; thus, it reflects staff members' perceptions at or shortly after the time they provided services. Our goals were to evaluate key systemic strategies developed to provide health care to a recently displaced population, to identify gaps in the public health response, and to offer suggestions for improvements.

METHODS

At the request of CDPH, we designed a qualitative process assessment that included interviews with key staff members, direct observations, and reviews of records routinely collected by the center's medical and mental health units. A separate team conducted a cross-sectional study intended to describe the types of medical conditions treated at the medical unit.[7]

Data Collection and Analysis

Our analysis was based primarily on the responses of key CDPH and non-CDPH staff and volunteers to formal, confidential interviews; a semistructured guide was used in conducting these interviews. Individuals involved in the response from the beginning or those who had worked at least 2 shifts were targeted for interviews to ensure a comprehensive knowledge and experience base.

Between September 15 and October 21, 2005, 29 of the 82 individuals who were eligible for the study were contacted and interviewed. Four individuals in various leadership positions outside the health units also were interviewed. Most interviews (30 of 33) were completed before the center closed on September 23; 27 were audiotaped.

The interview guide was developed to gather information from interviewees on their position at the center, role changes over time, staff training, types of patients seen, successes and failures of the response, and recommendations. Prompts were used to encourage participants to elaborate on their responses. Interview data, which consisted of detailed notes taken during and immediately after each interview and written summaries of audiotapes systematically reviewed shortly after the completion of data collection, were converted to a standard summary format. Interview summaries were then coded and analyzed according to the evaluation objectives, the themes of the interview guide, and emerging themes.

All interview summaries were reviewed independently by at least 2 researchers, and the final coding structure was discussed by the authors to ensure the accuracy and reliability of the final data set. A master summary spreadsheet that incorporated dichotomous responses and coded answers to open-ended questions was created to guide assessments of key findings and formulation of conclusions and recommendations. In some instances, direct quotations were drawn to support specific findings and aid in describing the overall experience.

In addition to the interviews, direct observations and reviews of documents used in the health unit provided a valuable contextual framework for understanding and interpreting findings from the interviews. Qualitative observations were made on several days between September 12 and September 23 to assess the overall operation, and these observations were summarized in a narrative form according to the interview guide questions. Furthermore, copies of documents described by the interviewees, such as facility maps, lists of services, medical forms, and volunteer or staff application forms, were reviewed.

Table 1 summarizes the 33 interviews conducted; most of the interviews (n=24) involved CDPH employees. Interviewees represented a wide range of positions and responsibilities at the center: 22 were clinicians and 11 provided nonclinical support, including administration and emergency management. Given that most (22 of 33) of the interviews were conducted with medical staff, we focused on provision of medical services (as opposed to mental health services).

Setting

The center opened on September 6, 2005. It was open 24 hours a day until September 16 and then operated under reduced hours until it closed on September 23. The center served 5373 Gulf Coast evacuees, including 919 in the medical unit and 241 in the mental health unit.

The center was designed as a "one-stop shop" for a variety of social and health services. Upon arrival, individuals were greeted by United Way volunteers and guided through the facility. After registering with the Red Cross, evacuees selected from services provided by an

TABLE 1—Summary of Responses to Structured and Open-Ended Questions, by Agency Type: Individuals Interviewed at the Hurricane Victim Welcome and Assistance Center, Chicago, IL, 2005

	Total (N = 33), No.	Chicago Department of Public Health (n = 24), No.	Other[a] (n = 9), No.
Interviewee data			
Center unit			
Medical unit	22	17	5
Mental health unit	5	5	0
Other	6	2	4
Clinical staff member[b]			
Yes	22	17	5
No	11	7	4
Responded within 24 h of initial contact			
Yes	22	15	7
No	7	6	1
Data missing	4	3	1
Worked more than 8 h/d			
Yes	15	13	2
No	12	6	6
Data missing	6	5	1
Key issues			
Inadequate planning			
Mentioned	23	18	5
Not mentioned	10	6	4
Emergency response training received			
Yes	19	12	7
No	11	9	2
Data missing	3	3	0
Sense of preparedness			
Yes	26	19	7
No	3	2	1
Data missing	4	3	1
Primary care focus			
Mentioned	15	12	3
Not mentioned	18	12	6
Communication structure			
Mentioned	19	14	5
Not mentioned	14	10	4
Motivated staff			
Mentioned	16	10	6
Not mentioned	17	14	3
Inefficient staffing procedures			
Mentioned	22	18	4
Not mentioned	11	6	5
Medical information systems			
Mentioned	16	14	2
Not mentioned	17	10	7

Continued

TABLE 1—*Continued*

On-site pharmacy			
Mentioned	6	5	1
Not mentioned	27	19	8
Patient follow-up concerns			
Mentioned	8	7	1
Not mentioned	25	17	8

Note. Issues reported as "mentioned" were mentioned at least 1 time by an interviewee.
[a]The Chicago Department of Human Resources, Chicago Office of Emergency Management and Communications, Chicago Park District, Chicago Office of Intergovernmental Affairs, Medical Reserve Corps, American Red Cross, and the University of Chicago comprised this category.
[b]Clinical staff members were physicians, nurse-practitioners, registered nurses, and medical students. Nonclinical staff members were administrators, support staff, and public health professionals.

array of governmental and nonprofit agencies. Individuals in need of health care services were escorted to a medical or mental health unit, both operated by CDPH. The center also included child-care facilities, an interfaith spiritual center, a cafeteria, and rest areas. The Salvation Army established a warehouse near the center where evacuees were provided with free personal items such as clothing, toiletries, and toys.

RESULTS

Respondents agreed that the center was a place of compassion and that staff members had a strong sense of mission. However, because one of our goals was to formulate recommendations for future emergency planning, we focused on qualitative process assessments specifically relating to the operational successes and failures observed at the center. Here we summarize our findings in the form of 8 key issues, described in the sections to follow.

Planning

When asked about issues surrounding preparedness, the majority of respondents mentioned inadequate planning. Although CDPH had some elements of preparedness in place before Hurricane Katrina, the need to create key organizational systems during the center's operations decreased efficiency. CDPH disaster response preparation prior to Hurricane Katrina consisted of an inventory of potential sites for emergency response centers, an incident command structure managed by the Joint Operations Center (a city agency distinct from the health department charged with coordinating large-scale emergency responses), and 2 internal CDPH emergency drills (described subsequently). Most of the respondents stated that documents pertaining to the site inventory and the incident command structure were not useful, lacked key components, or were inaccessible. Consequently, members of the medical staff were often compelled to improvise, particularly during the first week of operations. This situation resulted in 2 major difficulties.

First, the site initially selected involved serious shortcomings; for example, its size was inadequate and its accessibility by car was limited. The center was moved to Fosco Park the night before it opened, diverting staff time from other tasks such as stocking basic supplies (sterile gauze and over-the-counter analgesics were unavailable for the first 2 days). The move also meant that logistics staff went sleepless the night before the center opened. Furthermore, although the Fosco Park site was ultimately well suited for the size of the Katrina response, the space allocated for medical care had to be expanded during the unit's operation.

Second, although Chicago's distance from the site of the disaster provided additional time to establish the incident command structure and to prepare the response, several management systems were not initially in place or were inadequate, including systems associated with staffing, medical and prescription records, referrals, and patient follow-up (described subsequently). The Labor Day holiday prior to the center's opening further complicated logistics, in that key individuals involved in the response were difficult to reach or unavailable.

Training

Despite 2 previous emergency response drills conducted by CDPH, some of the interviewees deemed the level of training inadequate. Although some CDPH staff members reported that the 2 CDPH bioterrorism preparedness drills conducted in 2005 helped them prepare for work at the center, 9 of the 24 individuals interviewed stated that they had no previous emergency response training (Table 1). Two staff members indicated that they did not feel prepared prior to arriving but felt prepared once they had begun working, and these individuals described the clinical director's guidance as helpful. Only 4 of the 24 CDPH respondents had no knowledge of their duties before arriving.

Medical students who staffed the triage unit during the first week received training from the Red Cross specific to Hurricane Katrina immediately before they reported. At that time, the students were expecting to travel to Baton Rouge, LA, but they decided to volunteer at the center at the clinical director's request. Overall, the students perceived that they were unprepared, although they found the experience valuable (e.g., they helped set up the triage area, provided triage care with little or no supervision, and assisted physicians in providing primary care services).

Primary Care Focus

The medical unit was originally designed as a triage and referral center but evolved into a primary care facility. Planning for the medical unit was informed by previous Chicago-based emergency preparedness exercises, which focused on mass prophylaxis and infectious disease outbreaks. These experiences resulted in medical services being tailored to provide acute and emergency care, mainly through triage and referral. However, at the center, most patients presented with health needs typically seen in a primary care setting; specifically, many needed prescription medications and care for chronic conditions such as diabetes and hypertension. The results of the investigation conducted in conjunction with this study showed that 48% of the patients seen required medication refills,[7] a percentage similar to those found in previous research focusing on floods and hurricanes.[8–10] A medical unit staff member summarized what most respondents suggested: "Many

patients needed teeth [dentures], eyeglasses, hearing aids they had lost. Next time we should take care of that first."

Staff members noted several factors that helped them adapt to the range of medical needs among the evacuees: the ability to expand the unit's patient care areas, an ad hoc process for procurement of durable supplies, and frequent briefings for key medical staff. Because the medical staff briefings fostered efficient communication and facilitated implementation of changes, they became essential, and nonattendance caused by scheduling conflicts or unawareness of briefings led to confusion. Although, according to 1 respondent, "Procedures changed every 2 minutes," many of the staff members believed that this situation did not cause extraordinary stress.

Communication Structure

As a result of the staff's flexibility, long work hours, and personal contacts, the medical unit functioned reasonably well. However, communication gaps and the lack of a clear organizational structure hampered the unit's efficiency.

The primary factors facilitating communication flow were daily briefings conducted by the unit's clinical director, low staff turnover, and the presence of a single "go-to" person (the clinical director) for all questions and concerns. Most staff members reported that the medical unit "worked," especially after communication elements were added during the first week, including clearly posted policy descriptions and staff schedules.

Although the organizational structure was simple and direct because a single person managed the operation, this arrangement would have been inadequate for a larger or more prolonged incident. The approach required that the director be present 20 or more hours each day for the first week, be aware of every emerging need, and instruct staff members individually regarding their responsibilities for a particular work shift. Furthermore, the structure replaced the command system developed before the incident, contributing to confusion among some staff members about the identity of their ultimate supervisor.

Gaps existed in interagency communication both within and outside the center. The building's telephone lines were not functional during the first week of operations, and some staff members had to resort to personal cell phones; the use of 2-way radios was helpful. Furthermore, access to the Internet was inadequate, limiting communication with CDPH headquarters and restricting resource searches. These findings are consistent with the results from a recent report published by the US Department of Homeland Security, which concluded that Chicago lags in terms of unified communications, specifically between the city and Cook County agencies.[11]

On the whole, staff members believed that their peers and supervisors supported them. For example, according to one respondent, "[The center] feels like one big family." However, many interviewees reported that the on-site presence of CDPH management was inadequate, particularly after the first week of operations.

Staffing Procedures

The process of staffing the emergency response team was inefficient and required lengthy security clearances. Three possible recruitment sources for medical staff were identified: CDPH (including clinicians), the Red Cross, and the Medical Reserve Corps, a national network of local volunteer medical and public health professionals. All staff and volunteers had to complete an 18-page application form and await approval from the CDPH legal office. This situation created a bottleneck of applications, complicating staffing and work schedules and even discouraging some volunteers from participating. In addition, several interviewees reported long waits before receiving assignments, and in some cases staff members were recalled after being informed that their services were no longer needed.

CDPH employees provided 24-hour medical coverage during the first week. Most CDPH staff (15 of 24 interviewed) commenced working within 24 hours of being contacted (Table 1). The utility of the Medical Reserve Corps system was hindered because the database had not been updated recently (and thus preapproved volunteers on the list may not have been available for emergencies, or their credentials or contact information may not have been up to date), and the person responsible for approving volunteers was on vacation with no backup assigned. Consequently, few non-CDPH volunteers were initially deployed.

CDPH respondents commonly described a lack of private physicians, nurses, mental health professionals, and clerical support. No dentists, optometrists, nutritionists, or hearing aid specialists were available. Pediatricians were present during limited hours in the first week, and the demand for female clinicians was not met. Other staffing issues stemmed from confusion over compensation and overtime pay. Several CDPH staff members reported that they were unsure whether they were classified as "paid" or "volunteer," indicating inadequate communication during recruitment. This issue continued through the second week of operations and caused concern, debate, and stress until it was resolved after cessation of operations.

Medical Information Systems

Medical information systems had to be developed during the emergency response. The initial medical forms were inappropriate; the narrative form was lengthy and lacking key information. It was difficult to locate medical records for the few patients who returned for additional care. The situation improved over time, and many of the interviewees believed that these disruptions did not affect patient care.

The lack of an adequate system for referral to services within and outside the center was a barrier to providing expedited care. Staff often relied on personal contacts, and in one instance a commercial telephone book was used as a referral source. Some interviewees reported that the process of referring patients to the mental health unit, also operated by CDPH, was confusing and inefficient. Referral difficulties were most commonly reported for dental care, oncology, obstetrics and gynecology, and eye and ear care. Furthermore, outside referrals were made to the already overburdened public health clinics in the city and county, with few private practice referrals available. Because no previous agreements with local hospitals had been established, referrals to emergency departments were difficult. Eventually a working referral system, described by 1 interviewee as "better than nothing," was created.

Reconstruction of Medication Regimens

Collaboration with a national pharmacy chain aided in reconstructing medication regimens. Prescription refills and replacement of

lost medication were the most frequently cited patient needs. During the initial days of the response, a CDPH provider initiated collaboration with a local pharmacist that resulted in the involvement of a national pharmacy chain; this chain offered access to databases from the hurricane-affected areas, provided free medications for 30 days, and donated diabetes, asthma, contraception, and personal hygiene supplies.

This arrangement resulted in prompt reconstruction of prescription histories for patients who were customers of the national pharmacy; also, it allowed patients to access needed supplies. However, providers experienced difficulties in reconstructing medication regimens for patients who were not customers of the pharmacy and in instances in which pharmacists were unavailable.

Patient Follow-Up

The lack of a patient follow-up system severely limited continuity of care. A patient follow-up protocol was not integrated into the emergency response. As described earlier, the medical unit was initially intended to function as a triage and referral center but later evolved into a primary care facility. Several patients required ongoing, follow-up care, and some even returned to the center for second visits. Many clinicians expressed great concern with respect to continuity of care. The study conducted in conjunction with our investigation identified 63 patients who needed urgent follow-up,[7] and a list of these patients was provided to the health department; however, attempts to establish a follow-up protocol did not materialize.

Finally, we identified a serious problem related to staff members' inability to provide ongoing care to undocumented immigrants. Although these individuals received initial care at the center, provision of follow-up care was difficult as a result of eligibility issues (e.g., undocumented immigrants were not eligible for Medicaid cards).

DISCUSSION

Several important lessons emerged from Chicago's public health response to Hurricane Katrina. In fact, many of the staff members we interviewed believed that the city's response should be viewed, in part, as a test for future emergency events. Specifically, this response should inform future emergency response protocols for providing health care to an unexpected, mass influx of individuals after a natural or human-made disaster occurring some distance away. Although Chicago quickly mobilized and sent resources to the affected regions, the city's distance from the Gulf Coast initially did not indicate a need for a local incident command response. However, Chicago's strong historical ties to the South[12] resulted in the city being a destination for many displaced families seeking shelter and assistance from relatives.

First, our findings confirm the importance of a clear, comprehensive, and well-communicated emergency response plan that can be tailored to disasters of various types, sizes, and proximities. In the case of Chicago, a comprehensive emergency preparedness plan would have prevented or mitigated the challenges described here. Similar issues related to inadequate planning have been reported elsewhere, including issues associated with communication,[13–16] organization structure,[13,14] medical records,[13] referrals for chronic and mental health care,[13,17] acquisition of supplies,[13,14,16] availability of well-trained health care providers and volunteers,[13,14,16] and medication history reconstruction.[13,14]

Second, medical personnel must be prepared to treat chronic and mental health conditions (including first-time diagnoses) in addition to infectious diseases and injuries, and they must meet other primary health care needs, such as medication refills. Health needs in Chicago were similar to those reported at other Hurricane Katrina response centers, irrespective of their distance from the affected regions or the mode of evacuation in question.[13,15,18–24] Also, morbidity surveillance activities conducted by the Centers for Disease Control and Prevention in Arkansas, Louisiana, Mississippi, and Texas during the 3 weeks after Hurricane Katrina revealed that primary health care services and medication refills were the most commonly reported needs.[25]

Third, the ability to reconstruct prescription histories quickly is key to meeting patients' needs and maintaining clinic flows. Cooperation with a national pharmacy chain, although entirely improvised, was highly effective in Chicago's response, and such efforts should be expanded in future responses. Municipal health departments should collaborate with other national and local pharmacies to establish protocols for retrieving patient medication histories as part of preparedness planning. This should be done in coordination with the Red Cross, the United Way, and appropriate federal agencies.

It is beyond the scope of this article to describe the overall process that will lead to a comprehensive response plan, given that the structure of such a plan depends on local contexts. However, on the basis of our interview data, we recommend that the following components be included in any emergency or disaster plan (detailed component descriptions are presented in Table 2): (1) emergency and disaster training and exercises, (2) health record collection and retrieval systems, (3) referral systems and coordinated protocols for patient follow-up, (4) multiagency partnership agreements, (5) evaluation procedures and organizational flexibility during a response, (6) a clear chain of command and concise communication systems, and (7) procedures for staffing a response to quickly meet specific and emerging needs.

Finally, we recommend the inclusion of a protocol for ensuring clinical follow-up for individuals with health problems requiring urgent, ongoing attention after the emergency response. Moreover, although we did not collect data on the health of center personnel after the response, we recommend physical and psychological health follow-ups for emergency responders so that health conditions related to their work can be better understood, monitored, and treated.[26,27]

Limitations

Our findings need to be interpreted in light of several limitations. First, we primarily relied on self-reported information, which is subject to incomplete recall and social desirability bias. However, given that data were collected during rather than after the actual Katrina response, these forms of bias may have been reduced. Second, to avoid disruption of services, we did not implement formal selection procedures to recruit interviewees. Therefore, our data were based on a convenience sample and may not be generalizable. However, a standardized guide

TABLE 2—Suggested Emergency Response Preparedness Checklist for Local Public Health Municipalities

Plan Component	Specific Objectives/Elements	Resources/Links
Health department must have a comprehensive emergency response plan that includes a training curriculum; plan must be reviewed and updated periodically	• All staff must understand the department's comprehensive plan and have access to the document • Staff must understand the department's incident command system and have access to the protocol • Multiple response site options must be established that can be configured to a variety of emergencies • The plan can adapt health care services to account for cultural differences and language barriers • An "all-risk ready" emergency department in a community hospital is identified as recommended by the federally funded Project ER One (see links) • The Trust for America's Health emergency preparedness score should be calculated and the state's emergency capabilities and limitations addressed (see links) • The National Response Framework's guiding principles for a coordinated national response should be incorporated into the plan (see links)	• Project ER One (http://www.whcenter.org/body.cfm?id=555603) • Trust for America's Health (http://healthyamericans.org) • US Department of Homeland Security National Response Framework (www.dhs.gov/xprepresp/committees/editorial_0566.shtm) • Joint Commission on Accreditation of Healthcare Organizations, "Health Care at the Crossroads" (http://www.usaprepare.com/ep3-12-03.pdf)
Secondary response plays a critical role in reestablishing primary care for individuals displaced after an emergency event; this type of response requires significant preparation and may occur at great distances from the event	• Plans are established to provide primary care services during and after the emergency response, such as prescription refills, immunizations, and management of chronic and mental health conditions (see links)	• CDC, "Information for Disaster Evacuation Centers" (http://www.bt.cdc.gov/disasters/evaccenters.asp)
Training should take place at least annually and must include a feedback loop that links directly to an ongoing planning process	• All staff are required to participate in continuing development and training (see links for examples of training resources) • Staff have a written description of specific responsibilities and detailed contact information for their emergency supervisors • A clear chain of command is established and understood by all • All staff must complete cultural sensitivity training	• Columbia University, National Center for Disaster Preparedness (http://www.ncdp.mailman.columbia.edu/training.htm) • Columbia University, "Developing, Implementing, and Evaluating Emergency Drills and Exercises" (http://www.cumc.columbia.edu/dept/nursing/chphsr/pdf/ExerciseGuideFinal.pdf) • Seattle/King County Public Health Department Advanced Practice Center, Workforce Training (http://www.phworkforceactivation.com/) • US Department of Homeland Security, First Responders (http://www.dhs.gov/xfrstresp) • Public Health Learning.com, Public Health Emergency Preparedness and Response (http://www.publichealthlearning.com/Public/GettingStarted)
Appropriate medical forms are in place, referrals to outside resources and specialties are up to date, and follow-up protocols have been established	• Electronic and hard copies of medical record templates that can be adjusted to meet different needs of the emergency should be developed • These templates will assist in creating medical intake forms, exposure assessments, patient health service and follow-up plans, and referrals to specialty or chronic care services (see links for examples) • Electronic and hard copies of referrals should be continuously updated for the department's community and neighboring communities; the referral list should include pediatric services, chronic care (e.g., hypertension, diabetes), optical and dental care, and mental health services • Referral and follow-up protocols should be understood by all participating agencies and providers	• Seattle/King County Public Health Department, Medical Intake and Screening Form (http://www.metrokc.gov/HEALTH/providers/epidemiology/evacuee-medical-intakeform.pdf) • CDC, Hurricane Evacuee Medical Intake Form (http://www.bt.cdc.gov/disasters/hurricanes/katrina/pdf/evacuee-intake-form.pdf) • CDC, Information for Disaster Evacuation Centers, Evacuee Educational Materials (http://www.bt.cdc.gov/disasters/hurricanes/educationalmaterials.asp)

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TABLE 2—*Continued*

	• The number of patients that can be served by each medical group or agency must be established • A protocol should be established for transfer of medical information within the health department and for medical information sharing with other responders	
Plan is coordinated with all relevant local agencies and organizations	• To avoid redundancy, the department should coordinate with other public and private medical groups or agencies in the department's community and neighboring communities to accept referrals and deliver services • Access to services should also be coordinated with the following agencies: National Disaster Medical System (see links), Red Cross, Planned Parenthood, Medicaid, Medicare, local private and public health care centers, transportation providers (e.g., taxi companies, public transportation), shelters, food banks, infection control organizations, telephone and cable companies, and community health centers	• US Department of Health and Human Services, National Disaster Medical System (http://www.oep-ndms.dhhs.gov/about/index.html) • Association of State and Territorial Health Officials, "Developing Partnerships with Community Health Centers for Emergency Preparedness Planning" (http://www.astho.org/pubs/EffePartnershipswithCHCsinPreparednessPlanningFinal01-19.pdf)
Evaluation of the response is built into the plan	• Responses to real emergencies, drills, and training should be systematically evaluated to ensure that objectives and performance goals are met; real-time evaluations should be incorporated into the emergency plan (see links) • The evaluation method must be understood by emergency responders	• Joint Commission on Accreditation of Healthcare Organizations, "Health Care at the Crossroads" (page 33) (http://www.usaprepare.com/ep3-12-03.pdf) • Public Health Learning.com, Public Health Emergency Preparedness and Response, Recovery and Evaluation (http://www.publichealthlearning.com/Public/GettingStarted)
Communication, both within and between agencies, is well planned and the necessary technology is implemented	• All staff can describe the communication system within the health department, in the community, and with neighboring communities • Communication devices are available and include 2-way radios, cell phones, and laptop computers; staff are trained in using these technologies and understand their limitations • Staff fully understand what information is appropriate to share with relevant organizations	• Joint Commission on Accreditation of Healthcare Organizations, "Health Care at the Crossroads" (page 31; http://www.usaprepare.com/ep3-12-03.pdf) • Seattle/King County Public Health Department Advanced Practice Center, Activation Communications (http://www.phworkforceactivation.com) • Public Health Learning.com, Public Health Emergency Preparedness and Response, Risk Communication (http://www.publichealthlearning.com/Public/GettingStarted)
To the extent possible, existing databases and structures (e.g., Medical Reserve Corps) should be used in staffing	• The health department should create and maintain an ongoing credentialing system for health care volunteers and professionals; a database of health care providers should be continuously updated • The database includes a variety of service providers to meet the needs of special populations, including female, minority, multilingual, and multicultural patients (see links for potential resources) • The department should develop an expedited credentialing system for new volunteers and professionals that can be implemented during an emergency response • A protocol for work compensation that is clearly communicated to all staff needs to be established	• Seattle–King County Public Health Department Advanced Practice Center, Workforce Activation (http://www.phworkforceactivation.com) • National Library of Medicine, Specialized Information Services, Special Populations: Emergency and Disaster Preparedness (http://sis.nlm.nih.gov/outreach/specialpopulationsanddisasters.html)

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TABLE 2—*Continued*

Supplies are prepared for a wide spectrum of health care needs, including acute and chronic conditions	• Medical/health supplies and medications are stored and easily accessible by various levels of trained staff • Arrangements are developed for rapid delivery of supplies from preapproved organizations in the department's community and neighboring communities • A full range of supplies and medications are accessible, such as protective equipment, immunization supplies, prophylactic antibiotics, chemical antidotes, stoma supplies, diabetic kits, birth control pills, and hygiene supplies	• Joint Commission on Accreditation of Healthcare Organizations, "Health Care at the Crossroads" (page 22; http://www.usaprepare.com/ep3-12-03.pdf)
Collaboration is established with local and national pharmacies	• The health department should arrange on-site or consultative pharmacy services with local and national pharmacies; pharmacies should have communication systems in place to request additional medications and supplies • A contract with national pharmacies should be developed to allow on-site access to prescription histories for patients from other locations in the United States • Arrangements are made for free or low-cost prescriptions to be available for a reasonable time depending on the level of emergency • Community members are advised to carry a personal medical information form at all times, as recommended by CDC	• Illinois Council of Health-System Pharmacists, Illinois Pharmacy Emergency Response Network (http://www.ichpnet.org/index.asp) • CDC, Personal Medical Information Form (http://www.bt.cdc.gov/disasters/hurricanes/katrina/pdf/kiwy.pdf) • In Case of Emergency RX (http://www.icerx.org)

Note. CDC = Centers for Disease Control and Prevention. This is a suggested list of recommendations based on lessons learned from the Chicago Department of Public Health's response to Hurricane Katrina. These recommendations are intended to serve as emergency preparedness planning guidelines for local public health departments rather than as a strict list of requirements. All of the resources listed were accessed on June 5, 2008.

was used in interviewing a high proportion of the respondents, and all of the information gathered was thoroughly analyzed. Therefore, we believe that our findings accurately reflect the views of the individuals we interviewed.

Third, as a result of logistical considerations, we did not interview individuals receiving services at the center. Fourth, although mental health services represented an important part of the CDPH response, we lacked sufficient data to fully describe provision of these services. Finally, CDPH operates within a well-established clinic structure, and thus our findings may not directly apply to jurisdictions without a similar infrastructure.

Conclusions

The CDPH response to Hurricane Katrina highlights the need for a comprehensive emergency plan that includes strategies for emergencies of various types, sizes, proximities, and types of medical needs. Systems that effectively locate well-trained public health responders and quickly establish management structures, clear communication flows, collection of health data, patient referrals, and follow-up are essential if emergency responses are to be effective. It is imperative that all of these steps be continually evaluated and that they be sufficiently flexible to allow appropriate modifications.

It must be emphasized that a certain amount of improvisation will always be necessary during an emergency response; such improvisation can occur only through periodic training and familiarity among the core response staff. The lessons learned from Hurricane Katrina were complex in Chicago and elsewhere, but they offer an opportunity to reevaluate current procedures and continue to improve strategies to ensure the public's well-being. ■

About the Authors

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Contributors

D. Broz led the study design and contributed to study implementation, data collection, analyses, and the writing of the article. E.C. Levin, A.P. Mucha, and D. Pelzel contributed to study design and implementation, data collection, analyses, and the writing of the article. W. Wong originated the study and contributed data by completing the study interview. V.W. Persky and R.C. Hershow supervised all aspects of the study implementation and conduct and contributed to interpreting the findings. All of the authors contributed ideas and reviewed drafts of the article.

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Human Participant Protection

This study was approved by the institutional review board of the University of Illinois. Interview respondents provided written informed consent.

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