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## Katrina's Legacy: Processes for Patient Disaster Preparation have Improved but Important Gaps Remain

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### Abstract

**Background**—Ensuring continuity of care for the chronically ill, who are elderly or indigent presents unique challenges after disasters; this population has fewer financial resources, is less likely to evacuate, has limited access to recovery resources, and is significantly dependent on charitable and government-funded institutions for care. This study expands a previous investigation of the extent to which healthcare providers in coastal Mississippi and Alabama have made changes to facilitate continued care to these populations after disasters.

**Methods**—Key informants representing healthcare and social services organizations serving health disparate residents of the Mississippi and Alabama Gulf Coast were interviewed regarding disaster preparation planning for the period 2009-2012. Interview transcripts were qualitatively coded and analyzed for emerging themes using Atlas.ti<sup>®</sup> software.

**Results**—Participant organizations have implemented changes to ensure continuity of care for the chronically ill in case of disasters. Changes include patient assistance with pre-disaster preparation and training; evacuation planning and assistance; support to find resources in evacuation destinations; equipping patients with prescription information, diagnoses, treatment plans, and advance medications when a disaster is imminent; multiple methods for patients to communicate with providers; and more mandated medical needs shelters. Patients whose chronic conditions were diagnosed post-Katrina are more likely to underestimate the need to prepare. Further, patients' lack of compliance tends to increase as time passes from disasters.

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**Conclusions**—Although changes were implemented, results indicate these may be inadequate to completely address patient needs. Thus, additional efforts may be needed, underscoring the complexity of adequate disaster preparation among disparate populations.

### Keywords

patient disaster preparation; chronic disease; continuity of care; health disparity

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### Introduction

Extreme weather events continue to take a tremendous toll in human suffering, infrastructure destruction, and economic cost.<sup>1</sup> Since the unprecedented 2005 hurricane season three tropical cyclones have landed in the United States Gulf Coast region. Appropriate disaster preparedness and effective response are seminal to mitigating the impacts that an extreme weather event has on human suffering, infrastructure destruction, and economic cost. In particular, special efforts must be made to accommodate individuals with chronic illness who are disproportionately affected.<sup>2</sup>

According to the Centers for Disease Control and Prevention (CDC), the top five of six conditions affecting Hurricane Katrina evacuees were chronic diseases.<sup>3</sup> Estimates of the proportion of individuals affected by Katrina with at least one chronic illness ranged from 41%<sup>4</sup> to 74%.<sup>5</sup> Research shows that following a disaster, the risk of adverse health outcomes increases for populations with chronic diseases.<sup>6-12</sup> The disruption of healthcare services and the immediate challenges, such as the lack of food, water, housing, and utilities exacerbate chronic conditions, especially for those who are indigent or elderly.<sup>6,7,11,13-15</sup> During the emergency response stage, patient foci shifts from taking preventive health measures to survival,<sup>9,16</sup> the chronically ill may not have access to medications and equipment to help control conditions, and patients are less likely to seek treatment until health conditions are serious, which may result in life-threatening complications if chronic diseases are not controlled.<sup>7,12,17</sup> Health disparate populations are particularly susceptible to negative health outcomes in the wake of disasters.<sup>18</sup>

Healthcare and social service organizations which constitute the safety net for the under and uninsured accumulated a wealth of knowledge through their experiences caring for chronically ill patients displaced or otherwise affected by Hurricane Katrina.<sup>17</sup> Lessons learned, however, will turn sterile if not translated into more effective practices for future events.<sup>19</sup>

The study reported here, conducted between 2009 and 2012, is a follow-up to a previous baseline study (2006-2007),<sup>14,16,17</sup> which identified ways to improve continuity of healthcare for chronically ill residents along the Gulf Coast in the aftermath of a disaster; in particular those affected with end-stage renal disease, diabetes mellitus, respiratory illness, hypertension, cardiovascular disease, mental health conditions, and Human Immunodeficiency Virus Infection.<sup>16,17</sup> By the time of the present study, two more hurricanes hit the Gulf Coast since 2005—Ike and Gustav in 2008—putting safety-net organizations' post-Katrina disaster preparedness plans to the test.

We investigated the extent to which safety net healthcare and social service organizations along the Gulf Coast have modified their disaster plans and preparations based on their experiences in the aftermath of Hurricane Katrina. Our study identifies changes that organizations have implemented to increase their involvement in assisting chronic disease patients with disaster preparation, as well as the provisions adopted to help ensure patient treatment is uninterrupted following disasters.

## Methods

This qualitative study followed a Key Informant Interview format,<sup>20</sup> similar to that employed in the baseline study. We proposed to recruit into the study the same fourteen organizations which participated at baseline and augmented the sample size to include five additional organizations engaged in the provision of health services to disadvantaged individuals in the Mississippi and Alabama Gulf Coast area. We specifically designed the interview guide to elicit information on the recommended areas of improvement identified in the baseline study. The study protocol and recruitment materials were approved by the University of South Alabama Institutional Review Board. Written informed consent was obtained from all participants.

Data collection and analysis was completed in three phases. In Phase 1, in-depth, semi-structured interviews were conducted with 26 key informants (KI) representing organizations across five coastal counties, three in Mississippi and two in Alabama. Each interview was recorded and professionally transcribed for analysis. Three analysts (V.B., S.E., M.I.) coded the transcripts for emerging concepts using Atlas.ti software version 5.2.9.<sup>21</sup> After reaching consensus on common codes, the three sets of individually coded transcripts were merged within Atlas.ti. This merged unit combined the contributions of the analyzers and highlighted any differences in coding. Next, two analysts (S.E., M.I.) jointly decided which code families represented the most salient themes. Code families were used to produce queries, which generated lists of participant quotations relevant to each specific theme. The code narratives were then analyzed for content and summarized in a comprehensive draft report.

In Phase 2, 12 KI were invited to participate in an Advisory Panel (AP) to review the draft report and were asked to complete an online survey to verify accuracy and completeness for each section of the report. Ten of those invited provided electronic feedback, which was compiled and returned to the research team members for review. Further detail and clarification were sought from nine KI invited to participate in a workgroup discussion of the main study results. Seven KI participated. Their comments confirmed the accuracy of the report and provided additional detail on some of the procedures described. A directed query addressed eight specific recommendations from the baseline study which had not been covered within the semi-structured interviews. The areas included: 1) whether organizations made provisions for special dietary needs; 2) how well the federal government anticipates the needs of patients; 3) how and where information on available health and social services is disseminated; 4) if collaboration exists between organizations and food distributors (chain stores, etc.) for equitable on-site distribution of perishables to both staff and patients; 5) if ongoing collaboration in relief efforts exists among smaller groups (churches, volunteers,

local traditional service providers); 6) whether experienced organizations (Goodwill, Salvation Army, etc.) coordinate with faith-based groups and distribute goods to satellite sites; 7) if a central location for donations is organized; and 8) if gas stations should be required to have generators. The KI most likely to know about the areas in question were contacted by telephone or e-mail and asked to provide the necessary information; their answers were included in the final project report, which compiles the follow-up study findings.

In Phase 3, the study advisory board (6 members) convened for a discussion centered on verifying the characteristics and functionality of the networks that developed in Mississippi and Alabama in response to the devastation caused by the hurricane.

## Results

Thirteen of the nineteen invited organizations participated in this follow-up study (68% organizational response rate). The non-participants included a county health department, a community health center, two commercial pharmacy chains, a closed-door pharmacy, and a private practice medical provider. Twelve KI from Mississippi-based organizations and fourteen KI from Alabama-based organizations were interviewed. Table 1 provides a breakdown of study participants by state and type of organization.

Representatives of 12 participating organizations (92%) provided comments on the draft report and their feedback was incorporated in the final study report. We recorded the participants' experiences regarding institutional and health system-wide disaster preparation, patient preparedness, and the establishment of both partnerships and networks to prepare for and respond to disasters.

This article focuses on the changes that participating organizations made to better prepare and accommodate those patients with chronic diseases receiving care within the safety net of hospitals, clinics and social services organizations in the Mississippi and Alabama Gulf Coast area, in the event of a disaster. We found that participating organizations providing direct clinical services for chronically ill patients ( $n = 8$ ) have modified procedures, post-Katrina, to focus on facilitating patient preparation, evacuation support, and post-disaster services. Table 2 summarizes changes related to continuity of care for chronic disease patients and the remaining challenges. The following sections discuss in further detail the improvements and challenges described by study participants.

### Pre-disaster Preparation Training

Eight organizations provide annual pre-disaster training which encourages chronically ill patients to prepare themselves and their families for a disaster. All provide flyers or checklists encouraging patients to have adequate survival and medical supplies for at least 72 hours, for themselves and their families. However, a KI noted that experts suggest 72 hours is inadequate preparation and urge that families should have at least seven to ten days of medicines, medical supplies, food, and water to sustain them without public assistance.

Key informants emphasized the importance of physicians encouraging patients with chronic conditions to prepare for disaster. To aid in this effort, one hospital developed patient disaster preparation educational materials that are distributed to physicians' offices. Three organizations provide pamphlets on disaster preparation: one social services agency sends the pamphlets to local businesses to remind employees with chronic illness to take special precautions, another provider distributes the flyers across the community, and the third provider has pamphlets available in its lobby. Two of these organizations supply public service announcements to local media encouraging personal preparation for disasters.

HIV social services organizations and dialysis centers reported similar methods of one-on-one disaster preparedness training, with one HIV center providing this training in a group setting as well. The dialysis centers provide preparedness trainings and informational sessions covering dietary needs and what patients need to know about their medications and lab reports. Additionally, a video on hurricane preparedness is shown to patients on every TV in the dialysis units. One agency providing home care services reported assisting their clients to create individualized patient disaster plans, including, if necessary, assistance with registration for medical needs shelters and evacuation services.

Three organizations provide "grab and go" packs with a few basic survival supplies such as flashlights, water, and some food products. Patients are encouraged to purchase additional supplies to add to the packs in preparation for evacuation. KI agree that "grab and go" packs are a useful preparation tool, and can be used to start conversations with patients around the issue of disaster preparedness. However, some KI indicated their organizations do not have funds to provide these packs to their patients and clients.

Although all organizations have increased efforts to train patients in disaster preparation, barriers to such efforts were noted. Patient preparation is still mostly based on written information, which is ineffective for patients of limited literacy or imperfect English language skills. Frequently, patients will not admit they cannot read, so training information should be presented orally. Translation is also needed for those patients who do not speak or read English, and translators are often unavailable.

Organizations with frequent patient contact report greater success with patient preparation. Infrequent contact limits providers' ability to adequately help patients prepare. Some organizations set specific dates within which patient disaster preparation training occurs; if patients are not seen within that period, they do not receive disaster preparation training.

In spite of providers' efforts, lack of patient compliance with training recommendations inhibits preparation. KI report that patient compliance with disaster preparation is affected by limited patient resources, lack of motivation, and complacency. Lack of compliance is believed to be a primary barrier to adequate patient preparation and likely increases as the time from a major event passes.

### **Evacuation support**

The harsh living conditions, resulting from the devastation created by Hurricane Katrina, indicated that the best alternative for the chronically ill is to evacuate the immediate area

before a hurricane strikes. However, evacuation presents a host of challenges. Several reasons for not evacuating cited in the baseline study included lack of transportation, limited financial resources, and reluctance to leave possessions and pets behind. Providers participating in this study are doing more to educate patients on the need to evacuate and in some cases are providing resources to facilitate evacuation.

KI provided a comprehensive list of chronic illnesses for which evacuation is recommended. All patients at risk of losing mechanical and electrical support or oxygen therapy are advised to evacuate. The list includes patients on dialysis, patients with Chronic Obstructive Pulmonary Disease (COPD) or HIV/AIDS, patients on chemotherapy or radiation, patients with complications from diabetes and/or relying on insulin that must be refrigerated and home care and hospice patients.

In both communities in the study, concerted efforts to improve transportation support for evacuation have been implemented, and local transit companies have buses available to evacuate those without personal transportation, including chronically ill patients and families. The Coastal Transit Authority in Mississippi uses public, school, and hospital buses to provide evacuation services. Residents are encouraged to register in advance.

In Mobile County, the Mobile Metro Transit Authority and the school board provide buses for evacuation through the Emergency Management Agency. Patients must register annually to reserve space for this service. Patients are collected from their homes, brought to a location where there is a brief intake and assessment, and then patients are routed to designated shelters out of the area. The county uses billboards, radio, and TV public service announcements to advertise the availability of this service. The Department of Health educates patients on the necessity of having a personal plan to evacuate and encourages patients to register in advance for transportation support.

All three community health center organizations educate patients on the importance of evacuation and refer patients to other agencies for evacuation assistance. Respondents in Mississippi and Alabama reported that local ambulance services and the fire departments may be called to assist chronically ill patients who need to be transported by ambulance out of the impact area. One not-for-profit pharmacy educates its patients annually on the importance of evacuating. They provide names and numbers of agencies that provide evacuation services, inform patients of specialized evacuation facilities, and encourage patients to use these resources.

Most respondents agree patients on dialysis should evacuate to ensure uninterrupted treatment. The dialysis centers encourage all patients in the coastal area to evacuate. The organization provides a waterproof packet with the patients' medications and lab reports, a three-day diet plan, a medical alert bracelet, the 1-800 number for the organization, and a list of things to take when evacuating. Staff ensures they record the patients' phone numbers and the phone numbers of family members or friends to keep up with patients' destinations. The centers also refer patients to other agencies, such as the Kidney Foundation, to provide financial assistance or gasoline to evacuate.

Both agencies providing services for HIV/AIDS clients evacuate clients to facilities north of the coast using agency vehicles. If clients need medical assistance, they are taken to a medical needs shelter outside the immediate area. Both of these agencies provide travel packs with hygiene supplies, food, and water. In addition, one agency provides resources such as gas vouchers to clients who prefer to evacuate using their own vehicles. The agency also refers clients to other organizations for transportation and shelter.

In summary, more evacuation services are provided to help the chronically ill evacuate the area than before Katrina. However, some KI report concern that if a major event threatens, public agency capacity may be inadequate to evacuate all patients with chronic illnesses. KI recommend that patients should identify friends and family who can provide evacuation transportation before relying on public services, as demand for services may exceed capability to deliver. KI from rural areas also report their communities offer no public evacuation services.

### **Provisions for post-disaster care**

As part of the training process, four organizations collect patient contact information for relatives and friends outside the immediate area who will communicate with patients during evacuation. Despite efforts to maintain patient contact information in evacuation areas, providers indicate that evacuation destinations vary depending on the hurricane track, so if the evacuation destination changes, providers may not have accurate contact information. Unless providers have frequent contact with patients, maintaining accurate evacuation information is problematic. KI suggest it is more important for providers to give patients multiple organization phone numbers so patients can contact providers after events regardless of physical damage to facilities. One KI acknowledged that safety net organizations have an obligation to inform their patients where to go for assistance if one's regular healthcare facility is damaged or inaccessible.

A challenge facing the displaced chronically ill after Hurricane Katrina was locating service providers in their new locations. The baseline study pointed to the need to provide patients with 1-800 numbers to contact current providers and to provide lists of resources in likely evacuation areas. Nine organizations in the current study provide lists of resources and contact information for service agencies and medical providers in the evacuation areas as well as in the immediate area, if providers' facilities are damaged or destroyed.

### **Patient Prescriptions and Knowledge of Treatments**

After Katrina, many displaced patients with limited knowledge of their prescription medicines could not contact providers, whose facilities and medical records were destroyed, to obtain or verify prescriptions. These experiences caused providers to realize the importance of providing documentation of patient diagnoses, medications, and treatment regimens, as well as training patients to be more knowledgeable of their medical conditions and treatment. In our follow-up study, it was evident that all participating organizations that prescribe or fill medications had implemented strategies to provide patients with portable records of their medications and, in some cases, other relevant treatment information, especially near the start of hurricane season.



One organization providing social services to HIV/AIDS patients provides identification cards and asks patients to sign release forms so the agency can assist the client with obtaining medications from the state health department or a pharmaceutical company in case of evacuation. Another organization assists HIV/AIDS patients with recording their own information and encourages clients enrolled in the health department's prescription program to obtain a laminated card with prescription information.

Two organizations providing care for patients on dialysis and patients receiving cancer treatment offer information packets that include medical history, lab reports, diagnoses, and prescribed treatments. The dialysis centers in the study also provide diet information and a medical alert bracelet in the packet.

### Advanced Prescription Medications

Hurricane Katrina struck at the end of the calendar month when monthly medications were mostly consumed. Most insurance plans and Medicare/Medicaid prohibited early prescription refills, so patients in devastated areas had no access to pharmacies and no resources to purchase prescription medications; therefore, treatment of chronic diseases was disrupted in some cases for weeks. This disaster demonstrated the importance of having an adequate supply of prescription medications on hand if pharmacies are not available.

Fortunately, changes have been implemented to improve access to some prescription medications for patients with chronic illnesses in the event of disasters. For example, a county health department reported they can now provide early refills on maintenance medications that are not controlled substances. The department coordinates with a community health center organization to help patients get advanced medications if a hurricane is threatening. Another community health center organization can provide two weeks of advanced medications, and up to six weeks of medications, if the prescription is filled when a hurricane is imminent.

Agencies report that patients with HIV/AIDS routinely receive a three months' supply of medications. One agency maintains emergency contact information in order to check with patients to ensure they have a three-month supply of medication before a hurricane. In Alabama and Mississippi, policy changes with state health departments allow these patients to receive prescription medications from the departments even when patients evacuate. Dialysis facilities ensure patients have an adequate supply of medications before they evacuate; if necessary, patients are provided with samples to bridge them through the disaster.

In addition to health plans that limit early refills, one of the greatest barriers patients face in obtaining advance prescriptions are expensive drugs that make it difficult for patients to afford advance prescriptions. For patients who pay for their own medications, \$4.00 prescriptions offered in commercial pharmacies have substantially reduced the price barrier for advance refills. One non-profit pharmacy does not provide 90-day supplies due to limited inventory, but would like to provide this service. Another non-profit pharmacy recently revised policies to allow 90-day supplies of some prescription medicines. Three respondents from Alabama and Mississippi reported disaster preparation efforts to encourage pharmacies



to provide extra medication before an event, allowing delayed payment if the patient has only a few days' supply.

### Medical Need Shelters

The need for medical needs shelters was evident after Hurricane Katrina, when many patients sought help at local hospitals. As a result, both in Mississippi and Alabama, a mandate was issued to open medical needs shelters in the wake of disasters. As one organization recognized, the medical needs shelter has been a huge improvement on the healthcare system and takes a considerable burden off of the hospitals.

Health departments have protocols to determine which patients are qualified for medical needs shelters. Patients who need nursing care are not qualified for medical needs shelters and should be admitted to hospitals. Medical needs shelters accept individuals who are able to do the activities required for daily living, but need some assistance with equipment or electrical power to run ventilators and other types of medical equipment. Patients who require tracheotomy suction or dressing changes or assistance with medications are eligible for medical need shelters. Patients in special needs shelters are required to be accompanied by one capable adult to assist with care.

In Mississippi, a revised strategy designated the state's 15 community colleges and their multiple campuses as special needs shelters, with the purpose of providing an additional 1,500 beds for the special-needs population. Respondents in Mississippi reported the number of special needs shelters has increased throughout the state since Katrina. One respondent was pleased that before Hurricane Gustav (2008) the agency could even check to determine which clients had reserved space at and secured transportation to the shelters. However, another respondent reported concern over the number of shelters possibly being reduced due to a lack of resources.

Immediately after Katrina, Mobile and Baldwin Counties, AL, set up medical needs shelters. As a result, in 2006, opening a medical needs shelter before a disaster became a state mandate. The Alabama Department of Public Health is responsible for activating medical needs shelters in Alabama during times of evacuation. The medical needs shelter in Mobile, AL, can house 150 medical needs qualified patients and one caregiver per patient (300 total).

There is debate among respondents as to who should be admitted to special medical needs shelters. Although patients with controlled diabetes are not eligible for admittance, two respondents strongly recommend they should because they may require medication that needs refrigeration, which these shelters would be capable of storing. Respondents also argued whether all patients with HIV/AIDS should be admitted or only those who are unable to manage their medications without assistance.

Respondents stressed that medical needs shelters are not equipped with hospital beds, do not provide personalized nursing care, and cannot fulfill specific dietary needs of all patients. For these reasons, most organizations encourage patients to evacuate the area. Respondents strongly recommend that patients on dialysis should be evacuated.

Participants reported several problems regarding medical needs shelters. First, the number of medical needs shelters is reportedly inadequate to meet the demand. One participant was concerned that the response in a true disaster situation would be problematic as the space available in the medical needs shelters is limited. This problem is being addressed and new ways to provide medical needs shelters to meet demand are being evaluated. Also, one organization reported that adjacent counties are working together to be able to relocate overflow patients if necessary. Another issue reported is that sometimes the caregiver, who must accompany the patient, is as ailing as the medical needs patient. One organization reported that the solution to this problem is to strictly adhere to the admittance criteria and recommended police presence at the medical needs shelters in case somebody refuses to accept the criteria. Despite the reported concerns, the services provided by medical shelters to both the community and the healthcare system are significant.

Organizations that serve patients with certain chronic illnesses, such as multiple sclerosis, cerebral palsy or Down's syndrome—that do not meet the criteria for admittance into a medical needs shelter—are realizing their organizations should assist clients with evacuation or finding other types of shelter. They are working to find solutions for their patients.

## Discussion

We sought to understand how safety net organizations have acted on the lessons they had learned during and after Katrina and how these changes have improved their ability to foster continuity of care to patients with chronic illness in the event of a disaster. We identified improvements implemented by safety net organizations in the areas of support to patient preparation and evacuation, provisions for post-disaster care, knowledge of prescription information, and care provided through medical needs shelters. Factors limiting the effectiveness of service providers' efforts include complacency and lack of compliance by patients, as well as limited system resources.

The importance of patient preparedness training is recognized by all organizations included in the study. The provision of written information is the most frequent tool mentioned, recognizing its shortcomings in those with limited literacy and English language skills. Although an abundance of pamphlet and leaflets may not directly translate into improved preparedness behaviors *per se*, it does contribute to generate the “density of information” climate which has been associated with effective preparedness information. The density of information criterion includes three components: multiple sources, multiple channels, and frequent repetition.<sup>22</sup>

Health disparate populations often seek services from various safety net organizations. The fact that most of such organizations address disaster preparedness—even if only through printed media—contributes to engender the redundancy that is necessary to promote individual disaster preparedness considerations.<sup>22</sup>

One-on-one disaster preparedness discussions with patients, also held by some participating organizations, afford providers the opportunity to promote individual responsibility, self-efficacy, and a personal appraisal process. Such attributes are recognized building blocks of

motivated behavior.<sup>23</sup> Helping individual patients create a preparedness plan and take necessary implementation steps further supports self-efficacy. An interesting strategy used by a small number of participating organizations was the proactive design of preparedness “teachable moments” around the provision of “grab and go” evacuation packets. As described by Vineburgh et al., “the teachable moment uses a current or timely health issue as an opportunity to educate the public about important health behaviors that can have a *continuing impact*.”<sup>24</sup> However, as reported by KI, individualized preparedness training is significantly constrained by limited personnel and financial resources.

In spite of proactive and concerted efforts to offer preparedness training to their chronically ill patients, providers identified lack of patient compliance as the primary barrier to effective patient preparation. The literature documents that preparation for disasters is not a common behavior among the public.<sup>25</sup> There is indication that only approximately one third of Americans have a basic emergency preparedness kit, and two thirds feel personally unprepared for a disaster.<sup>23</sup> Surveys of populations seasonally exposed to hurricanes document higher estimates of preparedness: 69.3% of Houston residents reported having an evacuation plan,<sup>1</sup> and 57% of residents in low socioeconomic areas of the Texas Gulf Coast affirmed they felt prepared for the event of a hurricane strike in their community.<sup>26</sup> However, as described by Eisenman et al., among residents of Los Angeles County—an area known for its higher risk of earthquakes—preparation levels among persons with chronic conditions are low (41%) in comparison with people who report excellent health (53%).<sup>2</sup> The gap was larger for individuals with mental health illness: only 30% reported having disaster supplies. Differences remained significant after adjusting for socioeconomic status, providing indication that low levels of health may be an independent factor inhibiting disaster preparedness.

Effective disaster preparedness education and training may be among the most difficult jobs entrusted to safety net providers. In general, disasters are perceived as low probability events, and feelings of trivial personal susceptibility are common.<sup>22,25</sup> Within such a framework, an individual's stake in preparedness remains low since direct personal consequences are not viewed as likely, and the person's vested interest in disaster preparedness—proposed to be a major catalyst of behavior<sup>23</sup>—may not reach the necessary action threshold. While personal experience with a disaster may temporarily heighten the susceptibility perception,<sup>22,25</sup> there is also evidence that motivation wanes as time elapses, with the “window of opportunity” open by personal experience closing typically within a two-year period.<sup>22</sup> Financial and social vulnerability also diminish preparedness capacity.<sup>1</sup> They are prominent among the barriers to disaster preparedness experienced by the health disparate populations accessing care at safety net organizations.

Recognizing there are multiple and intricate obstacles to effective preparedness education, theoretical frameworks grounded in the social and behavioral sciences have recently been used to conceptualize, develop and test models to optimize risk communication and promotion of disaster behaviors.<sup>22-24</sup> Further empirical testing of such models is necessary to generate a strong evidence base upon which to create the resources that busy practitioners (such as those participating in the present study) need to successfully engage their patients. Meanwhile, the ‘communicating actionable risk’ model, as described by Wood et al.,

provides guidelines to shape preparedness education, which can be summarized as follows: 1) people are motivated by information about actions that are feasible to take, 2) actionable information includes observing others taking actions to prepare, as well as verbal and written information describing preparedness actions, 3) observing others prepare fosters confidence that preparedness actions are effective, 4) observing others also increases knowledge about what actions are feasible, and 5) the emphasis is on communicating actions, not risk.<sup>22</sup> Videos showing others engaged in disaster preparedness may be among the most effective ways to encourage these behaviors in our communities.<sup>22</sup>

One of the most memorable lessons afforded by Katrina was the need for patients to have portable records of their prescription medications and relevant diagnoses/treatments.<sup>14</sup> In the present study, the majority of organizations providing direct services to patients reported procedures to provide such records or to help patients create the records themselves. Likewise, community health centers, dialysis centers and HIV social services organizations now provide their clients with information about alternative places they may access for continuity of care in the event that facility closures, evacuation or displacement impede the provision of care at usual locations. The above mentioned provider-initiated actions are a clear example of lessons learned transformed into tangible procedures to foster continuity of care for the chronically ill. Research is needed to understand whether patients actually carry this information with them if evacuated or displaced.

Another seminal lesson conveyed by Katrina was the wisdom of patients stockpiling medications so as to be able to maintain their prescribed regimens through a disaster aftermath.<sup>9</sup> Nonprofit pharmacies in the present study have heeded the lesson and have modified or are in the process of modifying their dispensing policies to provide extended refills in case of impending hurricanes. A community health center also facilitates extended refills in the wake of major storms. Given the non-response by commercial pharmacies, we do not have information on whether health plans have changed policies to allow early or extended refills in support of patient preparedness. After Katrina, the Alabama Department of Health AIDS drug assistance program formulated policies that allow patients to request and receive their medications from any location within the state, thus supporting continuity of treatment for patients who are displaced or decide to evacuate.

Two system-level improvements in response to Katrina experiences concern transportation support for evacuation and the establishment of medical needs shelters. While progress in establishing protocols for evacuations and securing resources to evacuate patients and their families is evident, the capacity of the public transportation services may be inadequate to evacuate large numbers of people in a short time frame. Likewise, while mandates providing for special medical needs shelters to qualified patients are in place, KI in AL expressed concerns that demand is likely to exceed capacity. Patients must be aware of the purpose of and stipulations to medical needs shelters. Therefore, admittance to medical needs shelters should not be based on a patient's diagnosis, but rather on the degree of illness and needs.

Even as the deleterious effects of disasters are well known, achieving full preparedness compliance remains a challenge. Miller et al., point out the 66% of Americans feel they are unprepared for a disaster.<sup>23</sup> Theories for noncompliance exist related to particular behaviors

and mindsets. For example, studies suggest that people fall into repetition of the familiar—i.e. continuing practices, such as disaster preparations, as they have always done, even if they have not been entirely effective in the past. Others may not believe they are at risk, a perception reinforced every day that a disaster does not occur.<sup>22</sup> KI from our study noted that, even for those who have experienced the hardship of a disaster, the sense of danger may weaken as time passes, thus becoming less vigilant in their disaster preparations. In order to be effective disaster preparation must be woven into the community fabric. Communication of disaster preparedness must not only be clear, but geared toward facilitating action, disseminated frequently and from multiple sources and channels.<sup>22,25</sup>

The data reported in this study were collected between 2009-2012 and illustrate the major changes implemented by participating organizations to improve disaster preparedness and to assist their clients and patients over a seven year period post Katrina. Health care providers highlighted five areas of positive change: sustained efforts to enhance patient preparedness training, provision of portable medication records, promotion of individual stockpiling of medications, expansion of shelter options for patients with medical needs, and increased provisions for transportation support in the event of evacuation. Thus, the present study offers benchmarks against which future studies can compare. Subsequent studies can investigate whether additional disaster policies and procedures are implemented, the extent to which disaster preparation remains a top priority, or whether organizations return to complacency similar to preparation standards before Hurricanes Katrina and Rita. The study of disaster preparedness must be ongoing as organizations should constantly seek ways to improve preparation for a variety of disaster scenarios.

## Study Limitations

One limit of the research presented is the 68% organizational response rate. In particular, one of the organizations participating in the baseline study that declined to participate provides primary care to a sizable proportion of disadvantaged patients in Mobile County, AL. Therefore, our study results may not be wholly representative of the patient preparedness experience of primary care organizations in coastal Mobile County. Likewise, we were not able to establish contact with representatives of the local health department for Jackson County, MS. However, no medical care is provided by this organization, and missed input most likely would apply to administrative support rather than the direct care of patients. Finally, we were unable to elicit responses from two commercial pharmacy organizations located in MS and AL, and one closed-door pharmacy located in AL. The lack of input from commercial pharmacies is especially problematic as they had a major role in support of patients in the aftermath of Katrina. We are unable to report here whether their experiences have resulted in modified procedures to facilitate the acquisition of advanced prescriptions or whether they have put systems in place to stockpile medications to insure continued supply in response to natural disasters.

The data reported here were collected between 2009 to 2012. While we delineate both improvements and remaining challenges to processes for patient disaster preparation specific to health disparate patients in the Mississippi and Alabama coastal areas over a seven year period post-Katrina, it is possible that the information we provide does not represent current

practices. However, the study of disaster preparedness must be ongoing and our findings provide important benchmarks against which future studies can compare.

A third limitation of the study is the lack of independent verification of the data provided by KI. We portray the picture of patient preparedness based on the information gathered at interviews. However, the draft and final reports of the study were reviewed by a variety of KI from different organizations, which might be likened to a peer-review of the overall data. Thus, we are confident that the information presented does approximate the reality of the processes of patient preparation instituted over a seven year period since Katrina.

Additionally, we did not collect any primary information from patients. While our study was not designed to accomplish such an objective, research on the actual impact of the organization's training efforts should be a priority. Direct patient input would shed light on the barriers to preparation faced by patients, as well as the nature of mechanisms that would effectively support patient preparedness. Moreover, the patients that actually exercise preparedness behaviors should be singled out to become role models and may become the most effective disaster preparation trainers.

Finally, the study is observational in nature and based on self-report. However, in spite of the limitations discussed, our study should be representative of the post-Katrina patient preparedness processes exercised at the tertiary and primary level by organizations tasked with the care of health disparate populations in the coastal areas of MS and AL -a sizable area of the Gulf Coast. Studies are needed to examine whether the same disaster preparation methods are applied in other coastal areas. Moreover, while it is likely disaster preparation varies in non-coastal areas, studies are needed to identify which lessons learned from hurricane preparedness and response may be applicable to geographical regions where other types of disasters are more prevalent.

## Conclusions

Lessons learned from the devastation of Hurricane Katrina indicated needs for better planning by patients and providers, for continual education to ensure adequate patient preparation, and for building a collaborative network of healthcare organizations, capable of mitigating the impact of disasters among the chronically ill.<sup>4,14,16,17,29,30</sup> Healthcare providers and social service agencies are more proactive in training and helping patients with chronic illnesses to improve preparation for disaster. However, pervasive barriers to adequate preparation were identified, in particular, patient complacency which increases as time from the last major event passes, and lack of patient compliance with preparation guidelines. In addition, the scarcity of public resources for patient preparedness training, evacuation, and sheltering limits the system's capacity to adequately support health disparate populations through disasters.

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**Table 1**  
**Study participants by Organization and State**

Organization Type (No. participant organizations)	Mississippi	Alabama
Hospital (2)	<ul style="list-style-type: none"> <li>• Associate Administrator/Chief Nursing Officer</li> <li>• Trauma Coordinator</li> </ul>	<ul style="list-style-type: none"> <li>• Hospital Administrator</li> <li>• Assistant Hospital Administrator</li> </ul>
County Board of Health <sup>a</sup> (1)		<ul style="list-style-type: none"> <li>• Director of Administrative Services/Safety Officer</li> <li>• Director, Bureau of Disease control</li> <li>• Emergency Preparedness Coordinator</li> <li>• Epidemiology Officer</li> </ul>
Community Health Center (2)	<ul style="list-style-type: none"> <li>• Administrator</li> <li>• Coordinator</li> <li>• Clinician</li> </ul>	<ul style="list-style-type: none"> <li>• Corporate Officer</li> <li>• Director</li> <li>• Administrator</li> </ul>
Social Services Agency for persons living with HIV <sup>b</sup> (2)	<ul style="list-style-type: none"> <li>• Director</li> <li>• Coordinator</li> </ul>	<ul style="list-style-type: none"> <li>• Executive Director</li> <li>• Client Services Director</li> </ul>
Non-profit Pharmacy (2)	<ul style="list-style-type: none"> <li>• Executive Director</li> <li>• Pharmacist</li> </ul>	<ul style="list-style-type: none"> <li>• Executive Director</li> </ul>
Academic Disaster Preparedness Center <sup>c</sup> (1)		<ul style="list-style-type: none"> <li>• Director, Preparedness Training</li> </ul>
Dialysis Services Organization <sup>c</sup> (1)		<ul style="list-style-type: none"> <li>• Nurse Coordinator</li> <li>• Social Worker</li> </ul>
Social Services agency for persons living with Diabetes <sup>c</sup> (1)	<ul style="list-style-type: none"> <li>• Associate Director</li> </ul>	
Volunteer Medical Reserve Corps <sup>c</sup> (1)		<ul style="list-style-type: none"> <li>• Director</li> </ul>

<sup>a</sup> It also manages a Community Health Center Organization

<sup>b</sup> HIV: Human Immunodeficiency Virus

<sup>c</sup> Newly recruited organization

**Table 2**  
**Implemented changes to foster continuity of care for patients with chronic diseases after a disaster and related remaining challenges**

Area of Improvement	Remaining Challenges
<b>Pre-disaster preparation training</b>	
<ul style="list-style-type: none"> <li>• Provision of flyers, checklists or pamphlets on disaster preparation</li> <li>• Provision of “Grab and Go” disaster preparedness bags as a means to initiate disaster preparedness discussions with patients</li> <li>• One-on-one disaster preparedness training adopted by Dialysis Services</li> <li>• Group meetings and one-on-one discussions on disaster preparedness for persons living with HIV<sup>a</sup></li> <li>• Individualized assistance to generate a disaster plan and contact medical needs shelters for some home care patients</li> </ul>	<ul style="list-style-type: none"> <li>• Written materials not useful for patients of limited literacy and/or English language skills</li> <li>• Financial constraints limit numbers of “Grab and Go” bags available</li> <li>• Limited contact with patients precludes timely disaster preparedness training</li> <li>• Patients' limited interest on planning for disaster preparedness</li> <li>• Patients' lack of compliance with training</li> </ul>
<b>Evacuation support</b>	
<ul style="list-style-type: none"> <li>• Transportation support enhanced</li> <li>• Mechanisms in place to register for transportation support</li> <li>• Agencies serving persons living with HIV are capable of providing some transportation, as well as some resources for evacuation (gas allowance)</li> </ul>	<ul style="list-style-type: none"> <li>• Transportation needs are likely to exceed current transportation capacity</li> </ul>
<b>Provisions for post-disaster care</b>	
<ul style="list-style-type: none"> <li>• Some institutions ask for phone numbers of relatives or friends who may help locate displaced patients</li> <li>• In Mississippi, 1-800 Community Center number patients can use to find out what clinics are open post-disaster</li> <li>• Medical, dialysis and HIV social services providers proactively furnish their patients with information on medical and other resources they can access along their intended evacuation route</li> </ul>	<ul style="list-style-type: none"> <li>• Because evacuation plans may change, relatives of friends may not be able to facilitate contact with patients</li> </ul>
<b>Patients' prescriptions and knowledge of treatments</b>	
<ul style="list-style-type: none"> <li>• Medical, dialysis and HIV social services providers proactively furnish their patients with written records of their prescribed medications and any relevant treatment details.</li> <li>• Some progress made with the provision of advance prescription medications</li> </ul>	<ul style="list-style-type: none"> <li>• Some patients may still have difficulty procuring prescription medications in advance to properly prepare for disaster.</li> </ul>
<b>Medical needs shelters</b>	
<ul style="list-style-type: none"> <li>• Mandates to open medical needs shelters in Alabama, and enhancement to the capacity of medical needs shelters in Mississippi as a direct result of the experience with Hurricane Katrina</li> <li>• In Alabama, efforts to coordinate cross-county lines to enhance medical needs shelters capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Specially in Alabama, concern that demand will most likely exceed current medical needs shelter capacity</li> <li>• Patients with special medical needs, such as those with cerebral palsy, muscular dystrophy, etc. cannot be housed at medical needs shelters</li> </ul>

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<sup>a</sup>HIV: Human Immunodeficiency Virus

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