The Controversy Inherent in Managing Frail Nursing Home Residents During Complex Hurricane Emergencies

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Emergency planning for vulnerable populations constitutes a major element of community disaster preparedness and is an area in which guidance is particularly sparse. As evidenced by the well-publicized deaths of nursing home residents following Hurricanes Katrina and Rita, the need to improve nursing home emergency preparedness is self-evident. Nevertheless, as efforts to improve preparedness develop, a central controversy remains. Aside from mandatory complete evacuations, is it better to evacuate or not to evacuate frail elderly nursing home residents in the setting of hurricane emergencies? This paper reviews the historical evidence on both sides of the argument and suggests a policy and research agenda.

Keywords: Nursing homes; emergency preparedness; disasters

Since the events of September 11, 2001, billions of federal dollars have been devoted to improving the preparedness posture and public health infrastructure in the United States. The goal has been to develop a nimble health care system that is poised to respond expeditiously and appropriately to a spectrum of threats ranging from natural disasters to bioterrorism. To date, most of the attention has focused on traditional first responders (ie, fire, police, EMS) and hospital preparedness, giving less attention to preparedness at the community level and in non-acute health care facilities such as nursing homes (NHs). As evidenced by the failure of the public health and emergency response systems during and after Hurricanes Katrina and Rita, there clearly remain significant gaps in our ability to effectively respond, at all levels, to disasters.

Nevertheless, the prospects of not evacuating in the setting of emerging disasters can be equally tragic. Thirty-four residents better to evacuate or not to evacuate frail elderly nursing home residents in the setting of hurricane emergencies? This paper reviews the historical evidence on both sides of the argument and suggests a policy and research agenda. This is a US government work. There are no restrictions on its use.

Keywords: Nursing homes; emergency preparedness; disasters

Emergency planning for vulnerable populations constitutes a major element of community disaster preparedness and is an area in which guidance is particularly sparse. The elderly represent a major vulnerable group; their susceptibility is magnified in the setting of disasters. The 2 million residents of the 16,800 NHs nationwide are especially vulnerable, as they generally comprise a subpopulation with expanded care needs and as such, have higher disaster-associated risks than those experienced by other vulnerable populations. Nonetheless, NHs have not traditionally been incorporated into disaster planning at any level, a deficiency that must be remedied to avert a recurrence of the tragic events that occurred proximate to Hurricanes Katrina and Rita along the Gulf Coast and to prevent additional tragedies in future natural or man-made disasters.

As evidenced by the scores of deaths among residents at NHs that evacuated and among those that sheltered in place during Hurricanes Katrina and Rita, the decision of whether to "stay or evacuate" in the setting of a disaster is complex. For most NH residents, frailty, lack of mobility, dementia, or vision/hearing difficulties complicate their evacuation. For example, a bus fire that resulted in the death of 24 NH residents was caused by an overheated bus wheel bearing that ignited the tire with the portable oxygen containers, speeding the fire through the bus.

Nevertheless, the prospects of not evacuating in the setting of emerging disasters can be equally tragic. Thirty-four residents
perished at St Rita’s, a NH in the town of Chalmette, Louisiana, after its owners reportedly refused to evacuate. The owners stood trial for negligent homicide, but were ultimately acquitted. Another 22 residents perished at Lafon NH after its owners decided to weather Hurricane Katrina rather than evacuate. It has been suggested that many of the residents at Lafon might have been saved, had they received prompt emergency attention immediately following the hurricane.

The goal of this review is to consider the complexities inherent in determining whether to evacuate or shelter in place NH residents during a hurricane emergency. Current policies are predicated upon an assumption that a single strategy is appropriate in all instances—evacuate completely or shelter in place. Nonetheless, variation in the capacity of facilities, complications in securing contracted transportation, and the vagaries of predicting storm paths, along with the long lead time necessary to evacuate all NH residents from multiple facilities, might make it more reasonable to consider alternative, more graduated approaches to NH evacuation. Furthermore, a research agenda and health policy issues related to this issue are considered.

**SIGNIFICANCE OF THE PROBLEM**

**The Effects of Disaster on Frail Elders**

Elderly residents of NHs represent a clustered group of individuals at the highest risk for disaster consequences. In the United States, almost one half of the adults living in NHs reside in 1 of the 18 hurricane-prone Gulf and Atlantic coast states. NH residents are particularly vulnerable to the consequences of disasters for a variety of reasons. First, most NH residents have significant functional limitations: most residents require assistance with their activities of daily living (ADL) and many suffer from dementia, have significant vision/hearing impairments, or harbor other conditions that may compromise their ability to respond appropriately during emergencies. These functional impairments serve to limit health reserve, potentially magnifying the impact of disasters and forced relocation.

This phenomenon has been studied under nondisaster circumstances when residents are forced to leave a NH—often for financial reasons. In a study conducted by Capezuti et al., 120 residents were followed for 3 months after a forced relocation from one NH to another. Researchers noted a 2- to 3-fold increase in the rate of falls following transfer to another facility. A study conducted by Friedman et al. noted similar results among 210 studied residents. Although the responses of NH residents to traumatic experiences remains largely anecdotal, some research has noted that changes in eating and sleeping patterns occur as well as increased dependency and feelings of insecurity in response to a transfer.

A second major concern that increases vulnerability is the increased acuity found in today’s NH. As length of stay has decreased in acute care hospitals, NHs have increasingly been given the responsibility for caring for complicated post-acute patients with hospitalization diagnoses ranging from severe orthopedic injuries such as hip and pelvic fractures to cardiovascular events such as myocardial infarction, stroke, and vascular disease. It is noteworthy that measures of NH acuity collected by the Centers for Medicare and Medicaid Services (CMS) reveal a steady increase in acuity since the mid 1990s.

It is not surprising that there is a profound concern for exacerbation of existing comorbid medical conditions such as congestive heart failure, diabetes, and chronic obstructive pulmonary disease (COPD) when medical care is disrupted. Furthermore, given the advanced age of the average NH resident, weakened immune systems, and the high level of baseline physical disability, there is a clearly defined increased susceptibility to infectious diseases. This susceptibility to infectious diseases is evident under normal conditions as evidenced by the 3-fold increase in the incidence of pneumonia in NH populations compared with age-matched community dwellers.

Finally, in addition to physical ailments, NH residents exposed to disasters are at high risk for exacerbation of psychiatric diseases such as depression, posttraumatic stress disorders, and anxiety. The baseline prevalence of major depression among NH residents is reported to be in the 12% to 16% range; less acute depressive disorders occur in 30% to 35% of residents; and up to 50% exhibit at least some symptoms of depression. Prevalence estimates for anxiety disorders vary between less than 1% and 20%. These common psychiatric illnesses, along with the presence of cognitive impairment, place NH residents at high risk for experiencing disaster-related adverse mental health outcomes. Furthermore, disaster-related activities that are engaged in to ensure resident safety and well-being, such as emergency admission into other health care facilities, evacuation to safe shelters, or acceptance of residents from other facilities into the home facility, are likely to disrupt the routine care of these psychiatric diseases, potentially resulting in adverse mental health effects. Although the psychiatric effects of disaster on NH residents remains largely unstudied, there is ample evidence from the September 11th attacks that disasters can have profound effects on the psyche of those involved and even those not directly involved who experience a disaster through media coverage.

There is no reason to assume, however, that NH residents would experience any less mental health trauma than previously studied community dwellers.

**The Evacuation Experience**

Perhaps the most fundamental issue of relevance to NH populations in disaster settings is that of evacuation. While the concept of medical evacuation, as advanced by the military, has been well studied and codified for combat settings, scant data are available to inform evacuation decisions concerning individual residents of NHs in the setting of natural disasters. Regulatory agencies require institutions to maintain and drill building evacuation plans, but these are largely to support internal, local emergencies, such as fires or power failures and, until recently, have generally not focused on responding to a regional, multifocal disaster.

For example, in 2004–05, 94% of NHs nationwide met federal and state government standards for emergency preparedness planning while 80% met standards of staff emergency training. Nevertheless, 5 of the 20 NHs surveyed in a 2006 government report following Hurricane Katrina noted...
that they completely abandoned their plans when faced with the complexities of an evacuation.15

Until Hurricanes Katrina and Rita, little was published about the difficulties of evacuating frail elderly NH residents. Mangum et al52 surveyed NH administrators in the early aftermath of the mandatory mass evacuation of 1860 elderly NH residents from 19 institutions in anticipation of Hurricane Elena making landfall in August of 1985. Their findings point to the difficulty of evacuating frail elders. Investigators noted that transporting patients using prearranged buses was a time-consuming process with many associated complications. Some, like traffic and public authorities commandeering the vehicles for other uses, were beyond NH control. Temporary shelter destinations were not uniformly equipped to manage the functional and physical needs of elderly NH residents, despite the fact that Pinellas County had a detailed evacuation plan in effect prior to the event, and the Tampa Bay Region, which encompasses Pinellas County, had the nation's first regional evacuation plan. Finally, NH staff concerns, such as personal issues related to the safety of their own families, as well as fatigue and psychological stress, were important considerations that hindered efficient evacuations.

Subsequent to Hurricanes Katrina, Rita, and Wilma, more evidence exists suggesting the complexity involved in evacuating NH facilities. Hyer et al3 reported on a summit of southeastern NH providers convened by the Florida Health Care Association (FHCA) in early 2005 to improve regional planning following the disastrous 2005 hurricanes. This meeting identified the need to develop evacuation decision-making criteria that NH administrators could share with state and local emergency operations management personnel since many emergency operations centers did not recognize NHs as health care facilities. Consequently, even after the hurricane passed, NHs did not receive priority from emergency management in restoration of electricity, fuel for generators, or help in restocking food and medical supplies. It is noteworthy that 10% of 2005 evacuations in Florida and the Gulf States occurred after the initial storm had passed because of inability to maintain a secure and appropriate environment for residents.15

In August 2006, a report issued by the Office of the Inspector General (OIG) received significant media attention when it pointed out the inadequacies of NH emergency preparedness following Hurricane Katrina. In this report, investigators surveyed 20 NHs throughout the Gulf states, and found that 5 of the 13 sites that evacuated during recent storms encountered adverse consequences for the evacuated residents.15 In general, those that sheltered in place encountered fewer problems. Other findings in the OIG report included the fact that in 6 of 20 cases, administrators noted that a lack of coordination with state and local officials contributed to eventual morbidity. These findings are almost identical to those identified in a separate pilot study conducted for the Kaiser Family Foundation by Dosa et al. In interviews conducted with 20 Louisiana NHs, investigators identified large-scale problems with evacuation, lending further credence to the notion that the morbidity associated with evacuation is not trivial. In general, the 9 administrators who reported evacuating their facilities following Hurricanes Katrina and Rita experienced greater problems than those that sheltered in place.

Two general themes were recurrent during almost every phone interview and a follow-up focus group session. These themes included (1) administrators felt abandoned by local, state, and federal emergency preparedness officials; (2) there is substantial physical and technical difficulty in evacuating NH residents, similar problems with coordination of emergency needs with state and local governments. As one administrator noted when asked about the difficulties in evacuation, “When you start moving [the residents] out, it’s a tremendous burden, its very hard. They’re pulled and tugged. Their bodies are contorted into those buses. They’re so heavy. It’s not an easy thing to do to get these people on charter buses when they’re wheelchair bound. No one has any idea how much strength it takes to do that. And how much of a toll it takes on the residents just to do that to them.” Another administrator noted, “... the decision whether you evacuate or don’t is the toughest decision and there is no government assistance, there are no guidelines.”

DISCUSSION

The Complexities of Sheltering in Place

Research conducted in Florida and Louisiana also illustrates the complexities inherent in sheltering in place. In addition to caring for residents, NHs become shelters during storms for community home-bound elders, residents’ family members, and staff family members, increasing the numbers of people who require food, water, supplies, and sleeping areas. A 2004 survey of 256 Florida NHs impacted by the 4 hurricanes in 44 days revealed that 95% of facilities allowed staff to bring their families to the facility. By allowing staff to bring family members and pets, the facility is more likely to maintain adequate staffing during the event. Because of this influx of people into the NH, however, those surveyed noted that the 3 days of supplies previously mandated by the state were inadequate for a number of reasons. For example, those surveyed noted that the process of sheltering in place began at least 24 hours before the storm and supplies were frequently used up as the facility prepares for the storm, leaving the facility unprepared to deal with the aftermath of the disaster. As a result of this survey, the Florida Health Care Association (FHCA) now recommends that facilities have supplies for at least 7 days.51,53

In addition to routine supplies, the survey noted that facilities frequently lost electricity and had to rely on generators for electrical power. Almost three quarters of the facilities responding to a NH survey after the 2004 hurricanes said they lost power at least once.53 The capacity of generators varied because Florida regulations require generators to provide only emergency lighting and electricity to outlets for life support.53 Following the storm, many facilities experienced a prolonged loss of air conditioning, ability to do laundry, or even cook food, potentially compromising the safety for any length of time for less robust residents. While only 9% of the facilities reported problems with their generator during the storm, 18% reported that they would upgrade or buy a new generator after the 2004 hurricane season.53

Finally, both the Florida and Louisiana facilities affected by hurricanes noted significant problems with staff deployment.
Until 2005, few facilities had policies for overtime and staff deployment during storms. The FHCA’s disaster has since recommended two 12-hour shifts for all administrative and care staff during the storm and immediate recovery period. This recommendation is based on interviews with staff following emergencies that found them to be drained by more than 12 hours. The FHCA also recommended that NHs obtain local hotel rooms as sleeping quarters to allow staff to obtain a true break from unrelenting care responsibilities.

To Evacuate or Not to Evacuate, That is the Question

It is clear from previous disaster experiences in the Gulf states that the decision to evacuate a NH in the face of a conventional disaster such as a hurricane is a difficult one. In most cases, administrators and NH owners make difficult decisions related to evacuation at the site of care, based on the severity of the storm, threat of storm surge, previous experience, and logistical issues, such as transportation. If an administrator is ordered by authorities to evacuate facility residents, the decision is relatively straightforward, but mandatory evacuation orders are rare and timing is generally closer to landfall when NHs have the least time to mobilize resources and even less ability to attain evacuation transport and staffing resources. In the majority of circumstances, the choices are less clear-cut and determining whether to stay or go can be difficult, with late departures potentially exacerbating morbidity and mortality. As the evacuation of frail and vulnerable adults also includes transporting required medical equipment, disposables, and food and water, it is a time-consuming, complex, and expensive process that needs to be carefully considered as part of a facility’s disaster preparedness planning process. At the May 2007 FHCA- and John A. Hartford Foundation–sponsored NH hurricane summit, Scott Bell, president of the 34-home regional chain, Delta Health Care, reflecting on the decision to evacuate 139 residents and staff from Miramar Lodge Nursing Center in Pass Christian, MS, stated that the NH “ceased to exist after Katrina.” He added, “We didn’t lose anybody as a result of the evacuation, but you worry about that, absolutely, without any question, it’s (evacuation) the toughest (decision).”

Whether to evacuate or shelter in place is also driven in large part by a subjective evaluation of the degree of risk associated with evacuation of residents versus the risk of sheltering in place. Robust elders can often withstand the trauma of an evacuation without difficulty, but for the frail, the demented, and the dying, an evacuation may accelerate a rapid decline. How much of acceleration in decline occurs among those who are evacuated remains an unanswered question that could inform providers who are struggling to make the decision. It is likely, however, that there is a built-in morbidity and mortality associated with evacuation that manifests itself in the weeks that follow the evacuation event as residents experience increased hospitalization and likely worsening in comorbid conditions.

Developing a Research Agenda

While the literature on NH responses to disasters is sparse, one clear, over-riding question emerges, particularly in light of the federal push to develop “all-cause” disaster planning models for the public health infrastructure: under what conditions should NH residents be evacuated? Are the risks the same for all NH residents or are some at greater risk sheltering in place while others are at greater risk evacuating? As mentioned in the introduction, current policies are predicated upon an assumption that a single strategy— evacuate or shelter in place—is appropriate in all instances. It is plausible and indeed likely that more graduated approaches to evacuation are more effective. Certainly more research into graduated approaches to evacuation are indicated.

One manner of conceptualizing the evacuation decision is by considering the overall decision as the summation of separate elements of person risk, facility risk, and disaster event risk (Figure 1). In this model, event risk might be defined as the risk inherent in the disaster. As such, an approaching Category 5 hurricane would have greater impact than a Category 1 or 2 hurricane. Facility risk is defined as the risk inherent to the specific NH. For example, NHs that are more structurally sound or built in areas where disasters might have less affect would have a lower facility risk than those that are structurally less sound. Finally, person risk is defined as the level of risk posed to an individual resident. Patients who require complicated services such as skilled care following hospitalization or those on dialysis or chronic oxygen therapy might be considered high risk while more robust residents would be scored lower.

Each of these factors is critical to making determinations regarding whether to evacuate all residents, select residents, or to shelter in place during specific disaster events. In a graduated approach to evacuation, residents who have higher person risk (eg, require complicated services such as dialysis or oxygen; patients with complex comorbidities such as advanced conges-
tive heart failure, diabetes, or respiratory disorders) or those in high facility risk NHs might be evacuated early on to accepting health care facilities outside of the danger zone. This approach would maintain residents who are potentially more robust or those residing in lower risk NHs in place until more information about the trajectory and severity of the storm could be ascertained. It is noteworthy that this approach better approximates the military definition of evacuation and potentially limits the confusion inherent in rapid all-person evacuations.

Nevertheless, the partial evacuation response still requires knowledge of the types of patients who might benefit from early or late evacuation. Criteria would also need to be developed to determine facility risk. It is plausible, however, that the answers to some of these questions might be found through analysis of outcomes data among NH residents affected by Hurricane Katrina. Armed with these data, it may then be possible to develop more explicit guidelines for defining patient risk. These guidelines might be instrumental, along with information on the physical location and structure of individual facilities and the potential severity of the disaster, in determining whether to shelter in place or evacuate when faced with an emergency.

Policy Ramifications

To improve the care of NH patients during complex emergencies, several changes in policy will also need to be made. One key priority, as suggested by the OIG report, is that CMS strengthen the federal certification requirements to mandate emergency plans with specific emergency planning elements. As described in the report, OIG noted that 94% of NHs had acceptable emergency plans by government standards during the hurricane season of 2004/2005. Eighty percent of NHs met government criteria for sufficient emergency training. Nevertheless, many of these disaster plans proved inadequate during the Gulf storms. Recently, CMS has begun to strengthen their federal certification requirements and has begun to mandate improved communication with state and local emergency management organization.

Nevertheless, it is not simply adequate to require NHs to strengthen their plans and coordinate with agencies that in many cases continue to view them as private entities not under their purview. Quite clearly, many NH disaster plans failed following Hurricanes Katrina/Rita because of lack of coordination with state and local emergency management organizations. In some cases, resources such as transportation and fuel paid for and earmarked for NHs were redirected by local entities. In other cases, NHs that sheltered in place were forced to leave after the storms because of a failure by emergency personnel to restore services in a priority manner.

Until the overall perception of NHs as private entities changes and the facilities are accepted as key members of the health care provider community, it is unlikely that stronger disaster planning as mandated by CMS, will provide meaningful improvement. As such, agencies such as Homeland Security will need to ensure that emergency organizations recognize the importance that NHs play in medical care. It should be recognized that several states, including Florida, have begun to recognize NHs as Emergency Support Function (ESF) #8 entities, thereby making them eligible for federal disaster aid as directed by the Department of Health and Human Services. Every state in the country needs to similarly recognize NHs in this capacity, making them eligible for federal disaster funding and prioritizing as health care entities.

CONCLUSION

The tragic events that occurred along the Gulf Coast in the immediate aftermath of Hurricanes Katrina and Rita in 2005 starkly illustrate the deficiencies in coordinated disaster response planning in NHs, specifically regarding evacuation decision making. The vast majority of hurricane-associated mortality was among the elderly with case reports of large numbers of deaths among residents of several Gulf state NHs. Dozens of NH residents perished, either because they failed to evacuate, or because of complications related to poorly executed evacuations. We also do not know the long-term affects of evacuating frail elders during hurricane emergencies. It is clear that NH administrators desperately need, yet lack, evacuation guidance from health and emergency response authorities. A policy and research agenda is essential to address these issues and strengthen evacuation guidance. Further research is needed to better determine the physical and mental affects of disasters on the frailest elderly.

Finally, to optimize disaster response, NHs and their needs must also be incorporated into existing governmental emergency response systems. Multiple government agencies have promulgated a host of regulations and "interpretive guidelines" related to disaster management and response in health care facilities, yet despite this, the federal government found that all recently surveyed Gulf Coast NHs experienced significant problems related to the decision to evacuate or shelter in place. These findings suggest system-wide deficiencies that must continue to be addressed to prevent or mitigate repeat occurrences in the future.

Exclusive of government-initiated, mandatory, complete evacuation orders, the decision to completely evacuate, partially evacuate (including transfers of individual residents), or to shelter in place is complex and must be based on the integration of real-time data regarding the disaster event, the facility in question, and the clinical profiles of the residents at risk. Further research is needed to inform evacuation decision making and to optimize the safety of these vulnerable populations during future storms.

REFERENCES

2. Dosa D, Grossman N, Wette T, Mor V. To evacuate or not to evacuate: Lessons learned from Louisiana nursing home administrators following Hurricanes Katrina and Rita. J Am Med Dir Assoc 2007;8:142–149.