The Hurricane Katrina Aftermath and Its Impact on Diabetes Care

Observations from "ground zero": lessons in disaster preparedness of people with diabetes

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Hurricane Katrina was one of the most powerful storms to ever hit the coastal U.S. and one of the most destructive natural disasters to hit the country. As brutal and destructive as the winds and storm surge were, it was the aftermath of this storm that wreaked the greatest havoc. Katrina will continue to have an impact on our daily lives, particularly for those of us who lived and continue to live in the area affected. Clearly the greatest destruction of property from this storm occurred in the New Orleans area, surrounding parishes, and the Mississippi Gulf Coast. However, in the aftermath of Katrina, Baton Rouge, the closest major city to the massive destruction and a major route for evacuation, served as the staging area for disaster relief for a number of agencies. In the days immediately after the hurricane, hundreds of thousands of evacuees flooded Baton Rouge, and in this sense, Baton Rouge became "ground zero" for the medical disaster relief effort and nongovernmental organizations. We summarize below our observations on this disaster and suggest that guidelines are needed for health care organizations, health care professionals, and people with chronic diseases like diabetes to have a "plan of action" for major disasters, natural and man made (including terrorist attacks and industrial accidents). Table 1 outlines a potential list of items needed by a person with diabetes for disaster preparedness.

The disruption of a normal routine was particularly difficult for those who had to deal with chronic diseases. Caring for a chronic disease, particularly one such as diabetes, demands significant attention on a daily basis. An individual with diabetes must be certain that supplies of insulin and/or other medications are up to date and available. Individuals must find time to monitor their glucose and, once the value is obtained, make the necessary adjustments to their daily regimen. Dietary intake needs to be considered as well as incorporating physical activity into their daily activities. Finally, the individual with diabetes may need to address other comorbidities such as hypertension, dyslipidemia, and other related conditions. Thus, caring for diabetes on a daily basis demands constant attention in the best of times. In addition to the above disorders, physical injury is common in a disaster, and in the case of Katrina, evacuees wading in contaminated flood water, despite skin abrasions, led to serious skin infections, with little if any preparedness.

It may come as a surprise to most people that despite the best planning, many aspects of the health care "system" can be rapidly interrupted in a disaster. Physician's offices and pharmacies close due to evacuation, and health care professionals and their staff may suffer personal loss and tragedy, making it difficult for them to care for the needs of their patients. This may lead to a feeling of abandonment by patients. Furthermore, major medical centers may be inaccessible—three major teaching hospitals in Orleans parish were surrounded by floodwater and remain closed months after the disaster. Loss of electric power, telephones, and other means of communication and closure of roads due to flooding and fallen trees add to the complexity.

Imagine then the problems encountered for individuals with diabetes having to deal with the aftermath of Katrina, particularly those who had to evacuate under conditions that were not ideal. It is not uncommon in South Louisiana or any coastal region, for that matter, to have to evacuate for the threat of a hurricane. As history has taught us more times than not, individuals are able to return to their homes after the hurricane passes and resume normal lives and activities. However, in the case of Hurricane Katrina, the realization that this wasn't a routine evacuation came well after the fact. Little did the evacuees realize that the majority of them wouldn't be going back home anytime soon, if they even had a home to which they could return. If this was not a concern in and of itself, let us consider the problems that individuals with diabetes may have faced.

First of all, individuals who evacuated found shelter in homes of family, friends, hotels, or for the very unfortunate, shelters consisting of gyms, schools, or civic centers. It was highly unlikely that these individuals knew that they would not be returning to their home anytime soon. Most, if not all, of them had done very little in terms of preparation for days away from home with adequate medical supplies, prescriptions, medical records, etc. Thus, the most immediate concern for many of these individuals in the Katrina aftermath was obtaining the medication, including insulin and oral agents, required on a day-to-day basis.

Obtaining the required antidiabetic medication was particularly a problem for those in shelters. With no medical records to review, the medical history, medication, and doses used were based on patient memory and knowledge. Replace-

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A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

Table 1—*Preparations for a disaster for people with diabetes*

1. Good diabetes education emphasizing self-management skills and stress management.
2. Be up-to-date with all immunization including tetanus.
3. Keep a waterproof and insulated disaster kit including the following items*
   A. A list of items to pack during an evacuation.
      Glucose testing strips, lancets, and a glucose testing meter
      Medications including insulin, etc.
      Syringes
      Glucose tabs or gels
      Antibiotic ointments/creams for external use
      Glucagon emergency kits
   B. A list of contacts for national organizations such as the ADA through their help lines or the Internet.
   C. Photocopies of relevant medical information with you, particularly recent lab tests/procedures, if available.
   D. Up-to-date information on all oral medications and insulin as regards formulation and dosing. If possible, have the prescription number available. Many chain pharmacies throughout the country may be able to refill based on the prescription number alone.
4. Evacuate early if possible, taking the above with you.

*Disaster kits should be reviewed and replenished at least twice yearly.

ment medication, at least initially, did not match their normal regimen and was related simply to availability of pharmacologic agents. For example, an individual whose regimen pre-Katrina consisted of basal insulin combined with shorter-acting analogs would have to settle for what the shelter was able to obtain, generally NPH or regular insulin. Those on glitazones or newer secretagogues may have had to settle for a generic sulfonylurea and/or metformin during this time.

Obtaining insulin syringes and disposing of them provided yet another hurdle to be dealt with in shelters housing thousands. Shelters in general were not set up to provide medical care. Acutely ill evacuees were routed to special-needs shelters where medical care was available or triage to local hospitals was possible. While many of the evacuees were evacuated from hospitals, nursing homes, hospices, and from under the care of family members/caregivers, it was our observation that most diabetic evacuees were autonomous in being able to care for themselves, provided they had adequate nutrition and diabetes-related supplies. This did speak volumes about the diabetes education delivered to these individuals in their communities before Katrina.

Clearly, in the first few days after the disaster, obtaining the necessary supplies was a major problem. The high prevalence of diabetes was unanticipated by the formal relief agencies, or the supply chain failed to mobilize stockpiles to the shelters. Approximately 11% of the population previously living in Orleans and Jefferson parishes has diabetes. Therefore, the civic center in Baton Rouge that housed >6,000 individuals would have had to care for >600 individuals with diabetes in this shelter alone. Given that ~1 million individuals evacuated, ~100,000 individuals with diabetes now had to deal with the issues outlined above. The pressing need for diabetes supplies in shelters, not in hospitals, combined with the size and scope of Katrina caught the logistics chain off guard. For example, a large shelter in Louisiana, housing 6,000+ evacuees, had only a handful of glucose meters in the 1st week of the crisis. Many people that were evacuated from the New Orleans area brought along their insulin and supplies; however, for most these were quickly exhausted. Local, chain, and charity pharmacies filled prescriptions on an emergency basis, often a 7- to 14-day supply of medications, but did not typically provide glucose testing supplies. The positive impact of this corporate generosity cannot be underestimated and relieved much of the pressure on shelters and hospitals.

In addition to the obvious concerns for diabetes supplies and medication, the major change in dietary intake was a cause for concern. Individuals with diabetes may have gone without significant calories during this time of forced evacuation and stress or may have had to adjust to meals provided in shelters, which may not adhere to the daily requirements of the individual. The abrupt change in dietary intake and/or composition with a lack of diabetes medication led to significant disruption in glycemic control, putting patients at risk for both severe hyperglycemia and hypoglycemia. Clearly, the hyperglycemia would contribute to complicating other conditions, e.g., skin infections, etc. While statistics for the prevalence of these problems are currently unavailable, anecdotes abound about the high frequency and severity of both, which may have resulted in some deaths. Thus, management of diabetes in these cases obviously did not consist of aggressively treating blood glucose, but rather trying to prevent acute complications of diabetes such as hyperosmolar states and severe hypoglycemia.

In the subsequent weeks following the hurricane, financial loss, loss of personal belongings, and occasionally bereavement led to severe depression impacting diabetes in many patients. Reactive depression rarely responds to drug therapy, and adequate counseling resources are a challenge to find. Learning stress-management skills, including dealing with major disasters, should be considered as part of the diabetes education curriculum.

Among the tragedy and failures related to Katrina were examples of people and organizations functioning selflessly, efficiently, and effectively to care for others and themselves that have not been publicized. Clearly, medical personnel from numerous facilities and hospitals across the region, not only in Louisiana, but in Mississippi, Texas, and Alabama, donated significant time and effort toward the relief effort and should be applauded for their efforts. The New Orleans teaching hospitals cared for the extremely ill patients who remained, continued to ventilate some manually after the generators failed, and stayed on duty until all patients were evacuated. At Ochsner Clinic Foundation, a major teaching hospital just across the line in Jefferson parish, which was not flooded, major surgery was performed even on the day of the storm, and medical staff cared for patients and each other in the difficult days that followed. Continuation of Ochsner activities was the result of not only its geographic location, but also of comprehensive advanced planning for such a disaster and of execution of the plans by both medical personnel and administrative leadership, despite challenging and changing conditions. Periodically updated disaster planning by health care organizations and health care professionals needs to become an integral part of their activities.

To address the need for diabetes sup-

plies and care, the Pennington Biomedical Research Center initiated Diabetes Relief, a diabetes supply relief effort that collected and distributed insulin, glucose testing meters, lancets, alcohol preps, and glucose tablets/gel to >47 shelters and churches housing evacuees across Louisiana, Mississippi, and Texas. Insulin pump sets were also warehoused and distributed. This effort was supported by generous individual and corporate donations from across the U.S. and abroad, ran on a shoestring budget, and was fueled by effective, dedicated volunteers with a commitment to serve the diabetic population displaced by the largest natural disaster this country has ever seen. We thank our volunteers and donors that made this effort a tremendous success. In the future, a stockpile of diabetes-related supplies, prepackaged as diabetes care kits for shelters and individuals, should be created for rapid deployment after a disaster/evacuation. This kind of disease-focused stockpile could provide clarity as a clearinghouse for supplies, increasing the speed of diabetes relief in major disasters.

The American Diabetes Association website carried information for hurricane victims on how to manage their diabetes in such circumstances, and the Food and Drug Administration provided information on substitution of different types of insulin. Unfortunately, most people in shelters did not have Internet access, and very few people were aware that such information would be available. The lack of electric power in large segments of the region also diminished the effectiveness of Internet education and information.

Over the weeks following Katrina, additional efforts to help in diabetes care were initiated, primarily providing diabetes expertise to the affected areas. In this regard, diabetes educators were provided to the primary care disaster relief teams to help with insulin adjustment and general diabetes education.

Many issues outlined above, particularly those that deal with supply and medication availability, were never considered to be a major problem before Katrina, as the evacuation of a major American city on such a scale due to a natural disaster had never previously occurred in this country. We hope that the American Diabetes Association and other organizations dealing with chronic disease will raise awareness among people with these disorders and the health care professionals and organizations who provide their care of the need to be prepared. Relief and governmental agencies also need to be sensitized to the particular needs of individuals with medical problems that may be impacted by disasters. As the next few months unfold, we, as a medical community, will learn much more about what is needed if ever we're faced with this situation again. We are optimistic that we will return strengthened in resolve to continue to provide optimal diabetes care to an area with high risk of the disease and its complications. We are confident that we will emerge stronger.