

Mental Health and Recovery in the Gulf Coast After Hurricanes Katrina and Rita

Richard H. Weisler, MD

James G. Barbee IV, MD

Mark H. Townsend, MD

HURRICANE KATRINA WAS THE MOST DEVASTATING natural disaster in US history. Large parts of New Orleans and nearby Louisiana parishes were destroyed. About 90 000 square miles of the Gulf Coast, an area roughly the size of Great Britain, was declared a federal disaster area. The often contaminated flood waters covering much of New Orleans for almost 2 months contained a mix of raw sewage, bacteria, millions of gallons of oil, heavy metals, pesticides, and toxic chemicals, raising health concerns for residents and cleanup workers.

As recently as June 19, 2006, Federal Emergency Management Agency (FEMA) officials estimated that as many as 2.5 million Gulf Coast residents may have been displaced from their homes by hurricanes Katrina and Rita; this number is based on FEMA applicants whose mailing addresses were outside of their home ZIP code and the assumption that each applicant represents an average of 2.5 people.¹ Although more than 1.5 million residents fled the storm, hundreds of thousands remained behind, many of whom died or were injured during or in the immediate aftermath of the storm. As of July 2006, more than 1800 deaths were reported, including 1577 in Louisiana, and 231 in Mississippi.^{2,3} The number of fatalities would undoubtedly have been higher without prestorm evacuation and the efforts of many government and military personnel, first responders, area citizens, and volunteers.

Disruptions and Uncertainties in the Aftermath of Hurricane Katrina

The aftermath of Hurricane Katrina and, less than a month later, Hurricane Rita, tested both the US public and private health care systems as never before; the results, at best, are mixed. Many hospitals and nursing homes were damaged or destroyed, and a reported 215 patients and residents died in these types of facilities.⁴ In New Orleans, many hospitals and nursing homes were flooded before patients and staff had the ability to evacuate. Health care workers often took heroic measures to reduce patient mortality in the long days before rescue.

After the storm, health care remained compromised both for patients who were evacuated to other areas and for those who remained in the region. Medical and prescription records were destroyed; disruptions of pharmacy and distribution networks left patients without necessary medicines; and emergency medical service operations were adversely affected. Usual patient care patterns were disrupted as transportation networks failed and after many physicians, other health care professionals, and their staffs were forced to relocate and care for themselves and their own families. Treatment programs for patients with cancer, cardiovascular diseases, human immunodeficiency virus, mental illnesses, substance abuse, diabetes, and other long-term diseases were disrupted or ended. Some New Orleans residents endured threatened and actual physical and sexual violence until police and armed forces restored law and order. Evacuees also reported similar episodes of violence.

The economic, physical, and psychological damage to survivors of Katrina may ultimately be incalculable. Hundreds of thousands of people lost friends, family members, homes (31% of Louisiana and 21% of Mississippi homes in the hurricane-affected areas were damaged or, in some cases, lost⁵), jobs, automobiles, pets, photographs, and family keepsakes. In the hurricane's wake, families and friends were scattered around the country, disrupting social support networks that help buffer the effects of chronic stress. The initial lists of thousands of missing persons represent a fraction of the numbers of traumatized friends and families. Other major uncertainties remain: unresolved insurance claims, the possibility or forbiddance of rebuilding, insurance availability and affordability, availability of employment opportunities, and viability of the educational system and the health care system.

Mental Health Problems

After the initial crisis, the health care focus appropriately shifted from emergency response to caring for individuals developing or living with more chronic illness. Residents, rescuers, and health care workers were expected to de-

Author Affiliations: Departments of Psychiatry, University of North Carolina at Chapel Hill, and Duke University Medical Center, Durham (Dr Weisler); Department of Psychiatry, Louisiana State University Health Sciences Center, New Orleans (Drs Barbee and Townsend).

Corresponding Author: Richard H. Weisler, MD, Department of Psychiatry, UNC-CH/Duke University Medical Center, 700 Spring Forest Rd, Suite 125, Raleigh, NC 27609 (rweisler@aol.com).

velop high rates of mental health disorders, including post-traumatic stress disorder (PTSD), depression, anxiety, and substance abuse.

About 7 weeks after the hurricane, between October 17 and October 22, 2005, the Centers for Disease Control and Prevention (CDC) conducted a rapid-needs-assessment survey of returning New Orleans area residents for the Louisiana Office of Mental Health.⁶ Interviewers randomly selected households from 24 census blocks in Orleans Parish and 21 in Jefferson Parish, contacted 224 adult representatives (1 per household), and successfully interviewed 166 (74%), using SPRINT-E, a self-reported, postdisaster assessment that screens for symptoms of PTSD, depression, and impaired functioning to assess the need for mental health services. Of the survey respondents, 56% reported having a chronically ill member in their household, 23% reported problems obtaining medical care, and 9% reported difficulty obtaining prescription medications. Only 35% reported being employed at the time of the survey compared with 73% who reported employment before the disaster. Fifty percent of survey respondents' answers indicated possible need for mental health assistance, and 33% had probable need for mental health needs assistance. Moreover, nearly 26% of respondents indicated that at least 1 household member needed mental health counseling, yet only 1.6% of those residents who were reportedly in need were receiving counseling.

In February 2006, the Columbia University School of Public Health in collaboration with the Children's Health Fund Project Assist conducted a survey of trailer or hotel residents receiving subsidies from FEMA. Researchers used a multistage sampling strategy to assess the health of families and children from a cohort representing more than 12 000 households living in FEMA-subsidized housing at the time. Researchers interviewed representatives of 665 of 820 randomly selected households in which an adult was present in the 1601 households in the final sampling frame (81% cooperation rate and 42% overall response rate) using the validated Medical Outcomes Study Short-Form 12 Health Status Survey version 2 (David Abramson, PhD, written communication, July 9, 2006).⁷ One hundred thirty-seven (68%) of 202 of the female caregivers who responded to the survey indicated having a mental health disability due to symptoms of depression, anxiety, or other psychiatric disorders. These women were 2.5 times more likely than those whose survey scores suggested low levels of psychiatric disorders to have children with mental health problems. Since Hurricane Katrina, caregivers reported that 106 (44%) of 242 children had symptoms of new mental health problems, such as depression, anxiety, and sleep problems.

Seven to 13 weeks after the hurricane, the CDC conducted an assessment of members of the New Orleans Police Department and New Orleans Fire Department using the Center for Epidemiologic Studies Depression Scale and the Veterans Administration checklist to identify symptoms of

PTSD.⁸ A total of 912 police officers completed the questionnaire, resulting in an estimated overall participation rate of 65% to 76% based on an estimated 1200 to 1400 police officers on duty at the time of the interviews. Of the participating police officers, 170 (19%) reported PTSD symptoms and 227 (26%) of the 888 who responded to such questions reported major depressive symptoms.⁸ Fire department officials reported that of the 683 firefighters on its most recent (prehurricane) roster, 525 (77%) completed the same questionnaire. Of those, 114 (22%) reported symptoms consistent with PTSD, and 133 (27%) of the 494 who responded to such questions reported major depressive symptoms.⁸

Mortality, Suicide, and Homicide Rates

Although obtaining reliable data has been difficult, the mortality rate appears to have increased, due to suicide and other medical causes as suggested by a 25% increase in the number of death notices published in the *Times-Picayune* for January 2006 vs January 2005.⁹ The Deputy Coroner of New Orleans recently reported a near 3-fold increase in the suicide rate in Orleans Parish, from 9 to 26 per 100 000, in the first 4 months after Katrina.¹⁰ Although most officials agree that the suicide rates have increased, these numbers should be considered estimates at this time because of considerable problems with accurately estimating population sizes, self-inflicted deaths that are still unclassified, and other coding problems. Furthermore, although the murder rates in New Orleans had decreased 36.5% from 59.7 per 100 000 in 2005 to 37.9 per 100 000 in the first quarter of 2006, by the second quarter of 2006 the murder rate had increased to 71 per 100 000 (through June 25), a 37.1% increase over pre-Katrina levels.¹¹

One key issue with calculating any type of mortality or disease rate is the complexity of accurately determining the populations of areas. The FEMA assistance lists, for example, are reported to contain multiple entries for a single person, ineligible applicants, and people not living in the area where they are applying (split families). The FEMA assistance numbers, though criticized, may still provide the best current population estimates, but more complete community surveys would be helpful.

Adverse Health Effects and Use of Mental Health Services

The longer-term adverse health effects of the disaster can be expected to be substantial and require follow-up assessments to determine the need for mental health care services. Significant life events and chronic stress have been previously linked to an increased risk of psychiatric disorders, particularly major depression.^{12,13} In turn, depression appears to be associated with an increased risk of hypertension,¹⁴ heart disease,¹⁵ and diabetes.¹⁶ Depression and anxiety disorders are known to increase mortality rates.¹⁷ Alcohol, drug, and nicotine abuse are reported to increase after disasters and are associated with increased morbidity and

mortality, and alcohol and substance abuse also are associated with increased deaths from motor vehicle collisions and violent crime.^{18,19}

Initial assessments from the Substance Abuse and Mental Health Services Administration (SAMHSA) estimated that 500 000 residents may need mental health assistance. In Mississippi, mental health crisis counselors with Project Recovery (funded by FEMA, facilitated by SAMHSA, and working for the Mississippi Department of Mental Health) reported having had more than 1 million brief encounters (lasting less than 15 minutes, during which time they answered questions and handed out information) and reported having had 150 575 encounters lasting more than 15 minutes since September 2005. The majority of the longer encounters were single visits, but some individuals had been seen more than once. Of these longer encounters, 9537 patients required mental health referral for more intensive treatment and 2264 required substance use disorder treatment.

Project Helpline crisis calls in Mississippi, which are mostly for people dealing with depression and anxiety, increased by 61% between March 1 and May 31, 2006, compared with the period between October 1 and December 31, 2005 (Albert Hendrix, PhD, and J Hillman, written communications June 28, 2006). In Louisiana, between September 2005 and May 2006, a total of 158 260 referrals were made by Louisiana Spirit mental health crisis counselors who were supported by FEMA and SAMHSA, and worked with the Louisiana Department of Mental Health. During that same time, 19 934 of those residents were referred for mental health services and 574 were referred for substance abuse services (Anthony Speier, PhD, written communication, June 29, 2006). These reports do not include individuals who independently sought treatment or received private referrals for mental illnesses related to or exacerbated by the hurricane.

The National Institute of Mental Health has funded a study of residents affected by Katrina, known as the Hurricane Katrina Community Advisory Group survey. Data from this study and other ongoing assessments may help refine the earlier estimates of the numbers of people needing mental health assistance after the hurricanes. It is essential that the numbers needing mental health assistance and long-term follow-up care be updated and validated so that essential care can be provided and appropriate funding can be secured for future services, continued follow-up, and appropriate research.

Access to Medical and Psychiatric Care

The need for access to general medical care and psychiatric care services continues. However, the availability of physicians is limited since many offices were destroyed and practices were closed. Recent estimates project that only 140 of 617 primary care physicians returned to practice in New Orleans after Katrina and that only 22 of 196 psychiatrists continued to practice.²⁰ Orleans Parish has been designated as a shortage area by the Federal Health Resources and Service

Administration.²¹ Only 100 of about 400 physicians participating in Medicaid program in the Gulf Coast area prior to the hurricane are still participating in Medicaid after Katrina (Albert Hendrix, PhD, written communication, June 28, 2006).

Following the disaster, SAMHSA funded the Katrina Assistance Project, in which more than 1200 volunteer, licensed mental health and substance abuse professionals conducted more than 90 000 counseling sessions. These volunteers served across Louisiana and in parts of Mississippi and Alabama, making more than 13 700 referrals for mental health and substance abuse treatment and for social services through April 2006. However, many of the Katrina Assistance Project volunteers have left the region since funding for the program ended on June 30, 2006 (Chu Chu Saunders, MD, oral communication, July 11, 2006, and Anne Mathews-Younes, EdD, written communication, July 13, 2006).

Access to care has been restricted by the Stafford Act of 1974. This federal statute, designed to supplement the efforts of the affected state and local governments in expediting assistance, emergency services, and reconstruction and rehabilitation of devastated areas, mandates that funding for SAMHSA mental health treatment only be used for crisis management, not for continuing treatment.²²

Access to inpatient psychiatric services has been particularly affected. For example, the Medical Center of Louisiana New Orleans (formally Charity Hospital), which had 96 inpatient psychiatry beds before the storm, has not reopened. Approximately 200 other beds in New Orleans area private hospitals and the New Orleans Veterans Administration Hospitals also remain closed. Similarly, the Veterans Administration facility in Biloxi, Miss, was destroyed; this facility had 144 psychiatry beds. The City of New Orleans periodically releases data about health care resources in the area. For example, on June 14, 2006, only 2 psychiatry beds were available within 25 miles of the city, and there were no inpatient substance abuse detoxification beds closer than 75 miles away in Baton Rouge, La.²³ Thus, mental health services in the region are lacking when they are most needed.

Rebuilding the Gulf Coast Health Care Infrastructure

The aftermath of hurricanes Katrina and Rita yields a long list of needs, including long-term funding for rebuilding the health care infrastructure in the Gulf Coast area and for attracting physicians and other health care professionals for outreach and treatment programs. Federal assistance is needed to jump-start the National Health Care Service program for the region; continue funding for the federal SAMHSA volunteer counseling programs until more resources are available; fund disaster and environmentally related medical and psychiatric research studies of residents, workers, and rescuers; and rebuild the area's teaching hospitals and training programs to steadily increase the number of physicians and other health care professionals.

The annual cost of treating 1 mentally ill person in Louisiana averages roughly \$2900, based on the average of treatment costs for 40 000 patients in clinic treatment before Hurricane Katrina (Anthony Speier, PhD, written communication, June 29, 2006). With an estimated 500 000 residents in the Gulf Coast region potentially needing mental health assistance, more federal and state help is required to provide mental health care services and help rebuild local resources. Assistance and resources are also required for Baton Rouge; Shreveport, La; Houston, Tex; and other communities that have accepted internally displaced residents from the storms.

Mental health officials hope that Congress will consider amending the Stafford Act to allow states the necessary financial flexibility to use future SAMHSA crisis counseling funds for continuing treatment of individuals beyond immediate crisis management after disasters. Consideration should also be given to expanding Medicaid eligibility for this and similar disasters and permitting Medicaid patients 18 years and older who require psychiatric treatment to be admitted to free-standing psychiatric hospitals if no other beds are available in psychiatric hospitals that are attached to medical hospitals.

Rebuilding the Gulf Coast goes far beyond the need for repairing or building the physical infrastructure. For the rebuilding effort to be truly termed a success, the health care infrastructure, including health care workers and the patients they serve, must be a primary focus of attention and investment.

Financial Disclosure: Dr Weisler reported that he has served as a consultant to, on the speaker's bureaus of, and/or received research support from the National Institute of Mental Health, Abbott, AstraZeneca, Biovail, Bristol-Myers Squibb, Cephalon, Corcept, Eisai, Eli Lilly, Forest, GlaxoSmithKline, Janssen, Johnson & Johnson, Lundbeck, McNeil Pharmaceuticals, Medicinova, Merck, New River Pharmaceuticals, Novartis, Organon, Pfizer, Saegis, Sanofi-Synthelabo, Schwabe, Shire, Solvay, Synaptic, TAP, UCB Pharma, Vela, and Wyeth; and reported that he has been a stockholder in Bristol-Myers Squibb, Merck, and Pfizer. Dr Barbee reported that he has received research support from Abbott Laboratories, AstraZeneca, Bristol-Myers Squibb, Cephalon, Ciba-Geigy, Eli Lilly, Forest Laboratories, GlaxoSmithKline, Janssen, Merck, Park-Davis, Pamlab LLC, Pharmacia, Pfizer, Roache, SANO, TAP Pharmaceuticals, and Wyeth-Ayerst. He also reported serving as a consultant and/or a lecturer for AstraZeneca, Bristol-Myers Squibb, Cephalon, Eli Lilly, Forest Laboratories, GlaxoSmithKline, Organon, Pfizer, and Wyeth-Ayerst. Dr Townsend reported that he receives research support from Eli Lilly, Pfizer, Organon, Bristol-Myers Squibb, and Johnson and Johnson; has served on speaker's bureau for Bristol-Myers Squibb, Pfizer, and Shire; and has consulted for Shire.

None of the authors received any funding for this commentary.

Acknowledgment: We thank Alden K. Henderson, PhD, MPH, and Pamela G. Tucker, MD, of Agency for Toxic Substances and Disease Registry/CDC; Alex E. Crosby, MD, CDC Division of Violence Prevention; Lisa S. Gullede, MS, Louisiana State University Health Sciences Center Department of Psychiatry; and Michael Kahn, ELS, Cardinal Health for their assistance and technical support.

REFERENCES

1. Federal Emergency Management Agency. Hurricane Katrina current location report. Washington, DC: Federal Emergency Management Agency; June 19, 2006.
2. Louisiana Department of Health and Hospitals. Reports of missing and deceased. Available at: <http://www.dhh.louisiana.gov/offices/page.asp?ID=192&Detail=5248>. Accessed July 9, 2006.
3. Mississippi's invisible coast. *The Sun-Herald*. December 14, 2005. Available at: <http://www.sunherald.com/mld/sunherald/13402585.htm>. Accessed July 9, 2006.
4. Davis R, Johnson K. Louisiana looks into 215 Katrina deaths. *USA Today*, October 16, 2005. Available at: http://www.usatoday.com/news/nation/2005-10-16-la-katrina-investigation_x.htm?csp=N009. Accessed July 9, 2006.
5. Almost 1.2 million homes damaged in 2005 hurricanes. *Nation's Building News*. June 19, 2006. Available at: <http://www.nbnnews.com/NBN/issues/2006-06-19/Katrina+Recovery/2.html>. Accessed July 9, 2006.
6. Assessment of health-related needs after Hurricanes Katrina and Rita: Orleans and Jefferson Parishes, New Orleans area, Louisiana, October 17-22, 2005. *MMWR Morb Mortal Wkly Rep*. 2006;55:38-41.
7. Abramason D, Garfield R; National Center for Disaster Preparedness, Operation Assist. *On the Edge: Children and Families Displaced by Hurricanes Katrina and Rita Face a Looming Medical and Mental Health Crisis*. Executive summary available at: http://www.ncdp.mailman.columbia.edu/files/marshall_plan.pdf. Accessed July 9, 2006.
8. Health hazard evaluation of police officers and firefighters after Hurricane Katrina—New Orleans, Louisiana, October 17-28 and November 30-December 5, 2005. *MMWR Morb Mortal Wkly Rep*. 2006;55:456-458.
9. Berggren RE, Curiel TJ. After the storm: health care infrastructure in post-Katrina New Orleans. *N Engl J Med*. 2006;354:1549-1552.
10. Sauna S. A legacy of the storm: depression and suicide. *New York Times*, NY; June 21, 2006.
11. Perlstein M. NOPD is set to do battle with an influx of criminals to make the new New Orleans safer. *Times Picayune*, New Orleans, La. June 25, 2006. Available at: <http://www.nola.com/news/t-p/frontpage/index.ssf?/base/news-6/1151218729101580.xml&coll=1&thispage=1>. Accessed July 9, 2006.
12. Brown GW, Harris TO, Hepworth C. Life events and endogenous depression: a puzzle reexamined. *Arch Gen Psychiatry*. 1994;51:525-534.
13. Frank E, Anderson B, Reynolds CF, Ritenour A, Kupfer DJ. Life events and the research diagnostic criteria endogenous subtype: a confirmation of the distinction using the Bedford College methods. *Arch Gen Psychiatry*. 1994;51:519-524.
14. Jonas BS, Franks P, Ingram DD. Are symptoms of anxiety and depression risk factors for hypertension? longitudinal evidence from the National Health and Nutrition Examination Survey I Epidemiologic Follow-up Study. *Arch Fam Med*. 1997; 6:43-49.
15. Musselman DL, Nemeroff CB. Depression really does hurt your heart: stress, depression, and cardiovascular disease. *Prog Brain Res*. 2000;122:43-59.
16. Golden SH, Williams JE, Ford DE, et al. Depressive symptoms and the risk of type 2 diabetes: the Atherosclerosis Risk in Communities study. *Diabetes Care*. 2004;27:429-435.
17. Allgulander C. Suicide and mortality patterns in anxiety neurosis and depressive neurosis. *Arch Gen Psychiatry*. 1994;51:708-712.
18. Foa EB, Stein DJ, McFarlane AC. Symptomatology and psychopathology of mental health problems after disaster. *J Clin Psychiatry*. 2006;67(Suppl 2):15-25.
19. McGinnis JM, Foegen WH. Mortality and morbidity attributable to use of addictive substances in the United States. *Proc Assoc Am Physicians*. 1999;111:109-118.
20. Pope J. Three-fourths of medical professionals have left New Orleans. *The New Orleans Times Picayune*. New Orleans, La; April 26, 2006.
21. Orleans Parish declared as health professional shortage area [news release]. Baton Rouge, La: Louisiana Dept of Health and Hospitals; April 25, 2006.
22. Robert T. Stafford Disaster Relief and Emergency Assistance (Stafford) Act, 42 USC §5121 (1988).
23. NOLA Dashboard [update]. New Orleans, La: Louisiana Public Health Institute. June 14, 2006. Available at: http://stayhealthyla.org/downloads/dash_6_14_06.doc. Accessed July 9, 2006.