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On behalf of my colleague Dr. David Dosa who could not be here today, I would like to thank the Senators and the Senate Special Committee on Aging for providing the opportunity to testify here today on a topic that I have studied since 2004 when four hurricanes traversed Florida within 44 days. Since that time I and my colleagues have studied the effect of disasters on the frail older adults living in nursing homes and assisted livings and have worked to improve disaster preparedness, response, and recovery.

I would like to focus my remarks on more than a decade's worth of research that has been carried out thanks to generous grants from the John A. Hartford Foundation, The Kaiser Family Foundation, The Borchard Foundation, and the National Institutes of Aging. My focus will be on the issue of evacuation of nursing homes but for background, in 2004, Florida nursing homes only became part of local and state emergency management operations **after repeated hurricanes** crisscrossed the state and emergency management personnel finally recognized nursing homes needed help replenishing medical supplies, water, restoring power and getting fuel for generators to continue to operate (*Appendix 1*).

Following Hurricane Katrina, our research team interviewed nursing home administrators about their experiences during the storm (*Appendix 2*). Across the board, these interviews revealed that administrators wrestled with the important decision of whether to evacuate their residents prior to the storm or "shelter in place" during a Hurricane. Administrators noted to us that they were, "damned if we do and damned if we don't" in terms of the decision to evacuate. They cited pressure from emergency managers to leave their homes despite the difficulties of evacuating frail older adults on school buses to high school gymnasiums- often without adequate staffing and supplies. In general terms, many administrators noted that they saw patients decline, staff endure injuries moving residents, and believed more casualties occurred if they evacuated than if they remained in their own facility.

This initial work became the impetus for a National Institutes of Health sponsored study that evaluated the effect of Hurricanes Katrina (2005), Rita (2005), Gustav (2008), and Ike (2008) on nursing home residents (*Appendix 3*). This research eventually showed that among 36,389 NH residents exposed to the Gulf hurricanes, the 30 and 90 day mortality/hospitalization rates increased considerably compared to non-hurricane control **years regardless of whether they evacuated or sheltered** in place. In total, there were 277 extra deaths and 872 extra hospitalizations within 30 days after exposure to anyone of the storms. While everyone suffers in disasters, our data indicate that exposure to natural disasters such as Hurricanes Harvey or Irma clearly results in excess death and hospitalizations among frail populations.

Our research, however, does more than simply evaluate what Hurricanes do to nursing home residents. We asked the simple question. Is it better to evacuate or shelter in place? Using the data from the 4 storms and some methodological techniques described more fully in our research, we concluded that the very act of **evacuation prior to the storm increased the probability of death at 90 days by 2.7-5.3% and increased the risk of hospitalization by 1.8-**

8.3%, independent of all other factors. It should be noted that this data took into account the multiple deaths that occurred at St. Rita's and Lafon Nursing Homes during Hurricane Katrina. **Despite these tragic deaths, evacuation proved to be cumulatively more dangerous than sheltering in place.**

Why it is potentially more dangerous to evacuate from a hurricane than to shelter in place?
Definitive studies are not available but we offer several explanations:

1. Hurricanes often deviate from their expected paths after the decision to evacuate must be made. In general, safe evacuations must occur at least 48-72 hours before landfall. Unfortunately, hurricanes make last minute turns and speed up or down. Hurricane Irma was expected to be a category 4 making landfall near Miami. Many nursing homes evacuated west only to be evacuated a second time as Irma's path moved westward and threatened the very areas that residents had evacuated to.
2. The evacuation of frail older adults is a logistics nightmare and requires exquisite planning prior to the event. Good materials exist to help with plans (<http://www.ltcprepare.org/>) but even under the best-developed emergency plans, evacuations create anxiety for both residents and staff that appear to have serious adverse outcomes. (*Appendix 4*)
3. Older adults are susceptible to adverse outcomes whenever they transition from one environment to the next—even under optimal circumstances. Safe transitions require optimal communication among providers, keen knowledge of the patient, and access to medical records, correct medications, and appropriate supplies. In emergencies, transitions are seldom ideal and we have shown the consequence of such forced transitions in our hurricane research. (*Appendix 5*)
4. Older adults with dementia represent a particular hardship for evacuating facilities. Without the cognitive ability to follow directions, or participate in their own self-care, residents with dementia suffer significantly during evacuations. (*Appendix 6*)
5. Common comorbidities such as Congestive Heart Failure, Chronic Obstructive Pulmonary Disease, and various Cardiovascular Diseases require clinician's knowledge of the resident, careful observation, adequate temperature control (e.g. air conditioning), and adherence to specific medication regimes, physical and occupational therapies, and specific dietary needs.
6. Medical Records and medications are often misplaced or poorly adhered to during disasters.
7. Evacuations occur after the storm because nursing homes and assisted living may not be a priority for restoration of power. Florida had 40 Nursing homes and 177 assisted living communities **evacuate after the storm**; the majority evacuated because their generators weren't operating correctly.

Based on our research and experience, we have the following recommendations:

1. Generators to support air conditioning and other medical needs must be required for both nursing homes and assisted livings. Ideally these generators need to be elevated to ensure continued operations during flooding. I am proud that last Saturday Florida Governor Scott announced emergency rules requiring a generator and the appropriate amount of fuel to sustain operations and maintain temperatures at 80 degrees or less for at least 96 hours following a power outage. (<http://www.flgov.com/wp-content/uploads/2017/09/AHCA916.pdf>; http://www.flgov.com/wp-content/uploads/2017/09/EN_DEA.pdf)
2. Emergency plans for nursing homes and assisted livings are not always available nor understood by residents or family members. Regulations must require that emergency plans for both nursing homes and assisted living be posted and available for inspection prior to admission. More work needs to be done to help people make choices based on posted disaster plans and to ensure the posted “plan” is actually a workable plan. Optimal preparedness means real drills and plans that are tested - even if only partially.
3. Assisted Living communities require more disaster preparedness oversight than they currently receive. We know older adults and disabled people want care in the community in less restrictive environments. Nevertheless, assisted living communities routinely accept patients that would only have received care in a nursing home a decade ago. Waiver payments for residents with Medicaid have also increased, thereby making the federal government an interested party in assisted living regulations. Currently, we don't even know whether a particular Medicare-Medicaid patient resides in an assisted living facility. This inadequacy in disaster response must be rectified.
4. Evacuation must be nuanced and must take into account the size and severity of the storm, the ability of the facility to withstand wind and potentially storm surge, and the needs of the residents. Evacuation should not be “all or nothing.” There are times where certain medically complex patients (e.g., dialysis patients) might be more optimally treated with early evacuation while other more stable patients shelter in place. More research to identify the types of patients that benefit from evacuating or sheltering in place must be conducted.
5. Nursing Homes and larger Assisted Living Communities must be built in places that minimize flooding risk and must be built to standards that allow administrators to shelter in place if at all possible.
6. Every state and local emergency management organization in this country must identify and prioritize nursing homes and assisted living communities for restoration of services.
7. Some degree of litigation protection must be considered for those facilities that abide by the regulations and provide care during disaster scenarios. Our research clearly shows that hurricanes affect all nursing home residents, regardless of whether they evacuate or shelter in place. Unfortunately, this did not prevent many administrators from being sued repeatedly for the heroic care that they provided following Hurricane Katrina.

8. Finally, older adults matter. I am also the PI on a HRSA-funded Geriatric Workforce Enhancement Program grant. We believe that a continued commitment to geriatric education programs that help the nation's health workforce better serve the older and disabled population must be a priority. I can provide evidence today because the research and training developed after Hurricane Katrina has led to improved disaster response across the country. However, the funding rapidly dried up in the years that followed Katrina. Our country needs ongoing geriatrics training for population aging. We also need consistent research funding to evaluate the disaster needs of older adults and develop best practices. We know disasters will continue to occur and we must be prepared.

Thank you for allowing this testimony.

References:

Appendix 1

Hyer, K., Brown, L. M., Polivka-West, L., & Berman, A. (2010). Helping nursing homes prepare for disasters. *Health Affairs*, 29(10): 1961-5.
doi:10.1377/hlthaff.2010.0665

Hyer, K., Brown, L. M., Thomas,* K. S., Dosa, D., Bond, J., Polivka-West, L., & Schinka, J. A. (2010). Improving relations between emergency management offices and nursing homes during hurricane-related disasters. *Journal of Emergency Management*, 8(1), 57-66. doi:10.5055/jem.2010.0005.

Appendix 2

Dosa D, Grossman N, Wettle T, Mor V. (2007) To Evacuate or not to Evacuate? Lessons learned from Louisiana Nursing Home Administrators Following Hurricanes Katrina and Rita. *J Am Med Dir Assoc.* 8, 142-149.

Appendix 3

Dosa D, Hyer K, Thomas K, et al. (2012) To Evacuate or Shelter in Place: Implications of Universal Hurricane Evacuation Policies on Nursing Home Residents. *Journal of the American Medical Director's Association.* 13(190), e1–190.e7.

Appendix 4

Hyer, K., Polivka-West, L., & Brown, L. M. (2007). Nursing homes and assisted living facilities: Planning and decision making for sheltering in place or evacuation. *Generations: The Journal of American Society of Aging*, 31(4), 29-33.

Appendix 5

Thomas K, Dosa D, Hyer K, Brown L, et al. (2012) The Impact of Forced Transitions on the Most Functionally Impaired Nursing Home Residents. *Journal of the American Geriatrics Society.*60, 1895-900.

Appendix 6

Brown, L., Dosa, D., Thomas,* K., Hyer, K., Feng, Z., & Mor, V., (2012). The effects of evacuation on nursing home residents with dementia. *American Journal of Alzheimer's Disease & Other Dementias*, 27(6), 406-412.
doi:10.1177/1533317512454709.

Brown, L. M., Bruce, M. L., Hyer, K., Mills, W., Vongxaiburana,* E., & Polivka-West, L. (2009). A pilot study evaluating the feasibility of psychological first aid for nursing home residents. *Clinical Gerontologist*, 32(3), 293-308.
doi:10.1080/07317110902895317.

GRANTWATCH

By Kathryn Hyer, Lisa M. Brown, LuMarie Polivka-West, and Amy Berman

Helping Nursing Homes Prepare For Disasters

ABSTRACT Responding to the deaths and suffering of older adults in long-term care facilities following Hurricanes Katrina, Rita, and Wilma, the John A. Hartford Foundation funded an initiative called Hurricane and Disaster Preparedness for Long-Term Care Facilities. Long-term care providers are now acknowledged as health care providers by most federal and state emergency response centers. This paper describes the planning, research, and dissemination efforts of the Hartford grantees. It also provides insights into successful disaster grant making, noting foundations' unique flexibility, strategic and long-term view, and ability to be a neutral convener of stakeholders that can help grantees work toward achieving major policy change.

Hurricanes Katrina, Rita, and Wilma, which struck the southern United States in 2005, had a particularly devastating impact on many older adults in nursing homes. As an example, seventy-eight bodies were found dead in Louisiana nursing homes in the weeks after Hurricane Katrina.¹ In October 2006, as a response to these disasters, the John A. Hartford Foundation funded a three-year, \$361,556 grant administered by the Florida Health Care Association's Health Care Education and Development Fund, in partnership with the University of South Florida. The initiative, Hurricane and Disaster Preparedness for Long-Term Care Facilities, aimed to change response and decision-making protocols to avoid similar critical situations in the future.

The goal of the Hartford grant was to create an initiative that would meet three objectives: (1) increase the inclu-

sion of nursing homes in governments' emergency planning and response efforts; (2) secure nursing homes' access to the resources necessary to sustain frail elders, such as transportation and electric power—the same resources routinely provided to hospitals in emergencies; and (3) strengthen nursing homes' ability to prepare independently for and respond to catastrophic events.

The Hartford-funded initiative succeeded using a design that incorporated seven strengths identified by the Council on Foundations and the European Foundation Centre.² The strengths (described below) enable foundations to be particularly effective during disasters. This article describes how the Hartford Foundation's approach to disaster grant making and its funding were aligned with the seven strengths and helped change the emergency management system and increase the safety of frail elders during disasters.

Following the tragic events of the

2005 hurricane season, Kathryn Hyer, of the University of South Florida, asked the Hartford Foundation to support a meeting of state nursing home associations from the Gulf Coast region, with the objective of learning how to help nursing homes prepare for and recover from future disasters. Hartford recognized the value of convening such a meeting.

Because of the urgency of the effort, Hartford's board allowed the foundation to use discretionary funds to convene the initial Hurricane Summit meeting, demonstrating administrative and programmatic flexibility. Based on the needs identified by the attendees at the initial meeting, in February 2006 the foundation requested a formal proposal for a larger grant to support additional summits and resource development, which was awarded in September 2006.

Members of the foundation's staff had previously worked with Hyer, and that relationship provided a level of communication and trust that helped expedite the grant-making process. Furthermore, Hyer had an established relationship with the grant's principal investigator, LuMarie Polivka-West, at the Florida Health Care Association.

The Hurricane Summits

Because of the sensitive nature of the discussions, the Hartford Foundation acted as a neutral convener for three later annual meetings focused on the Gulf Coast states: the Nursing Home Hurricane Summits. The foundation played an active role in bringing together industry and government leaders to address gaps and expose failures that occurred during the 2005 hurricane season.

Other participants in the summits included representatives of private long-term care providers; federal, regional, and state policy makers; state and federal emergency management personnel; university researchers; and staff from regional foundations and nongovernmental organizations. The grant covered travel expenses to help associa-

tion and state officials with limited budgets participate.

The nursing home survey and certification branch of the Centers for Medicare and Medicaid Services (CMS), which handles long-term care for the agency, sent a representative to each of the summits. At the time, CMS was reviewing its emergency preparedness regulations for long-term care facilities after the deaths of so many nursing home residents during Katrina. Other federal agencies that participated in the summits included the Office of Inspector General and the Public Health Service, both of the Department of Health and Human Services (HHS) and the Department of Homeland Security (DHS).

The Hurricane Summits also provided annual data for emergency planning personnel, state and federal officials, nursing home regulators, and elected officials who needed to monitor progress related to the recommendations from the first summit after Hurricane Katrina. The summit structure provided an opportunity for regular progress reports, which increased accountability. The proceedings were recorded, and summary reports were published to capture changes, reinforce progress, and identify and assign next steps to be accomplished.

During the period covered by the grant, summit attendees forged strong working relationships, developed a deeper understanding of their shared interests, and worked diligently within their respective states and across the region to address concerns about long-term care. In addition, national and state nursing home associations pressed for policy changes based on recommendations from the summits and routinely shared information on disaster preparedness at annual industry-sponsored meetings.

At key state and national conferences, nursing home and assisted living providers, state and federal emergency management officials, and staff of state surveying agencies, as well as participants in the Florida governor's annual hurricane conference, attended sessions on long-term care disaster preparedness. The breadth of attendees constituted a marked change from programming before Katrina. Participants

in the hurricane summits disseminated information for the sessions and maintained the interest in disaster preparedness, despite a two-year respite from serious storms, in 2006 and 2007.

The summits demonstrated six of the seven strengths of foundation disaster grant making mentioned in the report of the Council on Foundations and the European Foundation Centre.² These strengths are as follows: (1) developing relationships with local organizations; (2) developing a long-term perspective; (3) convening key players across sectors; (4) calling attention to political, economic, and social policies that exacerbate the vulnerability of certain populations to hazards; (5) supporting research and disseminating its results and other grant-related findings; (6) attaining programmatic flexibility that permits a creative and strategic response to disaster situations; and (7) enabling administrative flexibility that permits timely action. Although the summits did not directly support research, the relationships forged were instrumental in subsequently obtaining research funds.

Five Suggested Areas For Grant Making

All of the Hartford Foundation's objectives for the grant were addressed during the summits. An August 2006 GrantWatch article in *Health Affairs*³ outlined the pervasive difficulties nursing homes had faced during Hurricane Katrina and suggested five areas that foundations might consider for grant making. Although not all five grant areas were objectives of the Hartford-funded grant, considerable progress has been made in each of the areas as a result of the summits. Below, we describe what has been accomplished in each area since 2006 and note the work that remains.

LONG-TERM CARE AND EMERGENCY MANAGEMENT The 2006 *Health Affairs* article³ documented the importance of categorizing long-term care providers as health care providers within each state's Emergency Support Function for Public Health and Medical Services (ESF-8). When activities supported by the Hartford Foundation's October 2006 grant began, only hospitals were recognized as health care facilities needing emer-

gency assistance during disasters; long-term care providers were ignored.

Vulnerable, medically frail elderly and disabled nursing home residents were forced to rely on the limited resources of each nursing home and its staff's ability to implement its disaster plan, with no guarantee of help from federal, state, or local emergency responders. In fact, sometimes state emergency officials thwarted the efforts of corporate owners of nursing homes to take care of their own residents. For example, within days after Hurricane Katrina's landfall, the State of Mississippi commandeered for its own use a truck filled with diesel fuel that was under contract to replenish the generators of a large nursing home that was sheltering residents, staff, and their families.⁴

Following the recommendations of the 2006 hurricane summit, the nursing home association in each Gulf Coast state sought to have nursing homes included as health care providers in the state's emergency management response. By 2007, five states—Alabama, Florida, Louisiana, Mississippi, and Texas—reported extensive integration of nursing homes into state emergency management planning. Local and state officials came to understand the need to include representatives of long-term care facilities in emergency management responses during all phases of a disaster.

As a result, nursing homes now have more access to resources for recovery. Instead of being classified with day spas and having to wait up to two weeks to have power restored, or struggling to meet operating needs with generators that require frequent refilling with diesel fuel, nursing facilities and assisted living residences are now considered a priority for rapid restoration of utility service. Of course, delays may occur because power companies might not be able to restore all electric services quickly. However, the medical needs of elders are now recognized, including refrigeration for medications, air conditioning to avoid heat-related illnesses, and washing machines to keep elders' linens and clothes clean.⁵

Changed policies and the increased recognition of the vulnerability of nursing home residents were evident in 2008, when Hurricanes Gustav and

Ike threatened Louisiana and Texas. In distinct contrast to the situation in 2005, emergency officials routinely reported the numbers of nursing home evacuations and clearly acknowledged residents' needs. Gary Blanchard and David Dosa reported that 73 percent of New Orleans nursing home administrators surveyed after Hurricane Gustav confirmed that collaboration with state officials had improved since Hurricane Katrina.⁶

GUIDELINES FOR RESIDENT EVACUATION As a result of the hurricane summits, explicit guidelines for decision making about evacuating the residents of long-term care facilities have been developed. These guidelines include systematic assessments of evacuations.

The decision-making guidelines for nursing home administrators take account of how frail residents are; the danger involved in the approaching storm; the anticipated storm surge and flood threat; the physical structure of the facility; the readiness of emergency responders and transport services; and the availability of required supplies such as food, water, and medications in the facility or during an evacuation.

Notably, the guidelines were jointly developed by nursing home staff and emergency management personnel. The Hartford grant funded the preparation of the guideline, "National Criteria for Evacuation Decision-Making in Nursing Homes,"⁷ which is an appendix in the *Emergency Management Guide for Nursing Homes*.⁸ It is also available as a stand-alone document and has been frequently downloaded from the Florida Health Care Association website.

EFFECTIVE COMMUNICATION SYSTEMS During Hurricane Katrina, telephones, computers, and other communication systems were compromised, leaving long-term care providers unable to communicate with emergency officials or to seek assistance from private companies or long-term care associations. Several states—including Alabama, Mississippi, and Utah—have subsequently used state and Department of Homeland Security funding to purchase satellite phones and take other related steps to improve communication systems.

There is a growing awareness of the need to improve communication among state and local emergency management

The Hartford grant helped strengthen markedly the emergency preparedness of long-term care providers.

response centers and long-term care associations and facilities. The hurricane summits provided a critical first step by bringing together for the first time emergency management officials and providers of long-term care.

RESIDENT TRACKING AND CASE MANAGEMENT Historically, nursing home evacuation plans have focused on keeping residents safe in the facility—called sheltering in place—rather than on creating systems for placing residents in other facilities. However, participants at the hurricane summits stressed the importance of tracking residents during an actual evacuation. The intent was to avoid repeating situations in which facilities temporarily lost track of many evacuated long-term care residents who lacked identification, had compromised ability to communicate, or had impaired cognition.

As reported during the 2007 summit, all of the Gulf Coast states have developed databases that track facility status and bed availability during disasters. A goal not yet met is the development of a universal patient identification system. Privacy and dignity rules prevent nursing homes from maintaining identifiable labeling (Medicare ID number) on individual patients. Therefore, if residents are separated from staff who know them in the confusion of an evacuation, there is no ability to link the individual to the CMS patient data system, which provides patients' cognitive status, allergies, diseases, medications, and functional limitations. This is a national data system that CMS routinely requires long-term care facilities to

maintain as a way of planning residents' care.

DISASTER PREPAREDNESS GUIDE The Hartford grant helped strengthen markedly the emergency preparedness of long-term care providers. Initially, the grant was to have funded the development of a disaster plan for long-term care facilities to use during hurricanes. However, the Florida Health Care Association—Hartford's grantee—recognized that all states encounter natural and human-caused disasters. Wanting to be consistent with the Department of Homeland Security's National Response Framework and its National Incident Management System, which specifies the chain of command used during emergencies, the association expanded the scope of the proposed guide to be relevant for all kinds of catastrophes.

This guide, the *Emergency Management Guide for Nursing Homes*,⁸ includes both a manual and computer software to help nursing home staff prepare for emergencies. The manual and software, available for purchase, provide a comprehensive set of emergency response tools for long-term care providers in human-made and natural disasters. Appendices in the guide offer advice on sheltering in place as well as on how to safely evacuate residents.

Providers using this guide are encouraged to develop a relationship with the local emergency management response center. This is consistent with a 2008 CMS recommendation that nursing homes "collaborate with local emergency management agencies to ensure the development of an effective plan"⁹ and that these agencies review nursing homes' disaster plans.¹⁰ If facilities file plans with the local emergency management response center, staff at both the facilities and the center have easier access to necessary information in an emergency.

Included in the guide is a section titled "Nursing Home Incident Command System," which provides nursing homes with a structure, language, and protocols for managing disasters efficiently. The system promotes the use of common terminology to improve communication between nursing homes and emergency managers. The guide also provides training exercises and simulations of disasters, to encourage nursing homes to test

their plans and constantly improve their ability to respond to an emergency.

Outcomes

The Hartford Foundation's grant has increased the inclusion of nursing homes in governmental emergency planning and response efforts. It has also improved the emergency preparedness and response of the nation's long-term care providers. As a result of the three-year grant, nursing homes are now generally acknowledged as warranting emergency management assistance during disasters, and they can secure the resources necessary to sustain their frail elderly residents.

DISASTER MANAGEMENT GUIDE The grant also supported the production of a nationally acclaimed disaster management guide promoting an approach to planning, response, and recovery from all sorts of emergencies. The approach is consistent with the National Incident Management System of the Department of Homeland Security. In summary, grant resources helped long-term care providers better prepare for hurricanes and other emergencies, contributed to the literature on the vulnerability of seniors during disasters, and identified disaster-response planning gaps affecting the nation's nursing homes.

Products from the Hartford-funded activities are appropriate for many types of disaster preparedness efforts. It has been possible to disseminate the material widely because the grant included monies for its distribution to every state nursing home association, all Gulf Coast state emergency management response centers, and state health departments. In addition, the guide is available through the American Health Care Association.

NATIONAL EXPOSURE Indicating the adaptability of the emergency planning material to different types of disasters, the Florida Health Care Association has received requests from the health departments of California, Indiana, Maryland, Missouri, North Dakota, and Utah for copies of the guide, software, and training materials. The guide has helped nursing homes plan what to do in the event of wildfires, tornadoes, floods, earthquakes, and hurricanes.

As part of the National Transportation Safety Board investigation of the

Disasters clearly present unique and critical grant-making opportunities for foundations.

Wilmer, Texas, bus accident that killed twenty-three long-term care residents fleeing Hurricane Rita, Polivka-West was invited to testify on the challenges of evacuating frail elders. She was also invited to testify in June 2009 before the Senate Special Committee on Aging, about long-term care and emergency preparedness.¹¹ Other material from the summits has received attention from federal agencies including the Federal Emergency Management Agency (FEMA) and from the National Academies.

ADDITIONAL FUNDERS Hartford's funding was instrumental in attracting additional grant support. A variety of sources—including private and corporate foundations, nonprofit organizations, and state and federal agencies—provided subsequent funding.

For instance, the Borchard Foundation Center on Law and Aging funded an analysis⁴ of existing state laws, regulations, and policies that govern nursing homes' preparation, evacuation, and recovery efforts in eight hurricane-prone states. Psychology Beyond Borders, a nonprofit, improved the quality of mental health care received by elders in nursing homes during a disaster by funding the development of a guide to psychological first aid and educational materials for use by staff. Florida Power and Light Company's FPL Foundation funded a series of training exercises for long-term care providers and local emergency management offices.

In addition, Mathers LifeWays Institute on Aging provided disaster education for nineteen long-term care leaders. The American Health Care Association contributed to a National Transporta-

tion Summit convened to develop a strategy for securing sufficient resources by long-term care providers for transportation during a disaster evacuation.

Finally, the Florida Department of Health funded the development of the "Nursing Home Incident Command System" section in *The Emergency Management Guide for Nursing Homes* and refinements to the accompanying software. One lesson we learned was that because materials quickly become outdated, software should be accessed through a central server rather than a CD, so people can receive regular updates.

COLLABORATIONS The co-principal investigators on the Hartford grant, Kathryn Hyer and Lisa Brown, are collaborating with Vincent Mor of Brown University, the principal investigator on a National Institute on Aging project, Strategic Approach to Facilitating Evacuation by Health Assessment of Vulnerable Elderly in Nursing Homes. The purpose of this study, which began in 2008, is to understand the consequences of decisions to evacuate or not by examining the morbidity and mortality outcomes of nursing home residents in the Southeast during hurricanes from 2004 to 2008.

Collectively, these funded products, projects, and research add to the existing knowledge base, influence clinical practice, enhance residents' care and safety, and improve the ability of staff to prepare for and respond to disasters.

Conclusion

REMAINING CHALLENGES Integrating all long-term care providers into federal, state, and local disaster planning and response remains a challenge. Assisted living facilities and home and community-based service providers vary in their ability to access emergency management assistance. Because most of them are not well connected to the emergency management response system, their clients are at risk.

Craig Fugate, director of FEMA, has pointed out that disabled individuals, regardless of age, are vulnerable during disasters.¹² Many community shelters are not adequately prepared to handle disabled and elderly people who need

assistance, and sometimes medical attention, during disasters. Critical information about where to go and how to get help during an emergency is not routinely available and accessible, especially for people with visual and hearing impairments and other disabilities. Although the Hartford grant focused on nursing homes, future efforts should address the dissemination of disaster preparedness tools to those helping elderly and disabled people living elsewhere.

Transportation for evacuation in emergencies continues to be a challenge. Many communities remain unable to move residents of multiple long-term care facilities while simultaneously meeting the transportation needs of home-bound and disabled residents. Federal and state reimbursement for nursing home evacuation is limited; Medicare will only pay for evacuation out of the facility and will not pay for the return of patients. Medicaid pay-

ment is state specific and limited.¹³ For-profit nursing homes are also not eligible to apply for reimbursement from the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Finally, CMS disaster policy varies by the disaster, and reimbursement policies are not consistently applied across similar natural disasters (hurricanes), let alone for nursing homes evacuating as a result of floods or tornadoes.

FOUNDATIONS' ROLE Disasters clearly present unique and critical grant-making opportunities for foundations. To be successful in this field, a foundation should recognize that it can help not just by providing funds but also by acting as a neutral convener, defusing what could be a highly stressful rehashing of past failures.

Foundations have a responsibility to be effective stewards of their resources. The Hartford Foundation's activities in this case demonstrate one way to carry out that responsibility: using such

strengths as administrative flexibility, the ability to act quickly, and the ability to focus on the long-term changes needed to help vulnerable populations. As a result of this Hartford grant, in the five years since Hurricanes Katrina, Rita, and Wilma, nursing homes and other providers of long-term care are far better prepared to meet the needs of their frail, disabled, and older residents during emergencies. ■

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NOTES

- 1 Brunkard J, Namulanda G, Ratard R. Hurricane Katrina deaths, Louisiana, 2005. *Disaster Med Public Health Prep.* 2008;2(4): 215-23.
- 2 Council on Foundations and European Foundation Centre. *Disaster grantmaking: a practical guide for foundations and corporations* [Internet]. 2nd ed. Washington (DC): Council on Foundations; 2007 Apr [cited 2010 Aug 9]. Available from: http://www.cof.org/files/Documents/International_Programs/disasterguide.pdf
- 3 Hyer K, Brown LM, Berman A, Polivka-West L. Establishing and refining hurricane response systems for long-term care facilities. *Health Aff (Millwood).* 2006; 25(5):w407-11.
- 4 Brown LM, Hyer K, Polivka-West L. A comparative study of laws, rules, codes, and other influences on nursing homes' disaster preparedness in the Gulf Coast states. *Behav Sci Law.* 2007;25(5): 655-75.
- 5 Hyer K, Brown LM, Christensen JJ, Thomas KS. Weathering the storm: challenges to nurses providing care to nursing home residents during hurricanes. *Appl Nurs Res.* 2009;22(4):e9-14.
- 6 Blanchard G, Dosa D. A comparison of the nursing home evacuation experience between Hurricanes Katrina (2005) and Gustav (2008). *J Am Med Dir Assoc.* 2009;10(9):639-43.
- 7 Florida Health Care Association. *National criteria for evacuation decision-making in nursing homes* [Internet]. Tallahassee (FL): FHCA; 2008 [cited 2010 Sept 9]. Available from: <http://www.fhca.org/images/uploads/NationalCriteriaforEvacuationDecision-Making2008.pdf>
- 8 Florida Health Care Association. *Emergency management guide for nursing homes* [Internet]. Tallahassee (FL): FHCA; 2008 [cited 2010 Sep 7]. Available from: http://www.fhca.org/facility_operations/emergency_management_guide
- 9 Centers for Medicare and Medicaid Services. *Emergency preparedness checklist: recommended tool for effective health care facility planning* [Internet]. Baltimore (MD): CMS; 2009 Sep [cited 2010 Aug 23]. Available from: http://www.cms.gov/survey_certemergprep/downloads/s&c_epchecklist_provider.pdf
- 10 Centers for Medicare and Medicaid Services. *Promising practices in state survey agencies: emergency preparedness practices—Florida* [Internet]. Baltimore (MD): CMS; 2008 Jun 12 [cited 2010 Aug 16]. Available from: http://www.cms.gov/SurvCertPromPractProj/Downloads/emerg-prep_Florida.pdf
- 11 Polivka-West L. *Testimony before the Special Committee on Aging of the United States Senate* [Internet]. Washington (DC): American Health Care Association and National Center for Assisted Living; 2009 Jun 24 [cited 2010 Aug 17]. Available from: <http://aging.senate.gov/events/hr212lp.pdf>
- 12 Fugate C. *Are disabled still at risk in disasters?* [Internet]. Atlanta (GA): CNN; 2010 Jul 26 [cited 2010 Aug 21]. Available from: http://www.cnn.com/2010/OPINION/07/26/fugate_disabled.disasters/index.html
- 13 Thomas KS, Hyer K, Polivka-West L, Branch L. *Florida's model of nursing home Medicaid reimbursement for disaster-related expenses.* *Gerontologist.* 2010; 50(2):263-70.

*Improving relations between emergency management
offices and nursing homes during hurricane-related disasters*

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ABSTRACT

Objective: To document the importance of the relationship of nursing homes to emergency management entities before, during, and after hurricanes, and the operational challenges that nursing homes face, the authors report the effects of eight Florida (FL) hurricanes on 689 nursing homes (70,000 beds) during 2004 and 2005.

Design: Using a State Administrative data set of all nursing homes, the authors document the impact of the four major hurricanes on the homes' ability to care for frail elders before, during, and after the storm. Supplementing State data are 257 self-reports from administrators on the impact of the hurricane on operations, resident care, and the importance of the relationship of the nursing home to local and state emergency operations entities.

Setting: Nursing homes.

Results: Almost one-third of all FL nursing homes either evacuated or sheltered residents from other facilities. No deaths during evacuation were reported for the 5,500 nursing home residents evacuated. Relationships with local emergency management offices prior to hurricanes were excellent, very good, or good for 58 percent of respondents. Regardless of the quality of the relationship, 80 percent of the respondents indicated that they would like to improve their relationship after 2004 season and 78 percent indicated they need to improve their disaster plans.

Conclusions: This article highlights the importance of establishing an effective working relationship between nursing homes and local emergency management offices during all phases of disaster preparedness to ensure that nursing home residents are safe.

Key words: nursing homes, residents, relationships with local emergency management entities, older adults

BACKGROUND

An analysis of Louisiana (LA) death certificates after Hurricane Katrina revealed that at least 103 deaths occurred in nursing homes.¹ Two of the most publicized cases included the drowning deaths of 35 nursing home residents at St Rita's and an additional 34 nursing home residents who died while sheltering at Lafon nursing home in New Orleans. One month later, during a mandatory evacuation from a Houston nursing home prior to Hurricane Rita, an additional 23 residents perished in a bus accident on a crowded highway.

Following these events, a number of studies evaluated the emergency preparedness needs of nursing homes during hurricanes.^{2,3} Perhaps, most significantly, a 2006 report by the Office of the Inspector General (OIG)⁴ noted that the majority of nursing homes had "adequate" disaster plans prior to the Gulf Hurricanes of 2004 and 2005 based on standards existing at the time. Nevertheless, as the tragedies of 2005 suggest, many of these plans proved to be inadequate when tested. The OIG report also raised concerns about the

lack of collaboration among nursing homes and local emergency management entities during all phases of a disaster. Dosa et al.,⁵ working with the Kaiser Family Foundation, echoed these findings in interviews with 20 LA nursing home administrators regarding their "lessons learned" following Hurricane Katrina. Castle⁶ examined 2,134 nursing home evacuation plans and found only 42 percent had procedures listed for working with the local emergency manager or had plan reviewed by local emergency management offices.

This previous research highlights the importance of good working relationships between nursing homes and state and local emergency management offices. Nursing homes care for frail individuals who require considerable assistance with activities of daily living.^{5,7-9} For those who evacuate, state and local emergency entities can assist or hinder nursing homes in obtaining necessary transportation or sheltering. For those choosing not to evacuate, problems with restoring electricity and providing necessary supplies after the storm have been reported and have clearly resulted in after-the-fact evacuations.^{7,9,10}

In 2008, The Institute of Medicine issued a "Research Priorities Report" that recognized the importance of protecting frail elderly during disasters by improving and prioritizing communication in preparedness and disaster response between organizations and government entities.¹¹ This study seeks to better understand the significance of the relationship that nursing homes have with their local emergency management entities during and following hurricane disasters. Using two data sources, we evaluate the impact of the eight 2004-2005 Florida (FL) storms on the homes' ability to care for frail elders before, during, and after the storm. We also report results of a nursing home administrator survey characterizing the nursing home's relationship with the local emergency operations office prior to and during the 2004 hurricanes, and their perception of the need to improve the relationship with emergency management after the hurricane experiences.

METHODS

Data sources

FL's agency for Health Care Administration (AHCA) database. A database developed by the AHCA was

evaluated to determine the impact of the 2004-2005 Florida hurricanes on all nursing homes across the state. To generate the database, information is compiled and updated by AHCA staff working at the state's Public Health and Medical desk (Emergency Support Function [ESF-8]) within the State's Emergency Operations Center (EOC). Emergency personnel use this management information system to monitor nursing home operations. Following each hurricane, AHCA personnel conducted telephone interviews with nursing home staff and with state surveyors who were dispatched to visit affected facilities. Interviewees were asked about individual facility evacuation rates, disruption of electrical power, water system outages, need for a generator, and need for oxygen.

Specific information in the database includes basic demographic details such as nursing home license number, name, and address. For each nursing home, the following information was recorded: number of evacuated residents; structural damage; power outages; no water; need generator; and need oxygen. Additionally, each nursing home was queried regarding their current occupancy capacity and their capability to be a receiving facility for residents from other facilities. Finally, an open-ended qualitative comment was recorded about the hurricane's general impact on the facility.

Two investigators (KT and SVD) independently reviewed all the qualitative data for each facility in 2004 (1,849 notes about the experience and 219 received residents information) and in 2005 (630 notes about the experience) using a standardized data abstraction tool listing the impact categories for hurricanes. The reviewers' codes were compared with all but 36 notes for 2004 and 14 for 2005 in agreement, resulting in a 98 percent rate of agreement. All disagreements involved interpretation of "need generator" or "power out." When notes were reviewed, a second time with both the reviewers present, data were reconciled.

The USF hurricane response and recovery survey. In addition to the AHCA database, we surveyed community-based nursing home administrators in the months following the 2004 hurricanes. Respondents

were recruited at association-sponsored regional meetings during October-November, 2004 and by mailed surveys to state trade association member nursing homes in an effort to capture information from facilities that were not represented at the regional meetings (N = 517). Each potential respondent was mailed an eight-page survey consisting of 47 structured questions, along with a \$5.00 gift card, and a cover letter explaining the study and presenting the elements of informed consent. A self-addressed, stamped envelope was included for respondents to mail their responses back to investigators. To encourage compliance, a reminder letter was mailed to potential respondents 14 days later to enhance participation and return of the questionnaires. Surveys were conducted with the approval of the University of South Florida Institutional Review Board and all participants were consented.

The survey solicited information about the overall effect of hurricanes on facilities, residents, and staff. Respondents were queried about whether their residents evacuated, and where they sheltered during (or after) the hurricanes. Additional questions asked whether nursing homes lost services following the storms (eg, electricity, water). Respondents were also asked about their relationship with their local emergency management office. Finally, respondents were asked to rate the quality of the assistance they received from state agencies and national voluntary agencies like the Salvation Army and Red Cross prior to, during, and after the storms.

Because the hurricanes in 2004 and 2005 were dramatically different in terms of storm intensity, physical damage, number of facilities impacted, and proportion of the state that was affected, all analyses are reported separately for each hurricane and each dataset. Using univariate analyses, descriptive information about each storm's impacts is presented.

RESULTS

AHCA database

Eight hurricanes struck FL during the 2004 and 2005 hurricane seasons, four of which were classified as major hurricanes (Category 3 or higher).^{12,13} During 2004, every FL county was declared a disaster

area at least once because of the intensity and cumulative impact of these storms over a 44-day period. In 2005, 55 percent of the counties were declared disaster areas.

Table 1 summarizes facility evacuations during seven of the eight 2004-2005 hurricanes; the State database for Hurricane Charley (Category 4) was created poststorm and, therefore, was not included in the descriptive analysis due to lack of information about activities before and during the storm. Table 1 indicates that residents were evacuated from 86 facilities; approximately 13 percent of all Florida nursing homes (N = 689) evacuated at least once in the 2004-2005 seasons. Multiple evacuations were common; one FL Keys' nursing home evacuated four times over 2 years and ultimately closed in 2006 with the owner claiming that hurricane-related expenses contributed to its closure.¹⁴ Hurricane Frances forced the most evacuations of facilities (N = 31) and residents (N = 1,946) in 2004, followed by Hurricane Wilma in 2005 where 17 facilities evacuated 1,236 residents. In total, 5,505 residents left facilities for shelter elsewhere and were received by another 125 (18 percent) nursing homes. In total, almost one-third of all nursing homes either hosted residents from other facilities or evacuated residents during the 2004-2005 seasons.

Operational implications of storms on day-to-day care were also substantial. During the 2004 and 2005 seasons, 565 (82 percent) of all facilities were without power at least once, and 49 (7 percent) lost access to potable water for at least some period of time. Structural damage was sustained by 21.5 percent of the facilities. Fifteen nursing homes had to evacuate two or more times over the 2-year period. A total of 135 nursing homes had power outage two or more times and 23 facilities experienced structural damage two or more times.

The timing of an evacuation is an important issue. The nature of hurricane disasters leads many to assume that evacuation occurs only prior to a hurricane, while with fires, evacuation takes place concurrently and with earthquakes, typically, postevent. However, of the 46 facilities in FL that reported evacuation, 10 facilities (22 percent) evacuated in the aftermath of the storm. Reasons for evacuation in the

Table 1. State data: 2004-2005 impacts of hurricanes on FL nursing homes									
		2004				2005			
		Frances	Ivan	Jeanne	Dennis	Katrina	Rita	Wilma	
Hurricane Descriptors									
Date of Impact	September 5, 2004	September 16, 2004	September 25, 2004	July 10, 2005	August 26, 2005	September 20, 2005	October 24, 2005		
Strength on FL impact	Category 2	Category 3	Category 3	Category 2	Category 1	Tropical storm	Category 3		
Counties declared disaster areas*	57 (85 percent)	38 (57 percent)	53 (79 percent)	18 (28 percent)	4 (6 percent)	4 (6 percent)	19 (28 percent)		
Impacts†									
Evacuated	31 (5 percent)	14 (2 percent)	15 (2 percent)	3 (<1 percent)	4 (1 percent)	2 (<1 percent)	17 (3 percent)		
Number of evacuees	1946	1118	593	299	122	191	1236		
Received evacuees	61 (9 percent)	11 (2 percent)	53 (8 percent)						
Power out	102 (15 percent)	42 (6 percent)	188 (28 percent)	24 (4 percent)	42 (6 percent)	1 (<1 percent)	165 (25 percent)		
Structural damage	28 (4 percent)	17 (3 percent)	53 (8 percent)	7 (1 percent)	4 (1 percent)	0	35 (5 percent)		
Water system out	9 (1 percent)	14 (2 percent)	9 (1 percent)	0	0	0	17 (3 percent)		

*percent out of 67 FL counties.

†N (percent out of 686 FL nursing homes).

immediate posthurricane period included: safety concerns of staff and residents isolated after hurricane, structural damage, flooding, and prolonged water and electrical outages that compromised resident care (ie, generator malfunction, shortage of generator fuel).

Electrical outages and the ability to keep generators operational were critical to the ability to maintain residents following these hurricanes. Facilities that were sheltering in place and experienced power loss indicated they were without a generator or needed an additional generator to maintain adequate patient care; others requested fuel for generators. State records indicated that 13 facilities also reported requests for oxygen.

The USF hurricane response and recovery survey

Table 2 provides survey results from 257 respondents about the impact of the four 2004 storms on

Florida nursing home operations. Of these, 257 respondents, 85 percent were recruited at association sponsored regional meetings. Forty percent of Florida's 649 facilities accepting Medicare and Medicaid residents are included in this study. Among the respondents, 205 (80 percent) were nursing home administrators, 18 (7 percent) were facility owners, 17 (7 percent) were directors of nursing, with less than 1 percent citing a maintenance or social service function. All respondents indicated that they were affected by at least one of the hurricanes in 2004. These facilities had an average size of 138 beds, slightly higher than the median facility size of 120 beds. Facilities were well distributed around the state including responses from 72 percent of FL's 64 counties which have nursing homes. Of the 257 providers who are included in these analyses, 48 (19 percent) evacuated for at least one of the storms. Telephone service was disrupted once for 27 percent,

Table 2. Survey data: Number of hurricanes striking nursing homes and impact per hurricane

Impacts*	None	One	Two	Three	Four
Affected facility	4 (2 percent)	51 (20 percent)	67 (26 percent)	88 (34 percent)	47 (18 percent)
Disrupted electricity	62 (24 percent)	87 (34 percent)	79 (31 percent)	24 (9 percent)	5 (2 percent)
Disrupted water	216 (84 percent)	31 (12 percent)	9 (4 percent)		
Disrupted phone	153 (60 percent)	70 (27 percent)	25 (10 percent)	7 (3 percent)	2 (<1 percent)
Produced loss of data	249 (97 percent)	7 (3 percent)	1 (<1 percent)		
Sheltered staff families	14 (5 percent)	46 (18 percent)	57 (22 percent)	69 (27 percent)	71 (28 percent)
Sheltered resident families	39 (15 percent)	47 (18 percent)	49 (19 percent)	59 (23 percent)	63 (25 percent)
Need to transfer residents to hospitals	185 (72 percent)	55 (21 percent)	13 (5 percent)	3 (1 percent)	1 (<1 percent)
Establish mutual aid agreements with other NHs	82 (32 percent)	37 (14 percent)	29 (11 percent)	25 (10 percent)	84 (33 percent)
Surveyed by DOH	199 (77 percent)	33 (13 percent)	21 (8 percent)	3 (1 percent)	1 (<1 percent)
Surveyed by AHCA	241 (94 percent)	11 (4 percent)	4 (2 percent)	1 (<1 percent)	
Evacuated	224 (87 percent)	29 (12 percent)	4 (1 percent)		
Able to transfer residents to hospitals	176 (69 percent)	41 (16 percent)	14 (5 percent)	11 (4 percent)	15 (6 percent)

*Number (percentage of 257 respondents).

Table 3. Survey data: Number of days without electricity by hurricane

	N	Minimum	Maximum	Mean	Std. Deviation
Charley	67	0.04	28	2.55	3.78
Frances	124	0.04	28	2.82	3.30
Ivan	39	0.04	20.5	2.81	3.88
Jeanne	126	0.04	27	1.89	3.05

twice for 10 percent, and three or four times for 3.5 percent of the respondents in the 2004 season. Of those who did lose telephone service, it ranged from 1 hour to 27 days. Hurricane Frances resulted in the largest number and longest telephone service disruption with 34 facilities reported losing telephone service for an average of 3 days and 18 hours. Although the state database provided an estimate of the number of facilities without power, the *Response and Recovery Survey* captured the number of days these facilities actually were without power (see Table 3). For the four hurricanes, facilities lost power for anywhere from 1 hour to 28 days. Hurricane Frances resulted in the longest average number of days without power (2.82 days) for the 124 facilities that reported losing electricity. Hurricane Jeanne tallied the largest number of power outages (N = 126) and with an average of 1.89 days of electrical loss.

During these hurricanes, nursing homes sheltered residents, family of staff, and family of residents. Table 2 indicates that 95 percent of the facilities allowed staff to bring family members to the facility during the storm and 85 percent allowed family members of residents to also be sheltered in the facility. Again, for facilities struck by multiple hurricanes, the sheltering occurred numerous times for multiple storms.

Facilities did not report problems with staffing of facilities. Unlike the experiences reported during Katrina,⁵ 97 percent of FL respondents reported that staff was adequate at all nursing levels. Most facilities deployed staff in two 12-hour shifts. On the basis of the data published elsewhere, the costs for staffing averaged close to \$40,000 per facility per storm.¹⁵

Facilities also reported that hurricane plans were helpful. When asked about how helpful their disaster response checklist or plan was in dealing with the hurricanes, 89.5 percent of the respondents indicated that their disaster checklist/plan was either helpful or very helpful in preparing for and during the hurricanes. Notably, 78 percent also reported a desire to revise and improve their disaster preparedness plan after their hurricane experiences.

Finally, the *Response and Recovery Survey* queried respondents on their "relationship with their local emergency management operations center (EOC)," the "helpfulness" of the EOC during the hurricane(s) and whether or not they wanted "to improve their relationships" with their local EOC. Twenty-four percent of the nursing homes indicated that they had very good relationship with their EOC and 43 percent indicated that the relationship was good. However, 12 percent said their relationship with their local EOC was either fair or poor. Importantly, 58 percent of the respondents stated that their EOC was either helpful or very helpful during the hurricane(s). For the 20 percent who described the EOC as "not helpful" during the hurricane(s), 45.5 percent indicated that they had "no relationship," 36.8 percent said they had a fair relationship, and 9.2 percent indicated they had a good or very good relationship with the EOC. By the end of the 2004 season, regardless of the quality of the previous relationship, 80 percent of the respondents indicated that they would like to improve their relations with their local emergency management office.

DISCUSSION

To better understand the relationship and to further examine the operational challenges that nursing homes face before, during, and after hurricanes, we examined effects of FL hurricanes on nursing homes in the state during 2004 and 2005. As is evident from the analysis of the AHCA database, individual nursing homes were adversely affected by the eight FL hurricanes. During the 2-year hurricane period, more than 5,500 residents were evacuated from 67 Florida nursing homes and no deaths directly related to evacuations were recorded. Almost two-thirds of

all facilities in the state lost power at least once. Nursing homes faced water outages, needed diesel fuel to keep generators operating, and required oxygen and medical supplies to keep residents safe. Because the State ESF-8 Public Health and Medical desk worked with the nursing home associations, facilities were able to accommodate most needs. However, these experiences also highlight the importance of establishing an effective working relationship between nursing homes and local emergency management offices prior to disasters.

After Hurricane Andrew struck southern FL in 1992, Florida instituted a new and rigorous review of nursing home disaster plans. The frequency of hurricanes forced nursing homes to file detailed planning documents, evidence of transfer agreements to ensure that a specific facility was willing to receive residents, copies of signed contracts for transportation, and most importantly, evidence that the city or county emergency management office had reviewed and approved the plan. The long-standing requirement for a review of plans appears to have Florida nursing homes better prepared to work with local emergency management entities. Our study indicates that the majority of administrators perceived a "very good or good relationship" between their nursing homes and their county/state EOC. Nevertheless, despite a 12-year requirement to file nursing home disaster plans with the local emergency management entity, 12 percent of respondents noted their relationship with their state or local entities to be fair or poor and 80 percent of all respondents noted their relationship could improve to better address future emergencies.

On the basis of a review of the surveys, it is quite clear that state and local emergency management entities are critical in disaster preparedness: they collect and distribute up-to-date information about an evolving event, coordinate all emergency activities, and manage available federal and state disaster-related resources. These resources begin prior to the storm, when emergency offices often manage access to scarce transportation resources and arrange for police escorts to expedite evacuation in addition to providing real-time weather updates on storm intensity, expected landfall, and potential flooding.

In addition, emergency management offices have considerable importance after the event when they often control access to critical supplies such as food, fuel, water, and restoration of electrical power—all vital elements for frail elders sheltering in place during hurricane recovery efforts.¹⁶ Finally, emergency management offices manage public safety and can order police to provide security to ensure the physical safety of the nursing home residents, staff, medications, and supplies. After Hurricane Katrina landed in Gulf Port, MS the CEO of a MS nursing home reported that he had to hire armed guards to protect the staff and residents of a nursing home that had fuel, food and medications when everything around the facility was in shambles.¹⁷ The relationship of emergency management to nursing homes during all phases of disaster preparedness is vital to ensure that nursing home residents are safe regardless of whether a nursing home chooses to evacuate or shelter in place.

Nursing homes also need to work with their local emergency management office to decide whether or not to evacuate during a hurricane, and emergency management personnel should help facilitate any evacuation deemed necessary.¹⁸ The preference is to have residents shelter in place in their current facility unless it is likely to be flooded.^{19,20} It is less disruptive of routines, more likely to be familiar to frail frightened elders and the caregivers are both known to residents and knowledgeable about residents' needs and medical history. However, for a facility to successfully shelter in place, the facility must have adequate resources to sustain safe operations until power is restored. Administrators noted that disaster plans needed to be revised to include more evacuation transportation contracts, especially for stretchers and ambulances. Administrators also noted the need to increase the electrical generator capacity, to have contracts to replenish diesel to keep generators operating and to have seven days of food, water, and supplies.¹⁶

There are methodological flaws in each dataset that should be noted. The state dataset evolved and became increasingly sophisticated as it was used to help manage state response to events. This made it difficult to precisely compare storms and their

impacts over time. However, the qualitative data from notes reflects the best knowledge available to the regulators and emergency operations officials during the event and provides insights into the evolving management challenges facing nursing homes as they struggled to meet resident needs safely. These notes and the evolution of the database reflect Florida's quality improvement commitment to evaluate its reporting and management systems after each emergency management activation. Despite what may be a research limitation, Florida's nursing home computer-based information system, the Emergency Status System, is recognized as a detailed and comprehensive system; CMS has recommended it to other states as a potential standard model to manage nursing home facility disasters. The numbers reported are an underestimate of the total facilities and residents that evacuated because many Tampa Bay nursing homes were ordered to evacuate in anticipation of Hurricane Charley. We know that nine nursing homes evacuated after the storm; however, AHCA only collected evacuation data hurricane for Charley after the storm.

We collected information using the administrator survey in the period of 30-90 days after the events. As with after the fact surveys, *The USF Hurricane Response and Recovery Survey*, collected data that is subject to recall bias. Although administrators were queried the impact of each hurricane on providers, the questions on relationship and helpfulness were overall questions rather than hurricane specific questions. Given the breadth of the hurricanes' impact across the state over 44 days it would have been difficult to differentiate attitudinal reactions for a specific single event from the overall impact. Moreover, this study seeks to highlight the critical relationship nursing homes have with their local emergency management offices. The internal validity of this study is also strengthened by the fact that both data sources present consistent themes about how hurricanes impacted the ability of nursing homes to meet the needs of their residents. Both sources document problems with power restoration, the need for homes to evacuate after the storm and concern about ability to access fuel to keep generators operational, and to replenish

supplies and other resources to sustain internal operations as the community recovers.

CONCLUSIONS

Tracking the morbidity and mortality effects of disasters on specific groups of long-term care residents is a research objective of the authors. By understanding the effects of disasters on long-term care residents and facility operations the authors hope to improve planning, communication and decision-making among local and state emergency management personnel and nursing home administrators. Adequate disaster planning and management is essential to elders' well being.

Nursing homes must continue to be held responsible for developing their own disaster preparedness and evacuation plans and training staff on those plans. Certainly some plans and preparation are inadequate. However, the OIG report⁴ and Castle⁶ indicate that most homes have "adequate" plans on paper per government regulation, but the plans frequently fail when tested. Failure can be attributable to a number of issues including the unpredictability of the hurricane's path and intensity as demonstrated by Hurricane Charley. Nevertheless, one factor that can be controlled is local and state emergency operations centers' willingness to recognize both nonprofit and for profit nursing homes as vital healthcare facilities.

Nursing homes are community healthcare providers that protect frail, vulnerable elders. The results of this study demonstrate that the effects of hurricanes on facility operations are significant and key gaps exist in local, state and federal coordination that have important implications for regulating nursing home disaster preparedness. Disaster preparedness is both a private and community effort. Healthcare facilities must plan and train personnel prior to disasters, implement well-developed plans as disasters unfold, and manage postevent recovery. However, all phases of disaster preparedness also require that nursing homes be recognized as healthcare providers, and all phases require an ongoing relationship with emergency management personnel in state and local emergency operations centers and through the ESF8's Public Health and Medical support function.^{2,19,20}

The focus of the paper is on Florida in 2004, but the experiences of nursing homes confronting Hurricanes Gustav and Ike during 2008 suggest that issues related to developing improved relationships between nursing homes and local and state emergency management organizations are not limited to one state. Despite substantial reforms after Katrina, LA nursing homes are reported to have continued difficulty accessing ambulance service needed to evacuate nursing home residents, limited ability to access fuel for generators, and have not uniformly achieved high priority for power restoration.²¹ LA's Department of Health and Hospitals noted that the state EOC also needed to provide resources for noncoastal nursing homes that were sheltering in place residents evacuated from coastal facilities.²² Similar findings were noted in TX as 86 nursing homes and 7,000 residents evacuated prior to Hurricane Ike's landfall near Galveston Island.²³

State and local emergency management entities' recognition of the nation's 16,000 nursing homes as facilities caring for almost three million residents annually is an important post-Katrina improvement. Eight southeastern states have a regional ESF8 public health and medical response coalition that includes a long-term care as a planning focus. Recognizing that "emergency plans must be coordinated with state and local plans," CMS drafted nursing home emergency planning regulations requiring "nursing homes to follow mandatory evacuation orders" and "have a plan for sheltering-in-place."²⁴ New regulations will increase the awareness of the importance of coordination within ESF8 functions and with local and state emergency operations. However, true coordination requires that nursing homes be officially recognized as healthcare facilities and given the same priority as hospitals for assistance before, during, and after the disaster.

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REFERENCES

1. Brunkard J, Namulanda G, Ratard R: Hurricane Katrina Deaths, Louisiana, 2005. *Disaster Med Public Health Prep.* 2008; 1(1): 215-223.
2. Hyer K, Brown LM, Berman A, et al.: Establishing and refining hurricane response systems for long-term care facilities. *Health Affairs.* 2006; 25(5): w407-w411.
3. Laditka SB, Laditka JN, Xirasagar S, et al.: Providing shelter to nursing home evacuees in disasters: Lessons from Hurricane Katrina. *Am J Public Health.* 2008; 98(7): 1288-1293.
4. Office of the Inspector General: *Nursing Home Emergency Preparedness and Response During Recent Hurricanes.* Washington, DC: Department of Health and Human Services, 2006; Report No.: OEI-06-06-00020.
5. Dosa DM, Grossman N, Wetle T, et al.: 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(3): 142-149.
6. Castle NG: Nursing home evacuation plans. *Am J Public Health.* 2008; 98(7): 1235-1240.
7. Brown LM, Hyer K, Polivka-West L: A comparative study of laws, rules, codes and other influences on nursing homes' disaster preparedness in the Gulf Coast states. *Behav Sci Law.* 2007a; 25(5): 655-675.
8. Brown LM, Rothman M, Norris F: Issues in mental health for older adults during disasters. *Generations.* 2007b; 31(4): 25-30.
9. Castro C, Pearson D, Berstrom N, et al.: Surviving the storms: Emergency preparedness in Texas nursing facilities and assisted living facilities. *J Gerontol Nurs.* 2008; 34(8): 9-16.
10. Hyer K, Polivka-West L, Brown LM: Nursing homes and assisted living facilities: Planning and decision-making for sheltering in place or evacuation. *Generations.* 2007; 31(4): 29-33.
11. Institute of Medicine: *Research Priorities in Emergency Preparedness and Response For Public Health Systems.* Washington, DC: The National Academies Press, 2008.
12. Florida Office of the Inspector General: *Florida Department of Health after Action Report: 2004 Hurricane Season.* Tallahassee, FL: Florida Department of Health, 2004.

13. Florida Office of the Inspector General: *Florida Department of Health After Action Report: 2005 Hurricane Season*. Tallahassee, FL: Florida Department of Health, 2005.
14. Swift E: Killing our aged. *Key West Citizen*. September 18, 2006.
15. Thomas KS, Hyer K, Brown L, et al.: Who foots the bill? Florida's model of nursing home Medicaid reimbursement for hurricane related expenses. Poster presented at *Gerontological Society of America 60th Annual Meeting*, San Francisco, CA, November 2007.
16. Hyer K, Brown LM, Christensen JJ, et al.: Weathering the storm: Challenges to nurses providing care to nursing home residents during hurricanes. *Appl Nurs Res*. 2009; 22(4): e9-e14.
17. Nohlgren S: Nursing homes swap storm stories and tips: Caregivers take away grim lessons from Katrina. *St. Petersburg Times*. May 23, 2007.
18. AARP Public Policy Institute: *We Can Do Better: Lessons Learned for Protecting Older Persons in Disasters*. Washington, DC: AARP Public Policy Institute, 2006.
19. Florida Health Care Education and Development Foundation: *New Tools Help Nursing Homes with Emergency Management Planning*. Tallahassee, FL: Florida Health Care Association, 2008.
20. Dosa DM, Hyer K, Brown LM, et al.: The controversy inherent in managing frail nursing home residents during complex hurricane emergencies. *J Am Med Dir Assoc*. 2008; 9(8): 599-604.
21. Fink S: Louisiana hospitals learning lessons from Hurricane Gustav. *ProPublica*. September 5, 2008.
22. Schuler M: Plan urged for hospital, nursing home evacuations. *Advocate Capitol News Bureau*. 1A, September 30, 2008.
23. Graves T, Yarwood B: For-profit providers need share of disaster funding. *Houston Chronicle*. October 20, 2008.
24. Centers for Medicare and Medicaid Services: Survey and certification, emergency preparedness for every emergency: Emergency preparedness checklist, 2007. Washington, DC: US Department of Health and Human Services. Available at www.cms.hhs.gov/SurveyCertEmergPrep/downloads/S&C_EPChecklist_SA.pdf. Accessed November 12, 2008.

To Evacuate or Not to Evacuate: Lessons Learned From Louisiana Nursing Home Administrators Following Hurricanes Katrina and Rita

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Objectives: To evaluate the “lessons learned” by Louisiana Nursing Home (NH) administrative directors (ADs) forced to make decisions relating to resident evacuation before Hurricanes Katrina and Rita and determine how emergency planning has changed in those NHs.

Design: Twenty in-depth telephone interviews followed by a focus group conducted in New Orleans.

Setting: Louisiana NHs in parishes affected by Hurricanes Katrina and Rita.

Participants: Twenty ADs employed by affected NHs during August and September 2005.

Measurements: Qualitative data sources consisted of transcribed telephone and focus group interviews. Data were analyzed using narrative summary analysis and descriptive data were tabulated using an abstraction tool.

Results: Nine of 20 NHs evacuated before the hurricanes and 11 sheltered in place. Six additional NHs

evacuated following the storms. The most common perceived consequences related to the evacuation process were resident morbidity or mortality (6 of 15), transportation issues (5 of 15), and staffing deficiencies (3 of 15). Common findings among the NHs that sheltered in place included supply shortages (8 of 11), facility damage (5 of 11), and staffing issues (4 of 11).

Conclusion: Respondents noted 4 general themes during the interviews and focus group session: (1) ADs felt abandoned by the state and federal emergency response apparatus during and after the hurricanes, and continue to feel that they are not a priority; (2) there is substantial physical and technical difficulty in evacuating frail NH residents; (3) staff retention remains a critical problem regardless of the evacuation decision; (4) there are key “lessons learned” that can be incorporated into future disaster planning. (*J Am Med Dir Assoc* 2007; 8: 142–149)

Keywords: Nursing homes; emergency preparedness; evacuation; hurricanes

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Since September 11, 2001, substantial federal dollars have flowed to states to improve the public health infrastructure against a bioterrorism attack. Most of this money has been awarded to first providers and acute care hospitals in an effort to better prepare them against an infectious disease emergency. As evidenced by the abject failure of the health care system following Hurricanes Katrina and Rita, these efforts did not necessarily translate into improved preparation for more conventional emergencies.^{1–4}

One particularly neglected area of study is the preparedness of communities to handle the evacuation of frail, elderly populations, particularly those in nursing homes (NH).^{5,6} For most NH residents, frailty, lack of mobility, dementia, and vision/hearing difficulties complicate their safe evacuation.^{7,8}

Several recent events, including a bus fire that resulted in the death of 24 residents, illustrate the extreme complexity of their evacuation.^{9,10}

Nevertheless, the prospects of not evacuating in the setting of emerging disasters can be equally tragic. For example, 34 residents were presumed to have drowned at St Rita's, a NH in the town of Chalmette, Louisiana, after its owners reportedly refused to evacuate.¹¹ The owners have been charged with negligent homicide. Another 22 residents perished at Lafon NH after the staff decided to weather Hurricane Katrina rather than evacuate. It is believed that many of the residents at Lafon might have been saved, had they received prompt emergency attention following the hurricane.¹²

It is clear from these events that the decision to evacuate a NH in the face of a conventional disaster such as a hurricane is a difficult one.¹³ NH administrative directors (ADs) often make difficult decisions related to evacuation at the site of care, based on the degree of emergency, previous experience, and logistical issues such as transportation and staffing levels. Therefore, the overall goal of this project was to record and analyze the experiences of NH ADs at homes affected by Hurricanes Katrina and Rita in an effort to better understand the "lessons learned" by those who were faced with making decisions related to evacuation. A second goal of this research was to determine how emergency planning for hurricanes has changed in areas affected by Hurricanes Katrina and Rita.

METHODOLOGY

Sample

The names and telephone numbers of ADs at NHs located in Louisiana parishes near the Gulf of Mexico were identified, using a list supplied by the Louisiana NH Association (http://www.lnha.org/find_facility.htm; Regions 1, 3, and 7). Institutional Review Board (IRB) approval and waiver of informed consent was granted by Brown University before study initiation. Prior to telephone contact, ADs were sent a mailing from study investigators outlining the purpose of the project, the voluntary nature of the study, and a list of possible risks. ADs were also provided a telephone number to opt out of further participation.

After 3 weeks, participants were contacted by telephone alphabetically by NH and asked to schedule a 30- to 45-minute telephone interview. If there was no response, a repeat call was made, after which potential participants were labeled nonparticipants. Once telephone contact with the participant began, investigators confirmed that they had served as ADs during the storms. Following completion of the telephone survey, participants were also asked whether they would be willing to participate in a follow-up 1-hour focus group session with other participants. A goal of 20 telephone interviews was set.

Telephone Survey

A 20-item telephone survey was constructed. Questions were grouped into a general category, followed by questions specific to NHs that evacuated and those that sheltered in place. Questions for respondents included whether they had

evacuated their facilities during Hurricanes Katrina and Rita. ADs were asked who made the final decision to evacuate or shelter in place, whether they were pressured by government officials, and whether they felt there had been adequate notification about the trajectory and severity of the storm.

ADs were asked about the consequences of the decision: injuries and deaths, and for those who evacuated, how it was handled for residents with special needs such as stretchers, oxygen, and dialysis. For those facilities that sheltered in place, ADs were asked whether there was structural damage to the building from the storm; whether emergency supplies were adequate during the storm; and how long after the storm the facility had to wait before federal, state, and/or local assistance was obtained. Finally, telephone interviewees were asked if they felt federal, state, and local officials could have done more to assist their decision related to evacuation. All telephone interviews were conducted during May and June, 2006.

Focus Group Session

A 90-minute focus group was conducted in a New Orleans hotel on July 20, 2006. A focus group is a qualitative data gathering technique with a moderator directing the interaction and inquiry in a structured manner.¹⁴ The stated objectives of the focus group were to identify the needs of NHs that might aid them in making future decisions to evacuate or shelter in place. In addition, participants were asked to identify lessons learned from their hurricane experiences. Finally, ADs were queried on their expectations from federal, state, and local governments regarding evacuation planning. ADs were paid \$100.00 for participation.

Analysis

All 20 telephone conferences and the focus group session were audiotaped and then transcribed. A data abstraction tool was created for the telephone interviews and 2 investigators (D.M.D., N.G.) read all 20 transcripts. Respondents were grouped by whether their NHs evacuated or sheltered in place. Respondents were also categorized by who made the ultimate decision to evacuate. In addition, transcripts were evaluated for detailed narrative comments about the consequences of each NH's decision to evacuate or shelter in place. Finally, the respondent's insight into lessons learned related to their decision was recorded. Results were tabulated and then confirmed with the other investigators for accuracy.

RESULTS

Overall, 51 facilities are listed in the 3 regions previously described on the Louisiana NH Association Web site. All 51 facilities received a mailing related to the study at the address provided by the NH Association. Before telephone contact, 4 ADs called to "opt out" of future contact with study investigators. After 3 weeks, each of the remaining 47 facilities was contacted in alphabetical order. During subsequent telephone contact, 9 facilities were eliminated because they had not reopened. An additional 5 administrators refused to participate directly and 12 nursing homes refused to return repeated phone calls from study investigators. A total of 21 phone interviews were therefore

Table 1. Characteristics of Participating Versus Nonparticipating NHs Contacted by Telephone (n = 47)

Data From 2004 Oscar File	Participating NH n = 19*		Nonparticipating NH n = 26*		P Value (t test)
	Mean ± SD	Median	Mean ± SD	Median	
Bed size	148.7 ± 59.5	126	127.8 ± 45.1	120	.19
Staffing ratio (residents/staff†)	1.7 ± 1.2	1.7	1.9 ± 1.1	1.7	.42
Patient severity mix‡	9.9 ± 0.8	10.1	10.3 ± 1.1	10.2	.25
Deficiency count	9.9 ± 7.3	8	9.4 ± 6.7	8	.79

NH, nursing home; OSCAR, Online Survey Certification and Reporting file.

* One nursing home excluded from each category because of lack of data availability for 2004.

† Staff = Number of registered nurses, licensed practical nurses, directors of nursing, administrators, and certified nursing assistants.

‡ ADLINDEX + STINDEX (Activities of Daily Living Index + Severity Index).

conducted. One interview was excluded subsequent to its completion as it was determined during the interview that the respondent AD was not employed by the facility during the months of August and September 2005. NH ADs were interviewed from NHs located in the following Louisiana parishes: Jefferson (7), Orleans (2), St Mary (2), and 1 each from Assumption, St Tammany, St Charles, St James, Lafourche, St John the Baptist, St Laundry, Vermillion, and Acadia parishes. Table 1 compares the overall bed size, patient-to-staff ratios, acuity level, and number of deficiencies using the Online Survey, Certification, and Reporting Database from 2004. No differences were apparent between responders and nonresponders.

Telephone Interviews

Table 2 summarizes the perceived consequences of the decision to evacuate or shelter in place for the facilities making that decision. Additional information is presented that specifies who made the eventual decision to evacuate and whether local, state, and/or federal officials were helpful in facilitating or assisting the decision. Several of the more frequently perceived consequences of the evacuation decision are highlighted in this article, accompanied by qualitative information obtained during the telephone interviews.

Overall, 9 of the 20 homes evacuated before either of the hurricanes, and 11 sheltered in place during the storm. Six

Table 2. Evacuation Status and Perceived Consequences by Telephone Respondents (n = 20)

	n, %
Evacuation status	
NHs that evacuated either before or after either of the storms	15/20, 75
If you evacuated did you evacuate:	
Before the storm	9/15, 60
After the storm	6/15, 40
NHs that sheltered in place during the storms	11/20, 55
NHs that did not evacuate at all for either storm	5/20, 25
Who made the ultimate decision to evacuate or stay?	
NH administrative director	11/20, 55
NH owner	7/20, 35
Local or state officials (eg, mandatory evacuation)	2/20, 10
Did you perceive local, state, or federal officials to be helpful in assisting with the decision to evacuate?	
Yes	6/20, 30
No	9/20, 45
Did not ask government for assistance	5/20, 25
Perceived consequences of evacuation (n = 15)*	
No consequences	3/15, 20
Transportation issues	5/15, 33
Staffing issues	3/15, 20
Shelter issues	2/15, 13
Mortality/morbidity of NH residents	6/15, 40
Perceived consequences of sheltering in place (n = 11)*	
No consequences	2/11, 18
Facility damage	5/11, 45
Staffing issues	4/11, 36
Supply issues (eg, power, water, medications)	8/11, 73
Mortality/morbidity of NH residents	1/11, 9

NH, nursing home.

* Six facilities are counted in both categories as these facilities sheltered during the storm and then evacuated subsequently.

additional homes evacuated following the storms, for a total of 15 evacuations. Among the homes that evacuated, the most common perceived consequences were morbidity or mortality related to the evacuation process (6 of 15, 40%), transportation problems (5 of 15, 33%), staffing problems (3 of 15, 20%), and problems related to the adequacy of the destination shelter (2 of 15, 13%). Three respondents (3 of 15, 20%) noted no perceived negative consequences of the decision to evacuate.

One AD commented, "I tell you that [evacuating] is one of the hardest decisions a person can make because you know if you evacuate, you're going to lose some residents, but if you stay, you could lose everybody." When asked to comment on the difficulty of evacuation, another AD commented, "When you start moving [the residents] out, it's a tremendous burden, it's very hard. They're pulled and tugged. Their bodies are contorted into these busses. They're so heavy. It's not an easy thing to do to get these people on charter busses when they're wheelchair bound. No one has any idea how much strength it takes to do that. And how much a toll it takes on the [frail] residents just to do that to them."

Obtaining reliable transportation was a problem for 3 of the 6 ADs who evacuated after the storm. They reported that they would have left before the storm had transportation been available. As one AD noted, "We would have evacuated had we been able to that Saturday [prior to the storm]. The majority of staff left. And like I said, even though we had contracts with ambulances, bus drivers, busses, and people to come and get them, they just didn't do it. They left." Several ADs also noted that their buses were commandeered by state/local officials to evacuate prisoners from local jails. Several ADs also noted difficulties for frail elderly patients, many of whom became dehydrated on bus trips of greater than 12 hours' duration.

Several ADs also commented on the difficulty of maintaining reliable staffing. One noted ". . . a good 60% of the [staff] is going to want to stay home with their families. And then you have a very skeleton crew. If you have to evacuate 2 or 3 times, you may not have [anyone] wanting to go after the second time." Even after the storm, ADs noted the difficulty in staff retention. "There's not enough staff," one noted. "There are people, you know, out of their homes. There are people still scattered all over the country. It's a struggle day to day."

Among those not evacuating, the most common perceived consequence was supply shortages (8 of 11, 73%). Other consequences included mostly minor facility damage (5 of 11, 45%) and staffing issues (4 of 11, 36%). Only 1 AD (1 of 11, 9%) noted a casualty related to the storm, and 2 (2 of 11, 18%) noted no overt consequences as a result of sheltering in place. One discussed the difficulty of obtaining fuel after the hurricane and noted surprise at how quickly his generator burned fuel, "I had trouble getting diesel fuel for after [the storm] because it would burn up. It would burn [through] the tank in about a day and a half, so I had to run around. The Parish came through for me and loaded us up with fuel a couple of times."

Although those who sheltered in place generally experienced fewer logistical issues, several ADs identified difficulty in caring for residents without power. On losing air conditioning, one AD noted, ". . . it was really hard because patients, they dehydrate so quickly. . . we tried to beef up the fluid intake. We put cold rags on their heads. We had bought a few fans and the ones that were really critical, we put the fans on. But of course everybody was extremely hot."

Focus Group Session

Overall, 5 ADs attended the 90-minute New Orleans focus group; the discussion concentrated on the following: (1) expectations by the NHs of federal, state, and local governments regarding evacuation planning; (2) lessons learned by ADs related to evacuation issues, such as transportation, difficulties with staffing, and finding safe shelters; (3) lessons learned by ADs related to issues that had to be confronted among those sheltering in place (eg, facility safety and staffing); and (4) how preparation activities have changed since 2005.

In terms of the ADs' expectations of government officials, all 5 participants agreed that they were very much "on their own" for emergency planning. One AD noted at the conclusion of the focus group, "If you get nothing else from this, know that we are on our own, that we cannot rely on government assistance for anything when it comes to evacuation. It really is up to us to take care of our residents." Another commented on the lack of oversight related to evacuation, ". . . the decision whether you evacuate or don't is the toughest decision and there's no [government] assistance, there's no guidelines. You just watch TV and try to make your decision."

ADs were also asked to comment on lessons learned for future NH evacuations. Table 3 summarizes the core needs, as perceived by the focus group participants, for improved evacuation preparedness, and summarizes lessons learned from ADs related to these needs. Participants divided these needs into 3 core areas: reliable transportation, staff willing to accompany evacuees, and appropriate shelter for frail elderly NH residents. Respondents noted that contracting with local transportation companies was problematic, as local officials frequently diverted these buses to other locations such as jails. In addition, local drivers often failed to show up, particularly if a mandatory evacuation had been called. As a solution, several ADs noted that they were contracting with vendors from other distant cities (eg, Shreveport, Louisiana, and Dallas, Texas), indicating that these drivers would be more likely to drive into an "at risk" area, pick up residents, and drive out, particularly if they were evacuating residents back to their home area.

ADs also noted the severe logistical difficulties associated with evacuating frail elders. One AD noted, ". . . we had to take most of our patients, put them in a chair . . . , haul them up to the driver's level, and then drag them down the aisle to a seat. And at the time of evacuation, we had 200 patients. We started at 9 o'clock at night and finished at 10 o'clock the next morning, and it was fairly calm. And fortunately we lucked out, people should have gotten hurt but they weren't. We got really lucky." Several ADs noted that to solve this

Table 3. *NH Needs for Evacuation and Lessons Learned From the Focus Group*

Evacuation Issue	Encountered Problems	Lessons Learned
Transportation issues	Bus vendors failed to provide service for NHs after the evacuation order was given, particularly local vendors who were unable to provide drivers	Contract with vendors outside of the immediate area (particularly in evacuation destination areas) as these vendors are most likely to carry through with agreements; NHs that contracted with local school districts were more likely to run into trouble with absentee drivers and refusal to provide services
	Buses were often not equipped to handle stretchers and wheelchair access	Build specifically designed ramps, as many buses do not provide wheelchair access
	Bus trips were long and difficult for the frailest NH residents	Evacuate the frailest residents in NH vans or triage them to hospitals outside of the evacuation region before facility evacuation
Staffing issues	Dementia patients were difficult to direct on evacuation buses	Impress upon families to evacuate their own family members—particularly those with dementia who are otherwise mobile
	Staff were unwilling to leave family members behind	Offer to evacuate and shelter immediate family members of staff
	Staff members frequently disappeared or refused to evacuate	Organize volunteer efforts at shelter locations before hand
Shelter issues	Staff members had no financial incentive to stay	Incentives to work (as much as a financially possible)
	Nursing shortages were particularly difficult to overcome	Arrange for visiting nurses at evacuation location ASAP
	Sheltering NH residents is difficult as most are not set up to deal with the degree of acuity commonly found in NH settings	Two-tiered approach to evacuation (1) A more local place where residents can be placed for the first 48 hours (eg, the high school gymnasium) recognizing that prolonged evacuation to these sites is dangerous but allows for rapid return in cases of near misses (2) A facility (another NH, hospital ward, military base) where residents can go for more prolonged care presuming that residents cannot return within 48 hours
	Many potential shelters are across state lines making payment by Medicaid difficult, compromising the likelihood that accepting facilities will take future evacuees	Resolution of payment issues; many NHs have not been paid for evacuees received after hurricanes

NH, nursing home.

problem, they have since contracted with local builders to build specially designed ramps for their facilities for future evacuations.

Another issue noted by ADs as complicating the movement of NH patients is the problem of dementia. As one reported, “Our [destination] home knew they were receiving patients but they didn’t realize they were all Alzheimer’s patients. So they arrive at 3 AM and unloaded the bus. They did not find all the patients until 6 PM the next afternoon. They picked the last 3 up at the local Wal-Mart. . .” To improve future evacuations, ADs noted the importance of improved communication between the receiving site and the evacuating site, and the importance of convincing family members to evacuate their own relatives, particularly demented patients without more complex medical treatment needs.

Regarding staffing, ADs discussed the difficulty of retaining staff when asking them to evacuate with residents, particularly

if this meant being away from their families. ADs noted that allowing immediate family members to evacuate with the NH contributed to staff willingness to continue working, but also noted that in some cases staff felt competing responsibilities toward their extended families and their pets that compromised their ability to devote their attention to the residents.

ADs also noted problems with finding appropriate shelter for NH residents. As one noted during the focus group, “We tried for a year or 2 with discussions with anybody who would listen that evacuating to the floor of a gymnasium of a high school is not a proper destination [for NH residents]. What we found out from Katrina is there are not enough empty beds in the rest of the state to handle New Orleans.” ADs proposed solutions, including contracting with “sister institutions” to provide mutual aid, and noted the importance of future government assistance to open abandoned military bases or other sources of the capacity needed to meet needs during disaster.

Table 4. *NH Needs for Sheltering in Place and Lessons Learned*

Shelter in Place Issues	Encountered Problems	Lessons Learned
Facility issues	<p>Generators, when they worked, only supplied a few days of power and did not control all electrical needs including air conditioner.</p> <p>NHs were not on a priority list for restoration of public works services.</p> <p>Safety issues were a concern after the hurricane as some came to the NH looking for medications/drugs.</p> <p>Supplies such as diapers, linens, and chucks were used much more rapidly than expected.</p>	<p>Upgrades to NH generators are required to allow for them to run all electrical needs (including air conditioning) for at least 7 days.</p> <p>Need to integrate NHs into the community-wide disaster plan.</p> <p>Need better support from local police and/or national guard to ensure safety after the hurricane.</p> <p>Need to test emergency supply periodically as 7-day supplies might only last 2 to 3 days when tested.</p>
Staffing issues	Shelter and family support issues (eg, child care, pet care) for staff reporting to work	Allow staff members to bring families to shelter in place at NH. Identify "off duty" staff members who can assist with childcare/ pet care.

NH, nursing home.

Table 4 outlines the perceived care needs of NHs that choose to shelter in place. ADs noted 2 specific areas of importance: having adequate supplies and maintaining staff on hand. ADs reported that they encountered problems with inadequate generators that might have been sufficient for basic electricity, but failed to meet the power demands of air conditioners and oxygen generators. They noted the importance of upgrading generators and the available fuel supply to allow for 7 days without power. Also important were accurate inventories of diapers, linens, and chucks; supplies were used faster than ADs had calculated. ADs also noted the importance of making sure their NHs were on priority lists for restoration of public utilities, such as power, water, and sewage. As one AD noted, his facility sat 3 blocks from a major hospital, but he had to go out and find the power company 1 month after the storm in order to re-route power into the building.

ADs also noted problems retaining staff, even when sheltering in place. All 5 ADs noted that it was better to shelter in place for staff retention, but reported that it was important to invite immediate family members to shelter in the NH. ADs also noted that messages can be confusing to staff and families, particularly if there is a general call for evacuation. They also noted that the decision to shelter in place must be taken with the clear understanding of whether staff will be willing to assume the responsibility for the residents in the home for as long as it takes.

Finally, in response to the discussions about how preparedness has changed since 2005, all 5 ADs agreed that while there was more interest about their emergency plans on the state and local levels, little had changed regarding the priority given NHs in community preparedness planning. Speaking about a recent meeting organized by the Louisiana NH Association and attended by several NH ADs, they noted that government officials and legislators had confirmed to them at a recent meeting that NHs were "on their own" and that they "needed to understand that they were not a priority." Another AD noted that in

response to a query from state officials as to how he'd revised his evacuation plan, he retorted ". . . I've decided I'm putting all my residents in prison fatigues and issuing them a pet and they will get out because the state did a lot in those 2 areas and not in NHs."

DISCUSSION

This study represents one of the first efforts to evaluate the experiences and "lessons learned" by NH ADs confronted with the decision whether to evacuate residents before and after Hurricanes Katrina and Rita. Regardless of whether a NH evacuated or sheltered in place, each AD described the difficulty of making evacuation decisions and identified key "lessons learned," such as the need to secure adequate transportation, the complexities of moving frail NH residents, and the difficulties in staff retention.

In general, our "findings" echo those identified in a recent Department of Health and Human Services (DHHS), Office of Inspector General (OIG) report on NH disaster preparedness. In the OIG report released in August 2006, investigators surveyed 20 homes in the Gulf states, and found that 5 of the 13 sites that evacuated during recent storms encountered adverse consequences for the evacuated residents.¹³ Those that sheltered in place encountered fewer problems. These findings are also consistent with those identified by researchers who surveyed 19 Pinellas County NHs that had evacuated before Hurricane Elena in August 1985.⁶ In that study, investigators described problems with transporting frail NH residents, finding safe shelters, and difficulties with staff retention.

In summarizing the results of this study, 4 general themes appeared repeatedly in the transcripts of the telephone interviews and the focus group discussion. Each of these themes is discussed below.

Administrators Felt Abandoned by the State and Federal Emergency Response Apparatus and Continue to Feel That They Are Not a Priority

Most ADs noted that they received very little assistance in making decisions related to evacuation; indeed, most felt that they were entirely on their own. Several factors likely contribute to this perception. To date, the emergency response system has been quite vague about public responsibility for those under the care of privately owned and operated entities. It is also likely that there are vague reporting and communication lines between the states' inspection agencies responsible for evaluating the quality of a NH's emergency plan and the agencies responsible for the overall state and community-wide emergency response.

In both the OIG report and a recent Government Accountability Office (GAO) report related to disaster preparedness, the authors note that NHs were faced with severe challenges during the recent hurricanes and received minimal collaboration from federal, state, and local governments. In a series of recommendations outlined in the OIG report, the authors suggest that the Centers for Medicare and Medicaid Services (CMS) strengthen federal certification standards to include emergency planning, and encourage future collaboration with state and local emergency entities. However, how this is to be implemented given the diverse pattern of relationships between state inspection agencies and emergency response agencies is not at all clear.

Despite the perceived inadequate response of federal, state, and local governments to the needs of the frail elderly residing in NHs, ADs noted that there has not been a sufficient investment in fixing the problems that contributed to the disastrous consequences of the hurricanes of 2005. In most cases, ADs expressed little to no confidence that the local, state, and the federal government would handle things any differently in the event of another hurricane in 2006 or beyond. Many ADs noted that while there had been some improvement in government oversight related to completeness of NHs' emergency plans, no effort has been made to ensure that NHs actually have the resources and training to safely coordinate future evacuations. ADs also noted the pressing need for state and federal governments to evaluate and fix payment problems, such as with Medicaid, that might compromise or impede the willingness of receiving facilities to accept NH evacuees in the future.

It therefore appears that more work needs to be done to integrate the needs of NH residents into community-wide planning for emergency preparedness. Indeed, our anecdotal evidence suggests that in parishes where communication was better before the storm, NHs experienced fewer hardships, such as lost transportation, and received greater aid from local police/fire departments in physically assisting the evacuation process.

There Is Substantial Physical and Technical Difficulty in Evacuating Frail NH Residents

While the newspaper headlines attest to the potential disasters that affected several NHs that failed to evacuate,

there is also ample evidence to suggest that the process of evacuation is in itself dangerous and fraught with potential morbidity/mortality. In this study, 6 of 15 (40%) ADs noted morbidity or mortality during evacuation, compared to 1 of 11 (9%) when sheltering in place. These findings are similar to those identified in the DHHS report.

Although it is plausible that evacuating facilities might have experienced even worse casualties had they sheltered in place (given the higher risk profiles of their facilities relative to the storm), it is also evident that more research is needed to construct an evidence-based guideline for evacuation. Such work is now possible, based on an overall analysis of NH residents evacuated from the Gulf states, and comparisons of morbidity and mortality related to those who evacuated from at-risk NHs versus those who did not.

It is highly likely that such an analysis might suggest that a staged evacuation, in which the most severely ill patients (eg, those on dialysis, oxygen, or those with complicated medical regimens) are evacuated early to hospitals outside of the disaster region, is preferable to mass evacuation.¹⁵ It is also plausible that certain patient characteristics, such as limited medication requirements, might make it easier for residents to shelter in place.

Such evacuation guidelines are important, not just for hurricanes. Specifically, it may be conceivable to consider NHs as a potential surge capacity destination for hospital patients in the event of a flu pandemic. Should hospitals become overwhelmed with admissions, the idea of transferring less acute NH residents out to secondary evacuation sites to make room for incoming hospital patients is one idea to consider. In the event that such a calamity occurs, an evidence-based guideline suggesting which NH residents are safer to evacuate would be valuable.

The Difficulty of Retaining Staff and a Viable Organization During Disasters and Their Aftermath

It is clear from ADs that many NH staff performed their duties heroically before, during, and after the hurricanes, despite worries about their own families and homes. However, other staff failed to report or fled with their own families, leaving many NHs without adequate staff. This finding is consistent with previous research on health care staffing during emergency situations.^{16,17} Although several ADs noted that it was preferable to shelter in place to retain staff, many noted the difficulties of maintaining a viable organization in post-Katrina Louisiana. Several ADs noted the intense shortage of qualified nurses in Louisiana, suggesting that those qualified were going to higher-paying jobs outside of Louisiana or to local hospitals desperate for work force and with more ability to pay. Others noted the increased costs required to retain certified nursing assistants (CNAs), many of whom are besieged daily by offers from local NHs and hospitals, in addition to nonmedical opportunities. Since such labor disruptions can begin very soon after the first wave of the hurricane disaster passes, all NHs are in danger of losing their staff to the highest bidder in the "reconstruction" frenzy.

There Are Key “Lessons Learned” That Can Be Incorporated into Future Disaster Planning

ADs offered plausible solutions to some of the key issues identified as lessons learned during the events of 2005. For example, many ADs noted that they are contracting with transportation vendors outside of their region to ensure that they do not have recurrences of situations where potential bus drivers evacuated the area before carrying through on their contractual responsibilities to the NHs. Many NHs are soliciting local contractors to construct ramps specifically built to expedite evacuation on buses not designed for frail elders. In terms of staff retention, ADs are approaching staff members and offering mutual aid to the immediate families of critical staff members in the event of emergency evacuation or the need to shelter in place.

In terms of the lessons learned when sheltering in place, ADs are attempting to coordinate with public works and emergency response officials to prioritize the restoration of services to NHs. Others are upgrading their generators and adequately addressing the issue of emergency supplies. Many of the solutions offered by the ADs in Louisiana might assist the ADs of other facilities in reforming their evacuation plans to prevent some of the hardships encountered during the 2005 hurricane season. Additional research is required, however, to further evaluate the experiences of ADs in Louisiana, and little beyond anecdotal information is known about the experiences of NHs that accepted evacuees during the storm.

In conclusion, the ADs interviewed during this project emphasized the desire to better serve their residents during future emergencies and make better evidence-based decisions regarding evacuation. Nevertheless, they perceive that NH residents were abandoned by their government during 2005. Many ADs also worry that, despite increased awareness, little has changed to ensure that future disasters will be handled better. Although this study has a relatively small sample size, our findings are consistent with those emerging from interviews with 20 additional homes in the OIG report.

Nevertheless, it is clear that more work needs to be done to incorporate the needs of NHs into community disaster plans to ensure that these frail residents are not simply ignored. More research is required to evaluate the needs of NHs confronted with evacuation decisions. Specific attention to the development of evidence-based guidelines to assist ADs with making these difficult decisions is also needed. Finally, more government oversight and support is essential to ensure that the needs of NH residents are met by those facilities charged with their care.

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REFERENCES

1. US General Accountability Office. Disaster Preparedness: Limitations in Federal Evacuation Assistance for Health Facilities Should be Addressed. Washington, DC: US General Accountability Office, 2006. Publication GAO-06-826.
2. National Council on Disability. National Council on Disability on Hurricane Katrina Affected Areas, September 2, 2005. Available at: <http://www.ncd.gov/newsroom/publications/2005/katrina2.htm>. Accessed September 13, 2006.
3. AARP. We Can Do Better: Lessons Learned for Protecting Older Persons in Disasters, 2006. Available at: <http://assets.aarp.org/rgcenter/il/better.pdf>. Accessed September 13, 2006.
4. National Council on Disability. Saving Lives: Including People with Disabilities in Emergency Planning, 2005. Available at: http://www.ncd.gov/newsroom/publications/2005/saving_lives.htm. Accessed September 13, 2006.
5. Saliba D, Buchanan J, Kington RS. Function and response of nursing facilities during community disaster. *Am J Public Health* 2004;94:1436–1441.
6. Mangum WP, Kosberg JI, McDonald P. Hurricane Elena and Pinellas County, Florida: Some lessons learned from the largest evacuation of NH patients in history. *Gerontologist* 1989;29:388–392.
7. Shaughnessy PW, Kramer AM. The increased needs of NHs and patients receiving home healthcare. *N Engl J Med* 1990;322:21–27.
8. Gabriel CS. Characteristics of elderly NH residents and discharges: Data from 1997 National NH Survey. *Adv Data* 2000;312:1–15.
9. Belli A, Falkenberg L. 24 NH evacuees die in bus fire. *Houston Chronicle*. September 24, 2005:A1.
10. Langford T, Markley M. Evacuations plagued by problems. *Houston Chronicle*. September 27, 2005:A1.
11. Harris G. In NH, a fight lost to rising waters. *New York Times*. September 7, 2005: A1.
12. Hull A, Struck D. At NH, Katrina dealt only the first blow. *Washington Post*. September 23, 2005:A01.
13. Department of Health and Human Services, Office of the Inspector General. NH Emergency Preparedness and Response during Recent Hurricanes. Washington, DC: Office of the Inspector General, US Department of Health and Human Services, Thousand Oaks, CA, 2006. Publication OEI-06-06-0020.
14. Morgan DL. Focus Groups As Qualitative Research. *Qualitative Research Methods*. Vol. 16. Sage Publications, 1988.
15. Hyer K, Brown LM, Berman A, Polivka-West L. Establishing and refining hurricane response systems for long-term care facilities. *Health Aff* 2006;25:w407–411.
16. Qureshi K, Gershon RRM, Sherman MF, et al. Health care worker's ability and willingness to report to duty during catastrophic disasters. *J Urban Health* 2005;82:378–388.
17. Koh D, Lim MK, Chia SE, et al. Risk perception and impact of SARS on work and personal lives of healthcare workers in Singapore: What can we learn? *Med Care* 2005;43:676–682.



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Original Study

To Evacuate or Shelter in Place: Implications of Universal Hurricane Evacuation Policies on Nursing Home Residents

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A B S T R A C T

Keywords:

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Objective: To examine the differential morbidity/mortality associated with evacuation versus sheltering in place for nursing home (NH) residents exposed to the 4 most recent Gulf hurricanes.

Methods: Observational study using Medicare claims and NH data sources. We compared the differential mortality/morbidity for long-stay residents exposed to 4 recent hurricanes (Katrina, Rita, Gustav, and Ike) relative to those residing at the same NHs over the same time periods during the prior 2 nonhurricane years as a control. Using an instrumental variable analysis, we then evaluated the independent effect of evacuation on outcomes at 90 days.

Results: Among 36,389 NH residents exposed to a storm, the 30- and 90-day mortality/hospitalization rates increased compared with nonhurricane control years. There were a cumulative total of 277 extra deaths and 872 extra hospitalizations at 30 days. At 90 days, 579 extra deaths and 544 extra hospitalizations were observed. Using the instrumental variable analysis, evacuation increased the probability of death at 90 days from 2.7% to 5.3% and hospitalization by 1.8% to 8.3%, independent of other factors.

Conclusion: Among residents exposed to hurricanes, evacuation significantly exacerbated subsequent morbidity/mortality.

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In the wake of the publicity over the 78 deaths at Louisiana nursing homes (NHs) following Hurricane Katrina, public policy explicitly changed to require universal evacuation of all “at-risk” facilities before landfall by state and local emergency management organizations.^{1,2} In interviews conducted following Hurricane Gustav (2008) with many of the same NH administrators who experienced Hurricane Katrina 3 years earlier, Blanchard and Dosa³ noted that many administrators felt “external pressure from state and local agencies to evacuate their residents.” This perceived pressure is perhaps best evidenced by the absolute number of NHs that evacuated before recent Gulf storms. Thirty homes evacuated in 2005 before Katrina; less than a month later, 72 facilities

evacuated in the same region before Hurricane Rita.⁴ In 2008, 119 facilities evacuated before Hurricane Gustav and 81 facilities evacuated before Hurricane Ike, even though it made landfall far south of the evacuated Louisiana facilities (based on data obtained directly from the Texas Department of Aging & Disability Services, Mississippi Department of Health, and the Louisiana Department of Health and Hospitals).

Despite the policy requiring evacuation, there is controversy as to whether universal evacuation is best from the perspective of protecting NH residents.^{1,2,5} Most of the nation’s 1.6 million NH residents are frail, lack mobility, have difficulties with vision/hearing, and have significant cognitive impairment and other health comorbidities that can complicate a safe evacuation.^{6–9} Previous research has spotlighted the dangers inherent with transitions of care under nondisaster conditions. Capezuti et al¹⁰ noted a two- to threefold increase in the rate of falls after a forced relocation from one home to another.

The purpose of this study was to document the mortality and morbidity effects of the last 4 major hurricane disasters (Hurricanes Katrina, Rita, Gustav, and Ike) on NH residents in the Gulf states and

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to test the effect of evacuation versus sheltering in place on the morbidity/mortality experienced by those residents.

Methods

Data Sources

Before beginning work, the institutional review boards at Brown University and the University of South Florida approved the research protocol. We drew on multiple data sources for the current study, ranging from clinical data to Medicare claims and enrollment records, as well as information about each NH's geographic location, structural and staffing characteristics before the storm, and detailed meteorological information about each storm. Resident-level data from the Minimum Data Set (MDS) for 2003 to 2008 were matched to the Medicare denominator files and hospital claims using the Residential History File methodology described elsewhere.^{11,12} The MDS is a federally mandated assessment for all NH residents that includes demographics, diagnoses, treatments, and measures of both physical and cognitive functions.¹³ The Centers for Medicare and Medicaid Services Standard Analytic Files for part A claims contain information to evaluate inpatient hospitalization, hospice, home health, and outpatient services for residents in each cohort. The Medicare enrollment data include date of death.

NH characteristics were derived from the Online Survey Certification Automated Record, which records the results of annual state regulatory inspections, including information about NH ownership, size, staffing levels, aggregated resident characteristics, and the facility's address. Facilities included in the study had to be operational (serving residents with MDS data) for at least 2 years before the storm. Each facility was geo-coded using the mailing address identified in the Online Survey Certification Automated Record database.

Hurricane Characteristics

Hurricane damage results from high winds, heavy rainfall that causes flooding, and storm surge. Wind damage from hurricanes is a function of how close a facility is to the actual path and whether the facility is east or west of the path. The hurricane's northeast quadrant contains its strongest winds making it the "dirty-side" of the hurricane.¹⁴ Storm surge occurs when the low pressure of the storm causes the sea level to rise and strong winds push high waves associated with a hurricane onto the shore.¹⁴ As such, distance from the shore and elevation of the facility are important factors when considering whether to evacuate.

Data about each hurricane were downloaded from the National Weather Service Tropical Cyclone Advisory Archive. For each storm, the geo-coordinates of the projected 24-, 48-, and 72-hour path and the actual hurricane path, were used to generate shape files entered into ArcGIS (ESRI, 2006, Redlands, CA). Information on shoreline was downloaded from the National Oceanic and Atmospheric Administration Web site.¹⁵ Elevation data about each facility was (Raster Files) downloaded from the WorldClim-Global Climate Data Web site using the individual NH's geographic location.¹⁶ Then, using the Near tool in ArcGIS, we calculated the distance of each facility to the 24-, 48-, 72-hour, and actual path; the distance of the facility to the shoreline; the elevation of the building; and whether the storm was on the east or west side of the projected and actual paths.

Subject Sample

For each of the 4 storms (Hurricanes Katrina and Rita in 2005, and Hurricanes Gustav and Ike in 2008), an exposure cohort of

long-stay (>90 days), Medicare fee-for-service beneficiaries were identified. Exposed residents included those residing in at-risk homes at least 3 calendar months before the date of the hurricane landfall. At-risk NHs were defined as those homes located in parishes/counties that were included in the National Weather Service's initial Hurricane Watch at 48 hours and the subsequent warning zone at 24 hours.¹⁷ Additional NHs were included if they were located in parishes/counties where at least one NH was known to have evacuated based on lists provided by state NH associations. Finally, NHs from counties/parishes where there were no known evacuations were removed.⁴ The geographic exposure region for each of the 4 storms is available from the authors.

The exposed resident cohort was then compared with nonhurricane-exposed cohorts residing in the same NHs during the same time period in each of the prior 2 calendar years (eg, 2003 and 2004 for Hurricanes Katrina/Rita; 2006 and 2007 for Hurricanes Gustav/Ike). Facilities were excluded if they did not have data from all 3 years.

Resident Outcomes

Information on the date of death came from the Medicare denominator file. Using data from Medicare files, the prehurricane period (3 months before landfall to 4 days before landfall), 30-day and 90-day mortality, and hospitalization rates were established for exposed patients. A date 4 days before each storm was selected because of potential morbidity/ mortality associated with evacuations that commenced on or after that date but before storm landfall. To our knowledge, no homes evacuated before that date. The exposure groups were then compared with control populations residing in the same NHs during the same time period for the 2 nonhurricane years.

Independent variables characterizing NH residents (eg, demographics, health characteristics) were obtained from the MDS. In addition to age, gender, and race, we adjusted mortality and hospitalization outcomes for cognitive status (Cognitive Performance Scale),¹⁸ functional status (Activities of Daily Living Scale),¹⁹ and comorbidity (Changes in Health, End-stage disease and Signs and Symptoms Comorbidity Index)²⁰—all validated measures contained in the MDS.

Shelter versus Evacuation Data

Residents were considered to have evacuated if they resided in facilities that *completely* evacuated before the date of landfall for each storm. Data on a facility's evacuation status were obtained from the Texas Department of Aging & Disability Services, Mississippi Department of Health, and the Louisiana Department of Health and Hospitals. NHs that evacuated after the date of landfall were considered to have sheltered in place.

Statistical Analysis

Differences in the rates of mortality and hospitalization were determined across the 3 annual cohorts of long-stay NH residents from the same facilities. Outcomes from both the 2005 and 2008 cohorts—treated as exposed to 1 of the 4 hurricanes—were contrasted with outcomes from residents residing in the same NHs during nonhurricane years (2003 and 2004 for 2005 storms; 2006 and 2007 for 2008 storms). Because all outcome variables were defined as dichotomous, chi-square tests of statistical significance were performed to determine differences in outcome.

To evaluate the effect of the decision to evacuate on the mortality/morbidity of the population, we used an instrumental variable approach for each storm using methodology previously

used.^{21–23} Instrumental variable modeling, unlike more traditional statistical approaches, such as multivariate logistic regression, serve to help reduce unmeasured confounding in cases where it is impossible to randomize patients or account for all confounders.²³ As such, the instrumental variable approach was used to mitigate the influence of potential “omitted-variable bias” on the effect of evacuation. The equation estimated was:

$$h_{in} = \alpha_0 + \alpha_{1,iv}Eva\hat{c}_n + \alpha_2X_{in} + \alpha_3X_n + u_{in} \quad (1')$$

where $Eva\hat{c}_n$ was the variable that is predicted using the instrument. Geographic characteristics related to the location of the facility relative to the storm were used as instrumental variables. The key assumption is that these variables (eg, perpendicular distance from the facility to the path of the storm 48 hours before landfall [$Dist48$]) will cause variations in evacuation status across facilities that are unrelated to any omitted variable from the regression of patients’ outcomes (mortality and hospitalization). In particular, the assumption is that the correlation between $Dist48$ and u_{in} equals zero. Because we have more than one instrumental variable, the model is considered to be “overidentified.” We used Hansen’s J statistic to test the hypothesis that the model is correctly specified (ie, the validity of the restriction that the instrumental variable does not belong in the equation)^{1'} as a separate covariate).²⁴ The statistic is distributed as a chi-square. The probability of rejecting the null hypothesis increases as the value of the statistic increases.

Although the actual instrumental variables used differed across storms, the perpendicular distance between the NH and the path of the storm at 48 hours before landfall was consistent in models for all storms. Details of the specific variables used can be found in Table 1. The second stage of the model estimated the effect of evacuation on the outcomes of death and hospitalization at 90 days. In addition to storm parameters, such as the wind speed at landfall and the distance of the home to the actual path of the storm, the second-stage model included indicators of patient acuity (eg, congestive heart failure, cancer, diabetes, feeding tube, Cognitive Performance Scale score,¹⁸ Changes in Health, End-stage disease and Signs and Symptoms score,²⁰ facility-level Acuity Index,²⁵ gender, race and other factors predictive of hospitalization). These clinical indicators of patient acuity were selected based on qualitative data derived from previous interviews with nursing home administrators following Hurricanes Katrina and Rita who noted particular difficulties in moving/managing certain patients with complex medical needs.^{3,26}

To estimate the effects of storm intensity on outcome for those sheltering in place, we assumed that those closer to the center of the storm experienced more of an effect than did those who were further away. Given that hurricanes are actually strongest in the northeast quadrant of the storm, we modeled distance as either east or west of the storm.

We also compared the relative magnitude of the evacuation coefficient with other more meaningful clinical measures. For example, we tested the equality of the evacuation coefficient $\hat{\alpha}_{1,iv}$ (estimated coefficient on evacuation) and (for example) $\hat{\alpha}_{2,CHF}$ (estimated coefficient for coronary heart failure). A failure to reject the equality of coefficients suggests that we cannot reject the null hypothesis that evacuation had the same effect on the outcomes (mortality/ hospitalization rates) as the presence of coronary heart failure.

The estimated value of the coefficient of evacuation was reasonably stable across alternate formulations of the first-stage instruments, although the confidence intervals around the evacuation variable varied with the instrumental variables used. Nonetheless, the instrumental variable coefficient was very robust to the

configuration of independent variables included in the second stage. In the case of Katrina, a substantial number of homes evacuated after the storm’s landfall. Although the results shown in Table 1 were based on the original decision (preevacuation), the estimated model also included a dummy variable if the home was evacuated after landfall. This latter coefficient was also significantly related to the outcomes. We conducted additional sensitivity analyses dropping the postevacuation dummy variable, and found that the pre-evacuation coefficient roughly doubles, reflecting the tautological correlation between pre- and postevacuation status. Statistical measurements were conducted using SAS 9.3 (Cary, NC) and STATA 11.0 (College Station, TX).

Results

A total of 36,389 residents were exposed to 1 of the 4 storms. Table 2 presents the descriptive characteristics of the exposed cohorts for each of the 2005 storms compared with the nonexposed cohorts residing at the same facility in the 2 years prior. Table 3 presents the same descriptive characteristics for the 2008 storms, as compared with cohorts in the same homes in the prior 2 years when no significant hurricanes occurred in the region. For each storm, the characteristics of the exposed cohorts were statistically similar to the nonexposed cohorts with the exception of a statistically significant increase in the percentage of moderate dementia cases (Cognitive Performance Scale of 3–4) among those exposed to Hurricanes Katrina, Rita, and Gustav.

Mortality Rates

Figure 1 presents the actual versus predicted mortality rates among residents for each of the 4 storms at 30 and 90 days after each hurricane. Predicted mortality was calculated as the simple average of the mortality rates at 30 and 90 days for nonexposure years multiplied by the number of residents during the exposure year. There were a cumulative total of 277 (7.6 per 1000) extra deaths at 30 days. At 90 days, a total of 579 (15.9 per 1000) extra deaths were observed. The additional mortality effects were sustained with multivariate adjustment for changes in case mix over the 3-year periods.

Hospitalization Rates

Figure 2 presents the hospitalization rate differences among residents in each of the 3 years for each of the 4 storms at 30 and 90 days after each hurricane. There were a cumulative total of 872 (23.9 per 1000) extra hospitalizations at 30 days. At 90 days, 544 (14.9 per 1000) extra hospitalizations were observed. As with mortality, the additional hospitalizations observed among exposed residents were sustained despite case mix adjustment using multivariate regression.

Sheltering versus Evacuation

Table 1 presents the estimated value of the instrumental variable coefficients. In general, the results suggest that evacuation led to more mortality and hospitalizations by 90 days relative to residents who sheltered in place. Mortality rates increased from 2.7% (Gustav) to 5.4% (Katrina) as a function of evacuation. Hospitalization rates also increased from 1.8% (Ike) to 8.3% (Katrina). Thirty-day mortality and hospitalization rates relative to evacuation were also obtained and were generally consistent with the 90-day results.

To ascertain what these results meant clinically, we also compared the estimated effect of evacuation among patients with

Table 1
Effect of Evacuation Decision on Morbidity and Mortality

	2005 Storms		2008 Storms	
	Katrina	Rita	Gustav	Ike
Death at 90 days				
Evacuation	0.053** (0.021)	0.038** (0.017)	0.027** (0.013)	0.034** (0.012)
CHF	0.028*** (0.010)	0.024*** (0.009)	0.027** (0.011)	0.035*** (0.010)
Feeding Tubes	0.036*** (0.014)	0.014 (0.013)	0.038** (0.017)	0.032** (0.014)
Overid test: Hansen's J statistic and chi-2(3) P value in parenthesis	5.6 (.22)	2.66 (.44)	8.9 (.19)	2.90 (.41)
Hospitalization at 90 days				
Evacuation	0.083*** (0.030)	0.051* (0.028)	0.040* (0.023)	0.018 (0.025)
CHF	0.059*** (0.011)	0.057*** (0.012)	0.115*** (0.020)	0.075*** (0.013)
Feeding Tubes	0.053*** (0.019)	0.096*** (0.016)	0.083*** (0.025)	0.079*** (0.016)
Overid test: Hansen's J statistic and chi-2(3) P value in parenthesis	1.7 (.78)	3.6 (.3)	13.6 (.06)	6.06 (.11)
F-statistic from first stage	15	64	11	12

CHF, congestive heart failure.

All standard errors robust to heteroskedasticity and clustered within nursing home. For Katrina, the instrumental variables included a quartic polynomial in the perpendicular distance from facility to path of storm 48 hours, and elevation. For Gustav, perpendicular distance from facility to path of storm 24, 48, and 72 hours before landfall, elevation, and a cubic polynomial in the distance from the home to the shore. For Rita, the instrumental variables were perpendicular distance from facility to path of storm 48 hours before landfall, elevation, and the maximum wind speed at the points where perpendicular lines from the nursing home intersects the line depicting the 24- and 72-hour (before landfall) paths respectively. Finally, for Ike, the instrumental variables were the perpendicular distance from facility to path of storm 48 hours before landfall and 72 hours before landfall, distance from facility to shore, and the square of that distance.

*P<0.1.

**P<0.05.

***P<0.01.

several commonly encountered medical conditions, such as congestive heart failure and having a feeding tube in place. The results are also presented in Table 1 and suggest that the estimated effect of evacuation on mortality and morbidity was similar to the effects of having a congestive heart failure diagnosis and having a feeding tube in place. In results that can be obtained from the authors on request, we also show that the effect of evacuation on outcomes is, in general, stronger than the effect of other comorbid conditions, such as diabetes, renal failure, obesity, and severe cognitive impairment.

Discussion

Although the Centers for Medicare and Medicaid Services regulations required a generic facility evacuation plan before Hurricane Katrina, NHs were rarely incorporated into regional emergency planning efforts. After the 2005 hurricane season, several government reports and research papers identified deficiencies in preparedness, prompting a reevaluation of evacuation strategy.^{2,5,9,26} Moreover, well-publicized tragedies at several nursing homes severely affected by Hurricane Katrina increased

Table 2
Baseline Demographics and Health Characteristics of Long-Stay Nursing Home Residents among the 3 Cohorts for the 2005 Storms

Resident Characteristics	Hurricane Katrina				Hurricane Rita			
	Nonexposed		Exposed	P Value*	Nonexposed		Exposed	P Value*
	2003 Cohort (n = 9589)	2004 Cohort (n = 9475)	2005 Cohort (n = 9056)		2003 Cohort (n = 11,491)	2004 Cohort (n = 11,945)	2005 Cohort (n = 11,521)	
Demographics:								
Female	75.3	75.2	75.6	.776	75.8	75.7	75.4	.741
Age:				.336				.750
65–74	17.9	17.8	18.8		17.9	17.7	18.4	
75–84	38.8	39.0	39.0		38.4	38.5	38.5	
85+	43.3	43.1	42.2		43.7	43.8	43.2	
Race/ethnicity:				.860				.001
Caucasian	77.1	77.0	76.4		76.4	75.7	74.1	
Black	21.5	21.6	22.1		18.3	18.9	19.9	
Hispanic	1.0	0.9	1.0		4.4	4.3	4.7	
Other	0.4	0.5	0.5		0.9	1.1	1.3	
Comorbidities:								
CHES Comorbidity Index (0–5)	0.99 ± 1.04	1.02 ± 1.05	1.03 ± 1.06	.052	0.86 ± 1.03	0.86 ± 1.02	0.84 ± 1.00	.139
ADL Scale (0–28)	15.1 ± 9.6	15.1 ± 9.5	15.1 ± 9.5	.950	15.4 ± 9.7	15.2 ± 9.6	15.3 ± 9.5	.305
CPS Scale				<.001				<.001
0–2	40.0	39.2	38.0		40.2	40.1	39.6	
3–4	37.6	39.5	40.9		36.1	37.4	39.1	
5–6	22.4	21.3	21.1		23.7	22.5	21.3	

*Chi-square test for categorical variables and 1-way analysis of variance test of statistical significance for continuous variables. CHES, The Changes in Health, End-stage disease and Signs and Symptoms Comorbidity Index; ADL, activities of daily living; CPS, Cognitive Performance Scale.

Table 3
Baseline Demographics and Health Characteristics of Long-Stay Nursing Home Residents among the 3 Cohorts for the 2008 Storms

Resident Characteristics	Hurricane Gustav				P Value*	Hurricane Ike			
	Nonexposed		Exposed	P Value*		Nonexposed		Exposed	P Value*
	2006 Cohort (n = 7091)	2007 Cohort (n = 6914)	2008 Cohort (n = 6464)			2006 Cohort (n = 10596)	2007 Cohort (n = 9595)	2008 Cohort (n = 9348)	
Demographics:									
Female	74.1	73.6	72.8	.244	73.9	73.5	73.7	.853	
Age:				.132				.328	
65–74	18.1	18.6	19.5		17.6	18.6	18.6		
75–84	39.3	38.5	37.4		38.7	37.8	38.0		
85+	42.6	42.9	43.1		43.7	43.6	43.5		
Race/ethnicity:				.520				.513	
Caucasian	79.8	79.0	78.7		69.0	68.5	67.8		
Black	18.4	19.1	19.0		17.8	18.1	18.2		
Hispanic	1.1	1.1	1.4		11.7	12.1	12.5		
Other	0.7	0.8	0.9		1.5	1.4	1.4		
Comorbidities:									
CHES Comorbidity Index (0–5)	0.88 ± 1.02	0.88 ± 1.01	0.87 ± 0.99	.982	0.86 ± 1.03	0.85 ± 1.02	0.83 ± 1.00	.146	
ADL Scale (0–28)	14.4 ± 9.2	14.7 ± 9.2	14.6 ± 9.2	.065	15.4 ± 9.2	15.7 ± 8.9	15.9 ± 8.9	.002	
CPS Scale				.002				.092	
0–2	41.5	39.9	39.7		39.7	39.2	38.5		
3–4	40.1	42.4	43.4		40.0	41.2	41.9		
5–6	18.5	17.7	16.9		20.4	19.7	19.6		

*Chi-square test for categorical variables and 1-way analysis of variance test of statistical significance for continuous variables. CHES, The Changes in Health, End-stage disease and Signs and Symptoms Comorbidity Index; ADL, activities of daily living; CPS, Cognitive Performance Scale.

public demand to protect frail elders through an “evacuate-all” stance during future perceived hurricane threats.^{27,28} However well-intentioned this policy of universal evacuation is, this study demonstrates that there is a clear increase in hospitalization and mortality associated with the evacuation of frail elders over and above the effects of the storm itself.

This is not to say that these storms do not have an adverse effect on the NH population. Each of the 4 Gulf storms resulted in significant increases in morbidity and mortality. In aggregate, there were 277 additional hurricane-related deaths within 30 days of the 4 hurricane events. This translates to a rate of 7.6 additional deaths

(over and beyond the normal death rate) per 1000 residents. Indicative of the sustained effect of being exposed to a storm, we observed that at 90 days after exposure, a total of 579 additional lives (an additional 15.9 deaths per 1000) were lost. Importantly, deaths are not the only consequence and cost of evacuation. Among the survivors, the rates of additional hospitalizations were also significant, with 692 extra hospitalizations (19.0 additional hospitalizations per 1000 residents) at 30 days and 543 extra hospitalizations (14.9 per 1000 residents) at 90 days.

Nonetheless, given the current policy of universal evacuation, it is important to note that many of the deaths and hospitalizations

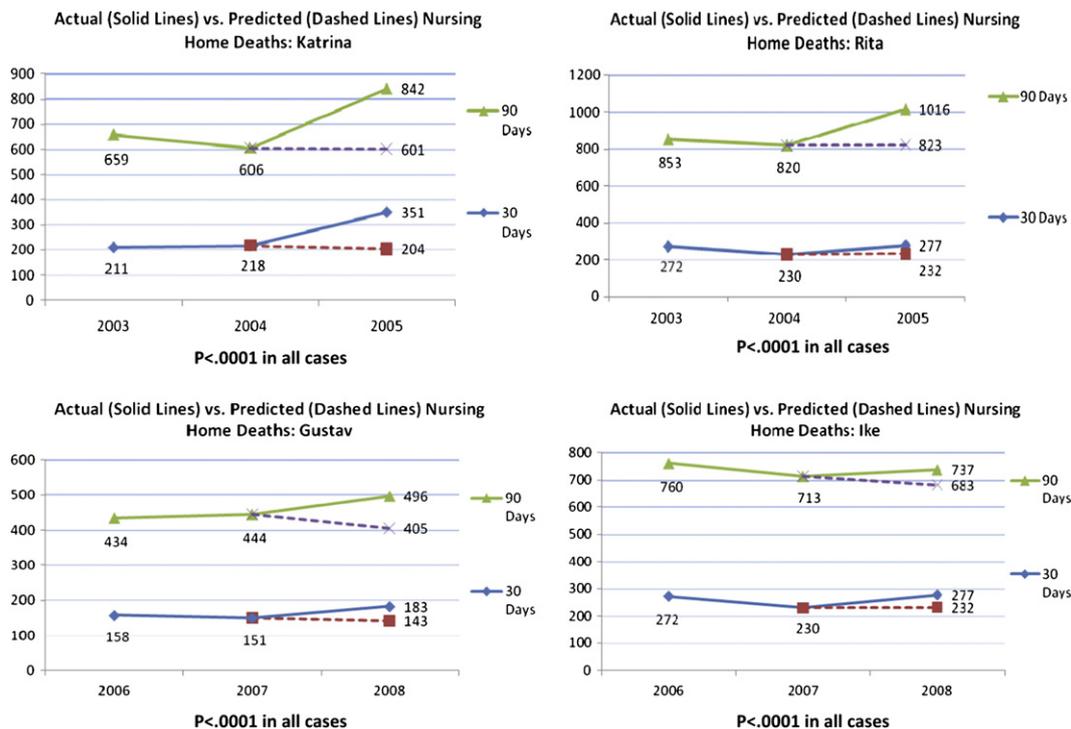


Fig. 1. Actual versus predicted mortality rates associated with hurricane exposure among nursing home residents.

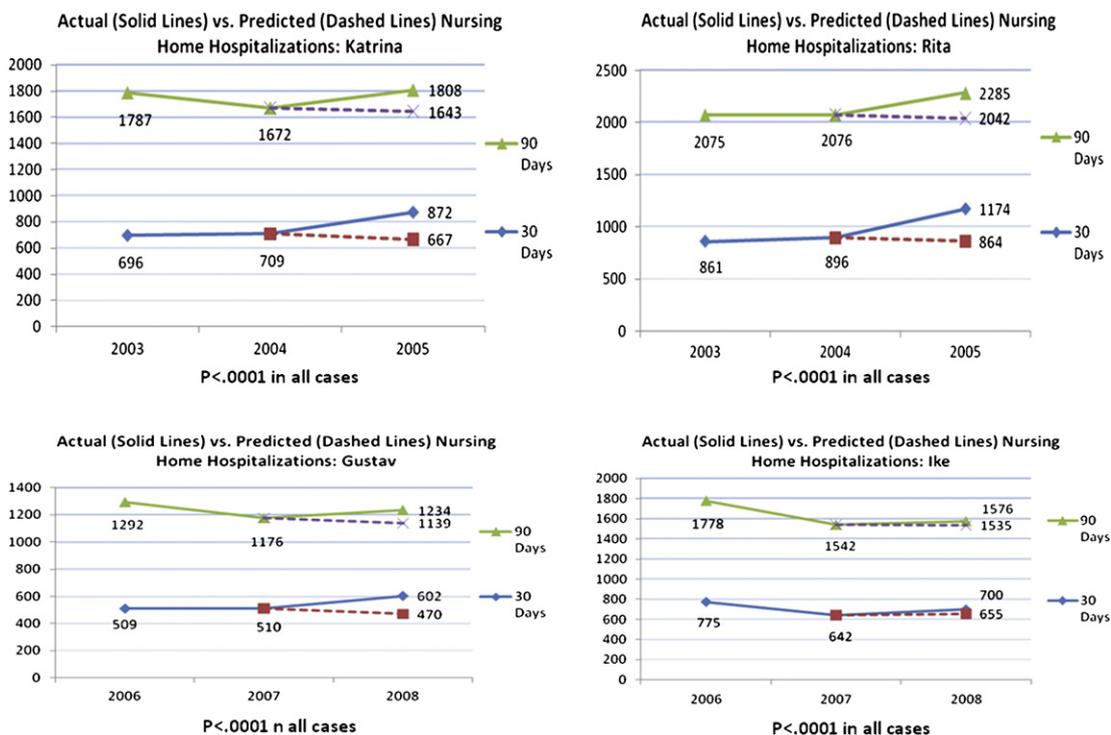


Fig. 2. Actual versus predicted hospitalization rates associated with hurricane exposure among nursing home residents.

occurred downstream from the immediate effects of the storm. For example, the *Morbidity and Mortality Weekly Report* estimated that there were 78 deaths of NH residents during Katrina.^{29,30} Our data suggest that 147 Katrina-related deaths occurred within 30 days of landfall and 241 deaths occurred within 90 days when compared with death rates in the same homes during nonhurricane years. It is likely that many of these additional deaths went unnoticed—perhaps disguised by geography (many NH residents left the immediate area) or by nursing home residents' already high rates of mortality.

Looking across all 4 storms, our data suggest that the act of evacuation itself compounded morbidity and mortality. Based on instrumental variable analysis, the increased risk of death attributable to evacuation ranged from nearly 2.7% to 5.3% for the 4 storms at 90 days. Evacuation also increased hospitalization from 1.8% to 8.3% at 90 days independent of other factors. These findings strongly suggest a need to reconsider the current mass evacuation standard that has emerged since the 2005 storms. Although it is important to ensure that NH residents are kept out of "harm's way," having all residents evacuate before each hurricane appears to have its own consequences. For example, a total of 119 facilities (82% of those identified as "at risk") evacuated the Gulf region for Hurricane Gustav—a storm that eventually had relatively minimal impact on land. It is reasonable to suppose and our statistical modeling confirms, that many of the excess deaths and hospitalizations that occurred relative to earlier years were attributable to evacuation and not the relatively minor storm effects. Because it is not unusual for storms to weaken as they approach landfall or change direction, the future impact of universal evacuation policies on frail elderly persons when such "false alarms" occur could cumulatively be far greater than the effect of the storms themselves. However, because such transfer trauma deaths would not be as dramatic as those directly caused by a storm, the effects would be much more subtle, although still considerable.

Obviously, some evacuations are appropriate given storm severity and facility location. Residents who are at highest risk for storm surge flooding should certainly evacuate. Facilities that are

likely to be affected by the stronger, easterly side of Category 3, 4, and 5 hurricanes should also probably evacuate. Future research is needed, however, to better understand which aspects of evacuation (eg, distance evacuated, transit time, receiving facility capacity) are associated with increased resident morbidity/mortality so as to minimize future transfer trauma. Furthermore, identifying residents most likely to experience adverse outcomes because of evacuation (eg, dialysis patients, residents with congestive heart failure) might prompt earlier efforts to evacuate such individuals, leaving the facility more time to decide whether to evacuate more robust patients more proximal to landfall.

Last, the findings from this study raise the question of whether NHs that care for frail elders should be rebuilt in areas prone to frequent hurricane evacuation.^{31–33} Given that the evacuation of NH residents during storms is linked to increased morbidity and mortality, the policy to allow construction of facilities in flood-prone areas at high risk for storm surge damage should be reexamined.

Limitations

There are several limitations to this research. First, the geographic region outlined in this study was intended to capture the effects of each storm individually. Although these storms were largely distinct, there is some overlap in Western Louisiana, where outcomes experienced by residents exposed to Rita might also reflect some previous exposure to Katrina. Second, it is well known that there are geographic differences (eg, differential flu rates) that account for changes in annual mortality/morbidity rates. Although unlikely, owing to similarities in the nonexposure and exposure cohorts during the 90-day prestorm period and the results of our instrumental variable approach, it is possible that some other unmeasured confounders might have contributed to adverse outcomes during exposure years. Additionally, some of the increases in mortality/morbidity might be partially attributable to the regional disruption in the health care system that occurred following Katrina. Determining how much of the mortality/

morbidity was related to the storm and how much was related to the disruption in health care that followed is not possible. Nevertheless, we did find that evacuation-related morbidity and mortality remained present for storms (eg, Hurricane Rita and Gustav) where core infrastructure was not as affected.

Finally, our estimates of morbidity and mortality measured the effects of the evacuation decision on all residents of the facility. It was generally assumed that residents remained with their homes (unless they were discharged) and that the homes that evacuated moved these residents to safer places where they were not as severely affected by the intensity of the storm. Although we know of no case reports in the press where residents of an evacuating facility were moved to a more dangerous location (ie, moving into the storm), this assumption cannot be directly tested because of the lack of data about the location of individual residents during the days that followed the storm.

Conclusion

Frail NH residents are adversely affected by hurricane disasters. Although there is significant increased morbidity and mortality related to exposure, there is added risk in evacuation. Although it is important that facilities, and public health and emergency management officials evacuate homes likely to flood during a hurricane, in light of the significant increase in mortality and morbidity associated with evacuation, the policy of universal evacuation of facilities requires careful reconsideration.

References

- Dosa D, Hyer K, Brown L, et al. The controversy inherent in managing frail nursing home residents during complex hurricane emergencies. *J Am Med Dir Assoc* 2008;9:599–604.
- US Government Accountability Office. Disaster preparedness: Limitations in federal evacuation assistance for health facilities should be addressed. Report to Congressional Committees. In: GAO-06–826; Washington, DC, July 2006:1–52.
- Blanchard G, Dosa D. A comparison of the nursing home evacuation experience between Hurricanes Katrina (2005) and Gustav (2008). *J Am Med Dir Assoc* 2009;10:639–643.
- Dosa D, Feng Z, Hyer K, et al. The effects of Hurricane Katrina on nursing home resident mortality, hospitalizations and functional decline. *Disaster Med Public Health Prep* 2010;4:1–5.
- Office of Inspector General. Nursing home emergency preparedness and response during recent hurricanes: OEI-06–06–00020; Washington, DC, August 2006. Report No.: OEI-06–06–00020.
- Eldar R. Vulnerability of disabled and elderly in disasters: case-study of Israel during 'Desert Storm'. *Medicine & War* 1991;7:269–274.
- Fernandez LS, Byard D, Lin CC, et al. Frail elderly as disaster victims: Emergency management strategies. *Prehosp Disaster Med* 2002;17:67–74.
- Hyer K, Brown LM, Berman A, Polivka-West L. Establishing and refining hurricane response systems for long-term care facilities. *Health Aff* 2006;25:w407–w411.
- Root ED, Amoozegar JB, Bernard S. Prepared by RTI International under Contract No. 290-00-0018. *Nursing Homes in Public Health Emergencies: Special Needs and Potential Roles*. Rockville, MD: Agency for Healthcare Research and Quality; 2007. AHRQ Publication No. 07-0029-1.
- Capezuti E, Boltz M, Renz S, et al. Nursing home involuntary relocation: Clinical outcomes and perceptions of residents and families. *J Am Med Dir Assoc* 2006;7:486–492.
- Intrator O, Berg K, Hiris V, et al. Development and validation of the Medicare-MDS Residential History File. *Gerontologist* 2003;43:30–31.
- Intrator O, Hiris J, Berg K, et al. The Residential History File: Studying nursing home residents' long-term care histories. *Health Serv Res* 2011;46:120–137.
- Morris JN, Hawes C, Fries BE, et al. Designing the national resident assessment instrument for nursing homes. *Gerontologist* 1990;30:293–307.
- National Weather Service. JetStream Online School for Weather: Learning Lesson: Quadraphonic Wind. 2010. Available at: http://www.srh.noaa.gov/jetstream/tropics/ll_quadwind.htm. Accessed February 20, 2010.
- NOAA's Coastal Geospatial Data Project. Available at: http://coastalgeospatial.noaa.gov/back_gis.html. Accessed February 9, 2011.
- WorldClim - Global Climate Data. Available at: <http://worldclim.org/current>. Accessed February 9, 2011.
- National Hurricane Center Archive. 2011. Available at: <http://www.nhc.noaa.gov/archive/>. Accessed February 11, 2011.
- Morris JN, Fries BE, Mehr DR, et al. MDS Cognitive Performance Scale. *J Gerontol* 1994;49:M174–M182.
- Morris JN, Fries BE, Morris SA. Scaling ADLs within the MDS. *J Gerontol A Biol Sci Med Sci* 1999;54:M546–M553.
- Hirdes JP, Frijters DH, Teare GF. The MDS-CHESS scale: A new measure to predict mortality in institutionalized older people. *J Am Geriatr Soc* 2003;51:96–100.
- McClellan M, McNeil BJ, Newhouse JP. Does more intensive treatment of acute myocardial infarction in the elderly reduce mortality? Analysis using instrumental variables. *JAMA* 1994;272:859–866.
- Newhouse JP, McClellan M. Econometrics in outcomes research: The use of instrumental variables. *Annu Rev Public Health* 1998;19:17–34.
- Xian Y, Holloway RG, Chan PS, et al. Association between stroke center hospitalization for acute ischemic stroke and mortality. *JAMA* 2011;305:373–380.
- Hansen L. Large sample properties of the generalized method of moments estimators. *Econometrica* 1982;50:1029–1054.
- Feng Z, Grabowski DC, Intrator O, Mor V. The effect of state Medicaid case-mix payment on nursing home resident acuity. *Health Serv Res* 2006;41:1317–1336.
- Dosa DM, Grossman N, Wetle 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.
- Harris G. In NH, a Fight Lost to Rising Waters. *New York Times*; September 7, 2005. A1.
- Hull A, Struck D, At NH. Katrina Dealt Only the First Blow. *Washington Post*; September 23, 2005. A01.
- Brunkard J, Namulanda G, Ratard R. Hurricane Katrina deaths, Louisiana, 2005. *Disaster Med Public Health Prep* 2008;2:215–223.
- Centers for Disease Control and Prevention. Public Health Response to Hurricanes Katrina and Rita—Louisiana, 2005. *MMWR Morb Mortal Wkly Rep* 2006;55:29–30.
- Chateau De Notre Dame Nursing Home Recuperates From Katrina With Help From Fema Fund. 2007. Available at: <http://www.fema.gov/news/newsrelease.fema?id=34915>. Accessed March 15, 2011.
- St. Margaret's Daughters' Nursing Home Reopens. 2007. Available at: <http://www.fema.gov/news/newsrelease.fema?id=40372>. Accessed March 15, 2011.
- Additional Millions Provided To Rebuild Orleans Nursing Home. 2009. Available at: <http://www.fema.gov/news/newsrelease.fema?id=49357>. Accessed March 15, 2011.

Nursing Homes and Assisted Living Facilities: Planning and Decision Making for Sheltering in Place or Evacuation

By Kathryn Hyer, LuMarie Polivka-West, and Lisa M. Brown

Although significant progress has been made in disaster preparedness since the devastating 2005 hurricane season in the Gulf Coast states, unique challenges remain for long-term-care providers in nursing homes, assisted living facilities, and continuing-care retirement communities. All of these facilities are responsible for the safety of vulnerable residents during disasters. During the 2005 season, poor management of evacuation efforts contributed to a significant number of deaths: more than 139 nursing home residents during Hurricane Katrina, and twenty-three residents in a bus accident during Hurricane Rita (Polivka-West, 2006). Retrospective reviews of the 2005 emergency preparedness activities before, during, and after these two storms made landfall indicate that emergency programs to protect older and disabled people from the effects of hurricanes were inadequate and poorly managed and required change (Office of the Inspector General, 2006; U.S. General Accounting Office [GAO], 2006c; 2006d; Hyer et al., 2006; Dosa et al., 2007).

This article specifically addresses the challenges those in charge of long-term-care facilities face as they decide whether “to stay or go” —evaluating risk to residents from potential evacuation, weighing storm path and intensity

Both options carry risks.

projections, and reviewing their emergency preparedness plans. Sheltering in place or evacuating both carry significant risks.

As one administrator put it after evacuating residents from a nursing home in Mississippi as Katrina moved in, “Absolutely, without any question, it’s the toughest decision.”

LESSONS LEARNED IN THE HURRICANE SEASONS OF 2004 AND 2005

Because of Florida’s extensive experience with disasters and evacuation, lessons learned in Florida illustrate important points that are relevant in many locations. Florida coped with eight major hurricanes in the years 2004 and 2005, yet reported no evacuation-related deaths. During those storms, more than 10,000 residents of nursing homes, assisted living facilities, and continuing-care retirement communities were evacuated in 2004 (Hyer et al., 2006), with 2,997 nursing home and assisted living residents in 2005. In large part, the lack of deaths can be attributed to Florida’s emergency preparedness infrastructure and policies that had evolved significantly during the previous decade because of the state’s experiences in coping with multiple hurricanes.

One of the basics of emergency planning is the idea that “all disasters are local” and therefore

best managed by the first line of defense: local fire, police, medical, and emergency management personnel (Brown, Hyer, and Polivka-West, in press). Florida has a strong emergency communications system to monitor each local jurisdiction's capabilities as it copes with a disaster. If the local government is without sufficient resources to adequately respond to a severe disaster, the state provides necessary resources. Similarly, when the state's capabilities are strained or insufficient to cope with a particular situation, the governor requests federal and regional assistance under the 2000 Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288) to obtain resources to carry out disaster relief and recovery activities.

Florida illustrates the workings of a strong partnership between state and local emergency preparedness operations centers. This partnership makes it possible to supplement knowledge about specific community health needs with information from long-term-care community providers as represented by their professional associations. A key ingredient in facilitating this collaboration is an information system created by the state regulatory agency, Agency for Health Care Administration (AHCA), over the 2004 and 2005 hurricane seasons. The system includes a database developed to help providers safely manage resident care during disasters.

In 2005, both Louisiana and Florida state emergency operation centers (EOCS) recognized long-term-care entities as healthcare facilities—in contrast to most other states, in which they are not recognized as such. Giving these facilities healthcare facility status is a key component of effective disaster management because, as such, they are eligible for a number of state and federal services and funds. The lack of healthcare facility status with the EOC of most states presents significant problems in planning for the care of frail adults and has serious consequences for providers whether they choose to shelter in place or evacuate residents. A facility will require significant support to safely carry out either plan.

For example, designation as a healthcare facility makes an institution eligible for federal evacuation resources under the federal National Disaster Medical System (NDMS). During Kat-

rina, nursing homes in most states did not have that status, and there was continued confusion about access to those funds during Rita (GAO, 2006b). Even today, it is uncertain exactly how long-term-care providers fit into the NDMS. Some federal reviews call for explicit recognition of nursing homes as healthcare facilities, and some would specifically provide evacuation help for assisted living facilities.

Fortunately, some progress has been made since 2005. For example, the omission of long-term-care facilities from the federal response plan mobilized nursing home associations in the Gulf Coast states to forge a regional partnership. In February 2006, the Florida Health Care Association (FHCA) convened the first Nursing Home Hurricane Summit, with support from the John A. Hartford Foundation, the University of South Florida, and AARP (2006), to provide a venue for discussion of the experience of the 2005 hurricanes to improve disaster preparedness. The summit identified factors that impaired safe evacuation of residents and otherwise hindered disaster response (Hyer et al., 2006; FHCA, 2006), with a second summit focusing on forwarding that process and capitalizing on the federal government's interest in improving disaster preparedness (FHCA, 2007).

In a 2007 survey of summit participants, all respondents reported progress toward improved disaster preparedness and response in a number of areas, but they also noted that a number of problems and challenges remain.

When asked to rank priorities, respondents cited access to transportation for evacuation purposes and evacuation decision-making as the two key issues requiring considerable work.

TRANSPORTATION

A summit recommendation is that transportation for the evacuation of long-term-care facilities be incorporated into disaster planning efforts at the national, state, and local levels. In a report to Congress, the U.S. Department of Transportation (2006), along with the U.S. Department of Health and Human Services, said that plans in the Gulf Coast region for evacuating people with various special needs generally are not well developed. Transportation

for the evacuation of long-term-care residents during a disaster is a resource-intensive undertaking. While some residents may travel safely in vans or buses, wheelchair lifts for these vehicles are almost always needed, and some residents who are undergoing rehabilitation or suffering from debilitating illnesses may require ambulance transport. Whichever form of evacuation transportation is required, acquiring and maintaining it on a year-round basis is expensive.

The transportation problem is exacerbated by the failure of the National Disaster Medical System to support the evacuation of long-term-care patients. As a result, the number of available ground transport vehicles in any region is insufficient to meet the transport demand created by a large-scale mass evacuation, leaving nursing homes and other long-term-care facilities few resources outside of their typical allocation (usually access to one or two wheelchair-lift vans). Access to evacuation transportation requires the leverage of multiple systems and careful coordination to avoid duplicate allocation of resources.

A regional transportation work group established at the 2006 Hurricane Summit by the FHCA and the American Health Care Association has been working steadily on two goals: (1) to create of an alliance with the motor carrier industry to identify additional transportation resources and (2) to increase federal awareness of the gaps in emergency transportation planning and response as they relate to nursing homes. The significance of the regional transport work group's mission was highlighted at the 2007 summit with concerns voiced from every state regarding the need to coordinate evacuation resources.

One of the major concerns voiced at the 2007 summit was how the federal and state contracts with transportation providers negatively affects the ability of local nursing homes to acquire evacuation transportation resources. For example, in Texas, the state has contracted with bus companies to provide evacuation transportation for community-dwelling residents. This special contract arrangement has all but eliminated the possibility for nursing homes to make their own arrangements with bus companies because most of the latter have promised their

resources to the state. Yet, because the nursing home population is not included on the list of vulnerable populations needing emergency transportation, residents are not eligible for use of state-procured transportation.

Summit participants also cited the limits of transportation alternatives at the community level. For example, Duval County in Florida, which includes the city of Jacksonville, has a total capacity of 9,500 licensed beds, including 11 hospitals, 30 nursing homes, and 66 assisted living facilities, yet there are only 107 ambulances for transporting very frail, ill, or injured people.

Another evacuation transportation concern raised by summit participants had to do with the need for long-term-care residential facilities to receive both advance notice of mandatory evacuations and state police escorts; some states are pushing for advance notice of mandatory evacuations so that they can move frail nursing home residents before the roads are clogged. However, summit participants said that a major problem develops when, because of the uncertainty of predicting when the actual landfall of a storm will occur, facilities are often evacuated too early. In some cases, residents have been evacuated 96 hours prior to an expected landfall. One nursing home administrator reported the following misadventure:

We evacuated for Hurricane Charley in 2004 from Tampa Bay to Orlando . . . where the hurricane was a direct hit. When you move a couple of hundred frail elders from a facility, it is not a comfortable situation, so the least amount of time they are moved, the better. And evacuate at night when it is the coolest and when there is the least traffic.

EVACUATION DECISION-MAKING

Who makes the decision to evacuate and when should the decision be made is a recurring question with no clear answers (Hyer et al., 2006; Dosa et al., 2007). Evacuation decisions could be rendered by the local EOC, a state office, or the governor; the decision could also be made jointly by the local emergency operations director and the owner of a facility. However, nursing home providers state that the decision is complicated by many factors, includ-

ing residents' conditions, the facility's location in the surge zone and its capacity to withstand hurricane force winds, and unique issues associated with the hurricane.

It is incumbent upon administrators and owners to know the specific risk of each facility—for example, the flood zone, surge zones, and elevation and structural soundness of the building. This knowledge is used to weigh the forecasted intensity of the hurricane in relation to the building's capacity to withstand the predicted event. The emergency management mantra is "run from the surge; hide from the wind," but each facility must evaluate, for each disaster event, the risks associated with a decision to evacuate versus shelter in place.

Recognizing that some facilities must evacuate for some storms, the agreement among owners, providers, and regulators was that facilities should shelter in place, when possible, and harden the physical plant to withstand hurricane winds. Implicit in the decision to shelter in place is the ability to provide emergency power through large generators with enough capacity to allow the facility to safely shelter residents, staff, and family of residents and staff for a prolonged period of time (FHCA, 2007).

Such preparations are not cheap. In addition to the expense incurred by the purchase of a generator and fuel are such costs as those related to hardening or upgrading the structure of an aging building. These expenses can be considerable, yet the financial resources required are not always readily available. In fact, federal disaster mitigation funds to harden buildings, available under the Robert T. Stafford Act, prohibit funding for-profit entities, a provision making approximately 70 percent of all nursing homes ineligible.

Evacuation procedures in assisted living facilities for the hurricanes in 2004–2005 varied greatly. These facilities differ in their policies, within and across states, concerning who is responsible for the care of the residents during a disaster. An analysis of Florida's emergency management data base indicates that of the 425 Florida facilities evacuating 6,781 residents during the 2004 and 2005 seasons, a little over one quarter of these facilities sent residents home with family members. Many facilities evacuated

to hotels, sister facilities, and, a few, to special-needs shelters. The disaster plan requirements for assisted living facilities differ by state and are not as prescriptive as nursing home requirements in any state. Development of assisted-living disaster plans, review of the plans, and drills on those plans are important areas of future work.

CONCLUSIONS

Until Hurricane Katrina, hospitals were the priority for emergency responders. Now, "both the needs and potential role of nursing homes . . . have emerged in local and national preparedness discussions" (Root, Amoozegar, and Bernard, 2007, p. 4). Florida and the southern coastal states provide a strong regional network and models for nursing home disaster preparedness, and they are working to incorporate assisted living facilities and other providers into the continuum.

The experience of these states is also a harbinger of issues other states will face in the future as state and federal Medicaid home- and community-based waiver programs encourage frail elders to remain at home, both based on elders' personal preferences and on the lower cost for care. The 2000 Census reported that 52 million Americans with at least one disability live in the community (U.S. Census Bureau, 2003). Clearly, the size of this population underscores the need for all long-term-care providers and for home- and community-based agencies to develop appropriate disaster plans. The federal emergency preparedness report also recognizes the challenge to coordinate and integrate the long-term-care continuum with the "complex assemblage of local State and Federal government agencies" (Root, Amoozegar, and Bernard, 2007, p. 3) and provides state case studies and an atlas to help communities begin to prepare for all hazards, not just natural disasters.

Because a disaster can occur at any time with little warning, emphasis must be placed on efforts to mitigate and prepare for a variety of catastrophic events to meet the needs of an aging population. The experiences of 2004 and 2005 have indicated that it is desirable to shelter nursing home residents in place, when possible. However, a disaster plan that includes evacuation transportation planning that is incor-

porated into disaster response systems at all levels—national, state, and local—must be in place in case the facility must evacuate to ensure the safety of vulnerable residents and staff. There is a need for regional mutual aid support plans among healthcare providers to coordinate the allocation of resources such as transportation, generators, staff, and receiving facilities. Yes, disasters are local, but, to protect frail elders and vulnerable disabled individuals, emergency response also has to be a recognized community responsibility. ☺

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REFERENCES

- AARP Public Policy Institute. 2006. *We Can Do Better: Lessons Learned for Protecting Older Persons in Disasters*. Washington, D.C.
- Brown, L., Hyer, K., and Polivka-West, L. In press. "A Comparative Study of Federal and State Laws, Rules, Codes, and Other Influences on Nursing Homes' Disaster Preparedness in the Gulf Coast States." *Behavioral Sciences and the Law*.
- Dosa, D. M., et al. 2007. "To Evacuate or Not to Evacuate: Lessons Learned from Louisiana Nursing Home Administrators Following Hurricanes Katrina and Rita." *Journal of the American Medical Directors Association* 8(3): 142-49.
- Florida Health Care Association. 2006. Proceedings of the Hurricane Summit, February 27-28.
- Florida Health Care Association. 2007. *Caring for Vulnerable Elders During a Disaster*. A report of the 2007 Nursing Home Hurricane Summit, May 21-22.
- Hyer, K., et al. 2006. "Establishing and Refining Hurricane Response Systems for Long-Term Care Facilities." *Health Affairs* 25, Article 10.1377. <http://content.healthaffairs.org/cgi/content/abstract/hlthaff.25.w407v1>. Accessed July 2007.
- Office of the Inspector General. 2006. *Nursing Home Emergency Preparedness and Response During Recent Hurricanes* (OEI-06-06-00020). Washington, D.C.: Department of Health and Human Services.
- Polivka-West, L. 2006. Statement of LuMarie Polivka-West for the American Health Care Association/National Center for Assisted Living to the National Transportation Safety Board Hearing on Wilmer, Texas, Highway Accident and Selected Federal Motor Carrier Safety Administration Oversight Issues.
- Root, E. D., Amoozegar, J. B., and Bernard, S. 2007. *Nursing Homes in Public Health Emergencies: Special Needs and Potential Roles*. Prepared by RTI International under Contract No. 290-00-0018. AHRQ Publication No. 07-0029-1. Rockville, Md.: Agency for Healthcare Research and Quality.
- U. S. Census Bureau. 2003. *Disability Status: 2000*. www.census.gov/prod/2003pubs/c2kbr-17.pdf. Accessed July 25, 2007.
- U.S. Department of Transportation. 2006. *Catastrophic Hurricane Evacuation Plan Evaluation: A Report to Congress*. Washington, D.C.
- U.S. General Accounting Office. 2006a. *Catastrophic Disasters: Enhanced Leadership, Capabilities, and Accountability Controls Will Improve the Effectiveness of the Nation's Preparedness, Response, and Recovery* (GAO-06-618). Washington, D.C.
- U.S. General Accounting Office. 2006b. *Disaster Preparedness: Limitations in Federal Evacuation Assistance for Health Facilities Should be Addressed* (GAO-06-826). Washington, D.C.
- U. S. General Accounting Office. 2006c. *Disaster Preparedness: Preliminary Observations on the Evacuation of Vulnerable Populations Due to Hurricanes and Other Disasters* (GAO-06-790T). Washington, D.C.
- U. S. General Accounting Office. 2006d. *Evacuation of Hospitals and Nursing Homes* (GAO-06-443R). Washington, D.C.



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Effect of Forced Transitions on the Most Functionally Impaired Nursing Home Residents

Kali S. Thomas, PhD,* David Dosa, MD,*[†] Kathryn Hyer, PhD, MPP,[‡] Lisa M. Brown, PhD,[‡] Shailender Swaminathan, PhD,* Zhanlian Feng, PhD,* and Vincent Mor, PhD*

OBJECTIVES: To examine the hospitalization rate and mortality associated with forced mass transfer of nursing home (NH) residents with the highest levels of functional impairment.

DESIGN: Retrospective cohort study.

SETTING: One hundred nineteen Texas and Louisiana NHs identified as being at risk for evacuation for Hurricane Gustav.

PARTICIPANTS: Six thousand four hundred sixty-four long-stay residents residing in at-risk NHs for at least three consecutive months before landfall of Hurricane Gustav.

MEASUREMENTS: Using Medicare claims and instrumental variable analysis, the mortality (death at 30 and 90 days) and hospitalization rates (at 30 and 90 days) of the most functionally impaired long-stay residents who were evacuated for Hurricane Gustav were compared with those of the most functionally impaired residents who did not evacuate.

RESULTS: The effect of evacuation was associated with 8% more hospitalizations by 30 and 90 days for the most functionally impaired residents. Evacuation was not significantly related to mortality.

CONCLUSION: The most functionally impaired NH residents experience more hospitalizations but not mortality as a consequence of forced mass transfer. With the inevitability of NH evacuations for many different reasons, harm mitigation strategies focused on the most impaired residents are needed. *J Am Geriatr Soc* 60:1895–1900, 2012.

Key words: nursing home; transitions; hurricane

Hurricane Katrina highlighted the inadequacies in nursing home (NH) decision-making during disasters. Because of the widely publicized number of NH resident deaths due to drowning, there has been an increase in the number of NHs that evacuate in preparation for a hurricane.^{1,2} The decision to evacuate is particularly grave given the acuity of the health of NH residents. Research from the hospital literature cites evacuation as being detrimental to patients' health.^{3–7} One study noted similar findings in the NH environment in research that showed that evacuation had an adverse effect on overall morbidity and mortality.¹

In 2008, Hurricane Gustav made landfall in Louisiana. In preparation for what was believed to be a powerful and devastating storm, 119 NHs evacuated, but as Gustav approached shore, it weakened significantly and caused much less damage than other major hurricanes. Therefore, Hurricane Gustav provides a good opportunity to study the effects of evacuation on vulnerable NH residents independent of a "storm effect."

There are many circumstances that prompt transitions or relocation of NH residents from one facility to another. In addition to evacuation for a hurricane, mass transfers of NH residents occur when many residents must leave the facility because of closure or evacuation for a natural disaster (e.g., fire or flood). Research on transfers of residents after a NH closure suggest that it negatively affects residents' health and well-being because of changes in environment, caregivers, and care routines.⁸ Other research suggests that individual transfers (e.g., to the hospital) can lead to changes in eating habits, sleeping patterns, and locomotion; decline in ability to perform activities of daily living (ADLs), and greater dependency and feelings of insecurity.^{8–10} For residents with disabilities, medical or mental illness, or cognitive impairment, being transferred to a different facility can intensify symptoms of existing illnesses and further impair functioning.¹¹

This study sought to build on these findings by examining the effect of NH evacuation on NH residents stratified according to degree of frailty. Simulating a natural experiment, the hospitalization and mortality rates of the most functionally impaired NH residents who were

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evacuated were compared with those of similar residents at nonevacuating facilities in response to Hurricane Gustav, a storm responsible for 5,036 forced NH transitions to other sites of care. Although Hurricane Gustav was a storm that weakened significantly before landfall, it was hypothesized that the disruption associated with evacuation, the noncontinuity of care, and the trauma of moving itself would have deleterious effects on the frail and impaired population. Specifically, it was hypothesized that individuals who were the most functionally impaired would have greater likelihood of hospitalization and death after evacuation than similar residents who sheltered in place.

METHODS

Data Sources

Before work was begun, approval was received from the institutional review boards at Brown University and the University of South Florida. Resident-level data from the 2008 Minimum Data Set (MDS) were matched to the Medicare denominator files and hospital claims using the Residential History File methodology, described elsewhere.¹² Descriptive characteristics for NH residents (e.g., demographics, health characteristics) were obtained from the MDS.¹³ Information on date of death and hospitalization was determined from the Centers for Medicare and Medicaid Services (CMS) enrollment record. Hospitalization events were recorded on Medicare inpatient hospital claims included in the Standard Analytic File. NH characteristics were derived from the Online Survey, Certification, and Reporting (OSCAR) file, which includes the exact address of the facility used for geocoding.

Sample

Study participants were long-stay (>90 days) NH residents who had resided in an at-risk Medicare- and Medicaid-certified facility for at least 3 calendar months before the date of storm landfall in 2008. At-risk NHs were defined as those homes geographically located in parishes or counties included in the National Weather Service initial hurricane watch at 48 hours and the subsequent warning zone at 24 hours.¹ Additional NHs were included if they were located in parishes or counties where at least one NH was known to have evacuated based on lists that the state NH associations provided. NHs in counties and parishes where there were no known evacuations were removed.

The most functionally impaired residents were identified as those who had a score of 23 or greater out of 28 on the late-loss activities of daily living (ADL) scale,¹⁴ which comes from the MDS and contains seven items (bed mobility, transfer, locomotion, dressing, eating, toilet use, personal hygiene). A trained clinician assesses the resident's functional capabilities over a 7-day period and assigns a score for each ADL item ranging from 0 (total independence) to 4 (total dependence). The scale sums the responses for all seven items, so higher scores indicate greater dependence and greater functional impairment.

Shelter Versus Evacuation Data

Residents were considered to have transferred if they resided in facilities that completely evacuated before the date of landfall for Hurricane Gustav. Data on a facility's evacuation status were obtained from the Texas Department of Aging and Disability Services and the Louisiana Department of Health and Hospitals. NHs that evacuated after the date of landfall for any reason were considered to have sheltered in place for the purposes of this analysis.

Variables

Using data from Medicare files, the likelihood of death and hospitalization by 30 and 90 days was determined for residents in at-risk NHs. Information on independent variables characterizing residents (e.g., demographics, health characteristics) was obtained from the MDS. In addition to age, sex, and race, hospitalization and death outcomes were adjusted for cognitive status and other indicators of resident acuity that has previously been suggested as being related to these outcomes. Cognitive status (summed scores on the Cognitive Performance Scale, measuring memory impairment, level of consciousness, and executive function and ranging from 0 (intact) to 6 (very severe impairment)), was divided into two degrees of severity: medium (score 3–4) and high (score 5–6).¹⁵ Resident acuity measures were also derived from the MDS and included cancer, congestive heart failure, diabetes, feeding tube, and the Changes in Health, End-stage disease and Signs and Symptoms (CHESS) Comorbidity Index (range 0 (no frailty) to 5 (high frailty)).¹⁶ Other independent variables measured at the facility level included the percentage of residents who were ambulatory, the facility's acuity index, for-profit ownership, occupancy rate, percentage of residents funded by Medicaid, and percentage of residents with a primary payer other than Medicare or Medicaid.

Analyses

Instrumental variable (IV—observable factors that influence evacuation but do not directly affect resident outcomes) estimation was used to mimic the randomization of treatment (evacuation).^{1,17,18} IV modeling, unlike more-traditional statistical approaches such as multivariate logistic regression, helps reduce unmeasured confounding in cases in which it is impossible to randomize individuals or account for all confounders.¹⁹ Therefore, the IV approach was used to mitigate the influence of potential omitted-variable bias on the effect of evacuation. To implement the IV estimation strategy, it was hypothesized that external factors such as distance from the predicted path, elevation, and distance from shore would be related to the decision to evacuate but not to resident outcomes. As detailed in previous analyses,¹ hurricane damage is often a function of high winds, heavy rainfall that causes flooding, and storm surge. The degree of damage sustained from winds is often negatively correlated with distance from the storm (the closer the storm, the higher the winds). In addition, storm surge occurs when the low pressure of the storm causes the sea level to rise and strong winds push high waves

associated with a hurricane onto the shore. Therefore, distance from the shore and elevation of the facility are also important factors when considering whether to evacuate.

Using probit in Stata (StataCorp., College Station, TX), the geographic characteristics related to the location of the NH relative to the storm were first tested as IVs. The critical assumption is that these variables (e.g., perpendicular distance from NH to the path of the storm 48 hours before landfall) will cause variations in evacuation status between NHs unrelated to any omitted variable from the regression of resident outcomes (hospitalization). Because there was more than one IV, the model is considered to be overidentified. Hansen's J-statistic was used to test the hypothesis that the model is correctly specified.²⁰

The IVs included distance from the facility to the predicted path of storm 24, 48, and 72 hours before landfall; a cubic polynomial of distance from NH to the shore; and elevation (feet above sea level) calculated in a geospatial analysis program (ArcGIS; ESRI, Redlands, CA). The distance between each geocoded NH and the 24-, 48-, and 72-hour and actual path and the distance between the NH and the shoreline were then calculated using a geospatial proximity tool (Near, ArcGIS). The Near tool determines the distance between each point (the NHs) and the nearest polyline (storm path or shoreline). Elevation data were downloaded in the form of raster files from the WorldClim Global Climate Data website (<http://www.worldclim.org>). Using the Extraction spatial analysis tool in ArcGIS, the elevation values were extracted from the raster file to each point (NH).

The second stage of the model estimated the effect of evacuation on the outcomes of hospitalization at 30 and 90 days. In addition to storm parameters, the second-stage model controls for factors that the literature has shown to be related to hospitalization and mortality: demographics (sex, race, age), resident acuity (body mass index, cancer, congestive heart failure, diabetes mellitus, feeding tube, Cognitive Performance Scale score, CHESS score, percentage of residents who are ambulatory, and acuity index) and facility characteristics (for profit, occupancy rate, percentage Medicaid, and percentage private pay). IV analyses were conducted using IVREG in STATA 11.0 to estimate the difference in the risk of hospitalization and mortality for the most functionally impaired residents who were evacuated.

RESULTS

Six thousand four hundred four residents (1,662 were the most functionally impaired and 4,802 were less functionally impaired) were exposed to Hurricane Gustav. Table 1 presents the characteristics and acuity measures of the most functionally impaired residents. Of these most functionally impaired residents, 12% (n = 155) of those evacuated were hospitalized within 30 days after the storm, 21% (n = 273) were hospitalized within 90 days (Table 2); 6.2% (n = 80) died within 30 days and 15.2% (n = 197) within 90 days.

Table 3 presents the estimated value of the IV coefficients. The results suggest that evacuation was associated

Table 1. Descriptive Characteristics of the Most Functionally Impaired Residents^a in At-Risk Nursing Homes Who Were Evacuated Versus Those Who Sheltered in Place

Characteristic	Evacuated	Sheltered in Place
Male, %	24	21
Black, %	25	20
Age, mean ± SD	83.5 ± 0.2	84.6 ± 0.4
Body mass index, kg/m ² , mean ± SD	25.0 ± 0.2	25.6 ± 0.3
Cancer, %	2	1
Congestive Heart Failure, %	12	13
Diabetes mellitus, %	36	36
Feeding Tube, %	24	27
Cognitive Performance Scale score, % (range 0–6)		
3–4 (medium)	41	37
5–6 (high)	46	54
Changes in Health, End-stage disease and Signs and Symptoms Scale score (range 0–5)	1.06 ± 0.03	1.06 ± 0.06

SD = standard deviation.

^a Activity of daily living scale score ≥ 23 out of 28.

Table 2. Distribution of Rates of Hospitalization and Mortality 30 and 90 days After the Storm for the Most Functionally Impaired Nursing Home Residents^a

Outcome	Evacuated, % n = 1,295	Sheltered in Place, % n = 367
Death (30 days)	6.2	5.4
Death (90 days)	15.2	12.5
Hospitalization (30 days)	12.0	8.2
Hospitalization (90 days)	21.1	16.6

^a Activity of daily living scale score ≥ 23 out of 28.

with 8% more hospitalizations by 30 and 90 days but not that there is a statistically significantly greater risk of death at 30 and 90 days for the most functionally impaired residents who were evacuated. Separate analyses were conducted (results not shown) to examine the effect of evacuation on the remaining less functionally impaired residents (those with an ADL score lower than 23). Evacuation was not significantly related to hospitalization or mortality for the less functionally impaired residents, suggesting that the detrimental effect of transitions, as measured by hospitalization, was observed only in those who were most functionally impaired.

The results also show that the effect of evacuation on hospitalizations at 30 and 90 days was, in general, stronger than the effect of other comorbid conditions, such as obesity, cancer, congestive heart failure, diabetes mellitus, and severe cognitive impairment (Table 3).

DISCUSSION

The present study examined the relationship between a forced mass evacuation and adverse outcomes for a group of the most functionally impaired NH residents. These outcomes were measured in terms of hospitalization and mortality. The results indicate that there is a statistically

Table 3. Results from Instrumental Variable Regression Modeling the Effect of Evacuation on the Most Functionally Impaired^a Nursing Home (NH) Resident Population (N = 1,662)

Variable	Hospitalization 30 days	Hospitalization 90 days	Death 30 days	Death 90 days
	Coefficient (SE)			
Evacuation ^b	0.08 (0.029) ^c	0.08 (0.038) ^d	0.03 (0.023)	0.06 (0.037)
Male	0.002 (0.020)	0.026 (0.027)	0.013 (0.015)	0.024 (0.021)
Black	0.032 (0.020)	0.058 (0.025) ^d	-0.01 (0.014)	-0.009 (0.019)
Age	-0.013 (0.010)	-0.017 (0.013)	0.008 (0.007)	0.021 (0.009) ^d
BMI	0.001 (0.012)	-0.01 (0.015)	-0.007 (0.011)	-0.031 (0.012) ^c
Cancer	-0.01 (0.064)	-0.106 (0.068)	0.122 (0.074)	0.024 (0.073)
Congestive heart failure	0.044 (0.028)	0.061 (0.034)	0.004 (0.018)	0.036 (0.027)
Diabetes mellitus	-0.027 (0.015)	-0.017 (0.021)	-0.014 (0.012)	-0.025 (0.019)
Feeding tube	0.08 (0.021) ^c	0.10 (0.031) ^c	0.017 (0.013)	0.035 (0.022)
Cognitive Performance Scale score (range 0–6)				
3–4 (medium)	0.005 (0.026)	-0.035 (0.032)	0.014 (0.017)	0.019 (0.028)
5–6 (high)	-0.002 (0.025)	-0.05 (0.032)	0.026 (0.016)	0.047 (0.030)
Changes in Health, End-stage disease and Signs and Symptoms Scale score (range 0–5)	0.003 (0.007)	-0.011 (0.010)	0.02 (0.006) ^c	0.02 (0.008) ^c
Ambulatory, %	0 (0.001)	0.001 (0.002)	0 (0.001)	-0.001 (0.001)
Acuity index	-0.009 (0.007)	-0.005 (0.011)	-0.005 (0.006)	-0.02 (0.008) ^d
For-profit ownership	-0.016 (0.025)	0.006 (0.030)	0.002 (0.017)	0.002 (0.034)
Nursing home occupancy rate	-0.051 (0.051)	-0.092 (0.069)	0.016 (0.039)	-0.046 (0.060)
Medicaid, % (1/10)	-0.01 (0.007) ^c	-0.003 (0.007)	-0.001 (0.005)	-0.003 (0.007)
Other insurance, % (1/10)	-0.02 (0.009) ^d	-0.011 (0.011)	-0.007 (0.006)	0 (0.010)
Constant	0.45 (0.158) ^c	0.46 (0.215) ^d	0.005 (0.110)	0.192 (0.154)

^a Activity of daily living scale score \geq 23 out of 28.

^b Instrumental variables were distance from facility to path of storm 24, 48, and 72 hours before landfall; elevation; and a cubic polynomial of distance from NH to the shore.

^c $P < .01$.

^d $P < .05$.

Standard errors were robust to heteroscedasticity and clustered within NHs.

Age, body mass index (BMI), percentage of residents with Medicaid, and percentage of residents with other insurance were divided by 10 for ease of interpretation.

significant greater likelihood of hospitalization after evacuation for the most functionally impaired NH residents. Furthermore, the more robust and less functionally impaired residents did not experience negative outcomes associated with mass transfer. Although a statistically significant effect of evacuation on mortality was not observed, these findings suggest that the most functionally impaired NH residents bear a great burden when being transferred from one facility to another during mass transfer. Under stressful conditions, transferring the most functionally impaired NH residents may lead to poor outcomes.

This study is the first to examine the implications of forced mass transfer on the most functionally impaired NH residents. Hurricane Gustav is an appropriate storm for evaluation of resident transitions because it was predicted to be a big storm and led to almost universal NH evacuation orders but weakened significantly as it approached shore. There was minimal flooding, and winds abated to less than 60 miles per hour after the storm made landfall, suggesting that any consequence of the storm was attributable to the evacuation and not the storm itself. In previous work,¹ four storms and their effects on morbidity and mortality for all residents in NHs were examined. It was found that certain storms had a more-robust and significant deleterious effect on resident health. In addition, individuals who were evacuated experienced worse out-

comes. Hurricane Katrina was associated with a significant increase in the rate of deaths, but even for Katrina, individuals who were evacuated had a greater risk of dying than those who sheltered in place. The results of the current study generally conclude that the effects of the storm, in the aggregate, affected mortality and hospitalization less than evacuation did.

These findings suggest that evacuating the most functionally impaired residents is expensive to healthcare payers such as Medicare and Medicaid and has direct deleterious effects on the lives of the NH residents. For Hurricane Gustav, approximately 1,650 of the most functionally impaired residents were evacuated. Estimates from the IV analyses suggest that there were approximately 132 more hospitalizations in the most functionally impaired residents who evacuated than in those who sheltered in place. If one assumes an average Medicare Diagnosis-Related Group (DRG) payment per hospitalization of \$5,000, this would represent additional spending for Medicare of \$660,000 for evacuating these 1,650 most functionally impaired residents. This DRG payment probably represents a conservative estimate because another study has suggested that the average DRG payment for hospitalizations rated as potentially avoidable was \$6,500.²¹

Beyond these findings, it is important to note that forced transitions occur frequently from one NH to

another, especially of the very sick and functionally impaired. Findings from this study indicate that transferring residents from one location to another could disrupt their continuity of care and, therefore, lead to adverse outcomes, such as greater risk of hospitalization. These findings are particularly important as we see an increase in NH closures in recent years.²² For the past decade, CMS OSCAR data have shown a decline in the number of NHs, from 17,508 in 1999 to 15,713 in 2010. There were 231 NH closures in 2009 and 191 in 2010.²³ With the average NH providing care to 100 residents, this suggests that, in the 2-year period, there have been 4,220 NH residents who have been transferred because of closures. Because approximately 22% ($n = 310,000$) of the long-stay residents in NHs (during 2009) are the most functionally impaired (ADL scale score ≥ 23), it can be assumed that a large number of those transferred were the most functionally impaired.

A practical implication of this finding is that NH administrators and staff must pay particularly close attention to the most functionally impaired NH residents during a transition. Furthermore, this attention must extend at least 90 days after transition, because greater rates of hospitalization were seen up to 90 days after evacuation. Several initiatives and interventions have been proposed and exercised in an effort to prevent relocation stress.^{24,25} Future research could benefit by examining the effects of relocation programs on the response to transfers of the most functionally impaired NH residents.

Caution should be used in generalizing these findings to all resident transfers. It is possible that mass forced transfer may have different dynamics than single-person transfers and therefore may result in different outcomes for the most functionally impaired NH residents. Additionally, the estimates measured the effects of the evacuation decision on all residents of the NH using distance variables as instruments. Therefore, the generalizability of the coefficient may not be appropriate for other settings. Finally, although the effect of evacuation of the most functionally impaired residents was not found to be statistically significant for mortality, a trend toward greater mortality was identified. Previous work on a larger sample (including all NH residents exposed to Hurricane Gustav) has suggested that evacuation is related to mortality. This association has also been shown for other storms in the Gulf Coast region, including hurricanes Katrina, Rita, and Ike. It is likely that this lack of statistical significance in the current study is a question of sample size. As such, these null findings should be interpreted with caution.

With these limitations in mind, these results suggest that the most functionally impaired NH residents experience harmful effects as a consequence of forced mass transfer. With the inevitability of transfers of the NH population, it is important that providers establish best practices and specific plans of care when moving those who are the most functionally impaired.

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Conflict of Interest: Vincent Mor is a founder and on the board of directors of PointRight, Inc., an information ser-

vices company serving NHs on quality measurement and improvement. He receives no research funding, data, or consultation on his research from PointRight.

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REFERENCES

1. Dosa D, Hyer K, Thomas K et al. To evacuate or shelter in place: Implications of universal hurricane evacuation policies on nursing home residents. *J Am Med Dir Assoc* 2012;13:190.e1–190.e7.
2. Blanchard G, Dosa D. A comparison of the nursing home evacuation experience between Hurricanes Katrina (2005) and Gustav (2008). *J Am Med Dir Assoc* 2009;10:639–643.
3. Gray BH, Hebert K. Hospitals in Hurricane Katrina: Challenges facing custodial institutions in a disaster. *J Health Care Poor Underserved* 2007;18:283–298.
4. Blaser MJ, Ellison RT. Rapid nighttime evacuation of a veterans hospital. *J Emerg Med* 1985;3:387–394.
5. Fisher HL. Emergency evacuation of the Denver Veteran's Administration Medical Center. *Mil Med* 1986;151:154–161.
6. Sternberg E, Lee GC, Huard D. Counting crises: US hospital evacuations, 1971–1999. *Prehosp Disaster Med* 2004;19:150–157.
7. Cocanour CS, Allen SJ, Mazabob J et al. Lessons learned from the evacuation of an urban teaching hospital. *Arch Surg* 2002;137:1141–1145.
8. Capezuti E, Boltz M, Renz S et al. Nursing home involuntary relocation: Clinical outcomes and perceptions of residents and families. *J Am Med Dir Assoc* 2006;7:486–492.
9. Lander SM, Brazill AL, Ladriagan PM. Intra-institutional relocation. Effects on residents' behavior and psychosocial functioning. *J Gerontol Nurs* 1997;23:35–41.
10. Rogers JC, Stuart MR, Sheffield P et al. Functional health status of relocated nursing home residents. *J Am Board Fam Pract* 1990;3:157–172.
11. Mirotnik J. Does cognitive status moderate the health effects of single-person room transfers on nursing home residents? *Gerontologist* 2002;42:634–642.
12. Intrator O, Hiris J, Berg K et al. The residential history file: Studying nursing home residents' long-term care histories. *Health Serv Res* 2011;46:120–137.
13. Morris JN, Hawes C, Fries BE et al. Designing the national resident assessment instrument for nursing homes. *Gerontologist* 1990;30:293–307.
14. Hawes C, Morris JN, Phillips CD et al. Reliability estimates for the minimum data set for nursing home resident assessment and care screening (MDS). *Gerontologist* 1995;35:172–178.
15. Morris JN, Fries BE, Mehr DR et al. MDS cognitive performance scale. *J Gerontol Med Sci* 1994;49:M174–M182.
16. Hirdes JP, Frijters D, Teare G. The MDS CHES Scale: A new measure to predict mortality in the institutionalized elderly. *J Am Geriatr Soc* 2003;51:96–100.
17. McClellan M, McNeil BJ, Newhouse JP. Does more intensive treatment of acute myocardial infarction in the elderly reduce mortality? Analysis using instrumental variables. *J Am Med Assoc* 1994;272:859–866.
18. Newhouse JP, McClellan M. Econometrics in outcomes research: The use of instrumental variables. *Annu Rev Public Health* 1998;19:17–34.
19. Xian Y, Holloway RG, Chan PS et al. Association between stroke center hospitalization for acute ischemic stroke and mortality. *JAMA* 2011;305:373–380.
20. Hansen L. Large sample properties of the generalized method of moments estimators. *Econometrica* 1982;50:1029–1054.
21. Ouslander JG, Lamb G, Perloe M et al. Potentially avoidable hospitalizations of nursing home residents: Frequency, causes, and costs. *J Am Geriatr Soc* 2010;58:627–635.

22. Feng Z, Lepore M, Clark MA et al. Geographic concentration and correlates of nursing home closures: 1999–2008. *Arch Intern Med* 2011;171:806–813.
23. Requirements for Long-Term Care Facilities: Notice of Facility Closure. 2011-3806. Centers for Medicare and Medicaid Services. 0938-AQ09:9503–9512.
24. Brown LM, Bruce ML, Hyer K et al. A pilot study evaluating the feasibility of psychological first aid for nursing home residents. *Clin Gerontol* 2009;32:293–308.
25. Jackson B, Swanson C, Hicks LE et al. Bridge of continuity from hospital to nursing home—Part II: Reducing relocation stress syndrome—an interdisciplinary guide. *Continuum* 2000;20:9–14.

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The Effects of Evacuation on Nursing Home Residents With Dementia

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Abstract

Background: In response to the hurricane-related deaths of nursing home residents, there has been a steady increase in the number of facilities that evacuate under storm threat. This study examined the effects of evacuation during Hurricane Gustav on residents who were cognitively impaired. **Methods:** Nursing homes in counties located in the path of Hurricane Gustav were identified. The Minimum Data Set resident assessment files were merged with the Centers for Medicare enrollment file to determine date of death for residents in identified facilities. Difference-in-differences analyses were conducted adjusting for residents' demographic characteristics and acuity. **Results:** The dataset included 21,255 residents living in 119 at risk nursing homes over three years of observation. Relative to the two years before the storm, there was a 2.8 percent increase in death at 30 days and a 3.9 percent increase in death at 90 days for residents with severe dementia who evacuated for Hurricane Gustav, controlling for resident demographics and acuity. **Conclusions:** The findings of this research reveal the deleterious effects of evacuation on residents with severe dementia. Interventions need to be developed and tested to determine the best methods for protecting this at risk population when there are no other options than to evacuate the facility.

Keywords

Alzheimer's disease, disaster, nursing homes, evacuation, hurricane, mortality

Introduction

In the wake of the Hurricane Katrina and in response to hurricane-related deaths, there has been a steady increase in the number of nursing homes that evacuate under storm threat.¹⁻⁵ Within the same storm-affected region in 2005, the number of nursing homes evacuating in advance of the storm more than doubled within a 1-month period; from 30 nursing homes prior to Hurricane Katrina to 72 facilities in advance of Hurricane Rita.² There was a 4-fold increase 3 years after Hurricane Katrina, when 119 facilities evacuated prior to Hurricane Gustav. This increase has been accompanied by considerable public debate about the appropriateness of a universal evacuation policy for nursing home residents.³ To address this concern, recent research examined the differential morbidity and mortality associated with evacuation versus sheltering in place for nursing home residents. Dosa and colleagues found that evacuation, and not storm effects experienced while sheltering in place, contributed significantly to increased rates of hospitalization, morbidity, and mortality of nursing home residents.^{2,6}

Nationwide, of the approximately 1.6 million adults who live in nursing homes, an estimated 50% to 70% carry a diagnosis of Alzheimer's disease or a related dementia.^{7,8} It is well recognized that impaired memory and reasoning severely limit a person's ability to independently and adequately respond to

complex, evolving, and dangerous situations.⁹ Although people with dementia are recognized as a vulnerable population during disasters, it is unknown if this diagnosis confers increased risk for disaster-related hospitalization and mortality for those who are evacuated.

Nursing home evacuation in response to a storm threat is typically done en masse with staff who may not know the residents. Supplies, equipment, and transportation are prepared in the hours leading up to the departure. Across studies examining relocation-related stress and transfer trauma, it appears that time spent preparing residents for a move reduces negative consequences and supports successful adjustment.¹⁰⁻¹³ However, it is unknown what types of intervention, if any, are currently used

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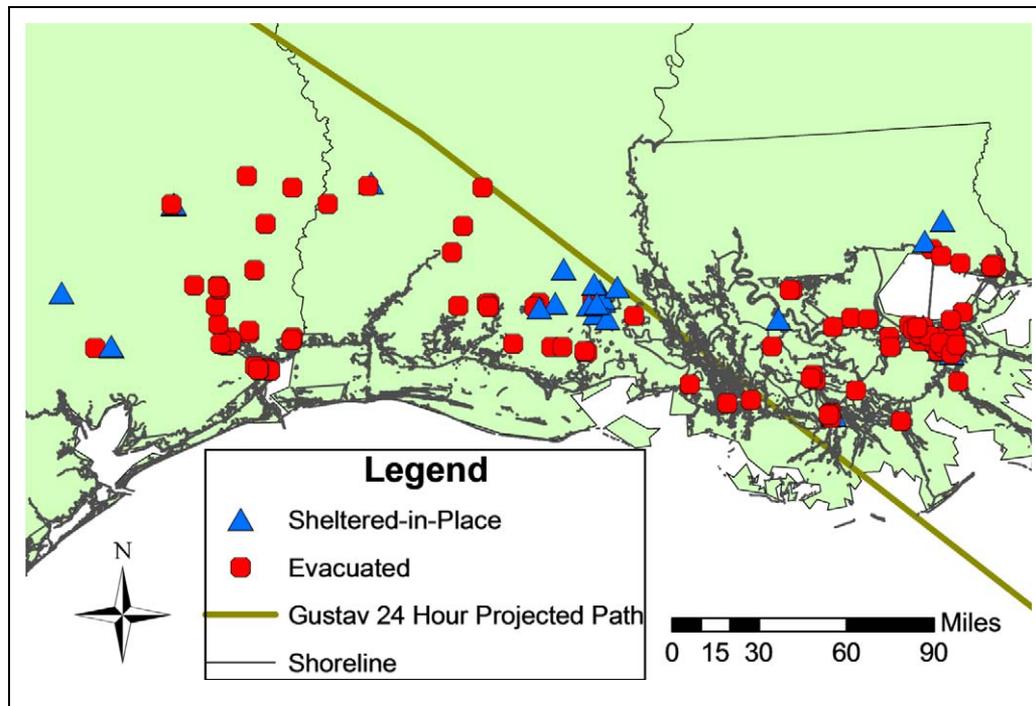


Figure 1. At-risk nursing homes for Hurricane Gustav that evacuated and sheltered in place.

to build resilience and prepare residents for this type of move, particularly given the limited time available prior to a storm. It is probable that residents with cognitive impairment may not adequately grasp what is occurring and understand why daily schedules are disrupted while staff are preparing for evacuation. It is also unknown whether nursing home residents with dementia fare worse during evacuation than those who are cognitively intact. To elucidate this issue, this study examined the effects of evacuation during Hurricane Gustav on residents diagnosed with Alzheimer's disease and related dementias.

Background

On August 27, 2008, as Hurricane Gustav approached the southeast United States, the Governor of Louisiana issued a Statewide Declaration of Emergency. In response to the storm's magnitude at sea and the uncertainty of the storm track, more than 2 million people evacuated in advance of the hurricane. After Action reports suggest that government officials and response agencies were extremely vigilant and determined to be proactive in the days leading up to Hurricane Gustav's landfall because of the devastation wrought by Hurricane Katrina 3 years earlier.^{5,14,15} To protect their residents, approximately 119 nursing homes evacuated in response to Hurricane Gustav's threat. Although the National Hurricane Center predicted with 45% certainty that Hurricane Gustav would make landfall on September 1, 2008, as a category 3 storm or greater, it struck Louisiana as a weak category 2 storm and quickly fell to category 1 intensity.¹⁴

Although Hurricane Gustav caused an estimated \$4.5 billion in economic losses, the overall damage to buildings and

physical infrastructure outside of rural coastal areas of Central Louisiana was minimal relative to other major hurricanes. As such, Hurricane Gustav provides a unique opportunity to examine the effects of evacuation on nursing home residents because of the minor storm effects. That is, because residents evacuated in advance of the storm, most nursing home evacuees were never directly exposed to the hurricane; did not return to damaged, uninhabitable buildings; or experience relocation to a new facility after the storm.

Methods

Data Sources

Institutional review boards at the University of South Florida and Brown University approved this research. Data were drawn from multiple sources to capture the storm effects, location of nursing homes, and residents exposed to the storm. For the current study, we first identified all nursing homes in counties in the path of Hurricane Gustav (Figure 1) using the Online Survey Certification Automated Record to identify the facilities' address, ownership, staffing, and size. To identify residents in nursing homes in specified at-risk areas for Hurricane Gustav during the 2006 to 2008 period (Figure 1), we used the Minimum Data Set (MDS). The MDS resident assessment includes nearly 400 data items providing information on residents' cognitive functioning, physical functioning, diagnoses, health conditions, treatments, and outcomes.¹⁶ The MDS data were merged with the Centers for Medicare and Medicaid Services enrollment file to determine date of death for the residents in the at-risk facilities.

Sample

We evaluated long-stay (>90 days), Medicare eligible, nursing home residents who resided in an at-risk nursing home for at least 3 months prior to the date of landfall. At-risk nursing homes were defined as those homes geographically located in parishes or counties that were included in the National Weather Service's initial hurricane watch at 48 hours and the subsequent warning zone at 24 hours. Additional nursing homes were included if they were located in parishes or counties where at least 1 nursing home was known to have evacuated based on information provided by the state nursing home association. Nursing homes from counties or parishes where there were no known evacuations and those without 3 years of consecutive data were removed.

Dependent Variables: Morality at 30 and 90 Days

Information on the date of death was determined from the Medicare denominator file. Using data from Medicare files, the pre-hurricane period (3 months prior to landfall to 4 days prior to landfall), 30-day, and 90-day mortality rates were established for exposed patients. A date 4 days prior to each storm was selected due to potential morbidity and mortality associated with evacuations that commenced on or after that date but before storm landfall. To our knowledge, no nursing homes evacuated for Hurricane Gustav prior to this date. The exposure group was then compared to a control population residing in the same nursing homes during the same period of time for the 2 nonhurricane years.

Independent Variables: Cognitive Status and Evacuation

Residents with seriously impaired cognitive status were identified as those with a Cognitive Performance Scale (CPS) score greater than 5 (a score of 5-6 indicating severe cognitive impairment). The validity of the CPS to detect cognitive impairment in long-term residents has been established.¹⁷ The CPS uses 5 MDS items (comatose status, decision making, short-term memory, making self-understood, and eating) to categorize the cognitive status of nursing home residents. In the identification of cognitive impairment, the CPS demonstrates substantial agreement with the Mini-Mental State Examination, with a reported sensitivity and specificity of .94 (95% confidence interval [CI]: .90-.98) and .94 (95% CI: .87-.96), respectively.

Residents were considered to have evacuated if they resided in facilities that completely evacuated prior to Hurricane Gustav's landfall. Data on a facility's evacuation status were obtained from the Louisiana Department of Health and Hospitals. Telephone confirmation with individual facilities was made whenever questions existed as to whether nursing homes completely evacuated. Nursing homes that evacuated after landfall for any reason were considered to have sheltered in place for the purposes of this analysis.

Control Variables Analyses

We used a difference-in-differences model to estimate the impact of evacuation on each outcome.¹⁸ This approach is valid only under a restrictive assumption that changes in the outcomes of both groups would have followed similar trends over time in the absence of the evacuation.¹⁹ Although such an assumption cannot be definitively tested, because no change in mortality was reported for the 2 previous years (2006-2007), we assume that would have continued on for 2008.

Independent 2-group *t* tests were conducted to compare the evacuated and nonevacuated groups at baseline in terms of demographic characteristics and resident acuity. We conducted unadjusted difference-in-differences analyses, and then examined difference-in-differences effects after adjusting for residents' demographic characteristics and acuity. The multivariate difference-in-differences model is as follows:

$$\text{Outcome}_{it} = B_0 + B_1 \text{CPS} + B_2 \text{Evacuation} + B_3(\text{CPS} \times \text{evacuation}) + X_{ita} + e_{it}$$

where Outcome_{it} is the major outcome of interest (mortality at 30 and 90 days). CPS is a dummy variable for high CPS score, and B_1 captures the potential differences between those with a high CPS score and those who have a CPS score less than 5. The dummy variable Evacuation represents whether or not the resident resided in a facility that evacuated for Hurricane Gustav, and B_2 captures the change in outcomes of interest if the resident was in a facility that evacuated in 2008. The coefficient B_3 is the parameter of interest: B_3 measures the effect of evacuation status on the residents with a high CPS score (ie, difference-in-differences). X is a matrix of covariates, including year dummy variables, and a number of other resident characteristics that the literature has shown to be related to mortality: resident characteristics (male, Black, and age), and indicators of resident acuity (body mass index, cancer, congestive heart failure, diabetes, feeding tube, CPS score, Changes in Health, End-stage disease, and Signs and Symptoms Scale score, percent ambulatory, and acuity index). Given the size of our data set, least-squares models estimations of linear probability regression models are presented. Although this approach does not recognize the binary nature of the mortality measure, it facilitates the tractable estimation of these models, which are based on a large number of observations and an expansive set of regression controls. We include facility fixed effects to control for time-invariant differences in mortality between facilities; robust standard errors are clustered at the facility level.

Results

Sample and Baseline Characteristics

The data set included 21 255 residents of 119 at-risk nursing homes over 3 years of observation. Of these, 18% (3745 residents) were severely cognitively impaired (Table 1) and a total of 5036 residents (82% of nursing homes) evacuated for

Table 1. Variable Description, Aggregated Over 2006 to 2008 (N = 21 255 Individual-Years from 119 Freestanding Nursing Homes)

	Mean (SD) or %
High CPS Score ^a	18%
ADL Score ^b	14.59 (9.24)
Male	26%
Black	19%
Age	82.96 (8.18)
CHESS Score ^c	0.89 (1.01)
Body mass index	26.46 (6.69)
Congestive heart failure	11%
Diabetes	35%
Tube fed	7%

Abbreviations: CPS, Cognitive Performance Scale; ADL, Activities of Daily Living; CHESS, Changes in Health, End-stage disease, and Signs and Symptoms Scale; SD, standard deviation.

^a The CPS score of 5 or 6 on a scale of 0 to 6.

^b The ADL Scale scores range from 0 (*total independence*) to 28 (*total dependence*).

^c The CHESS scores range from 0 (*no instability in health*) to 5 (*highly unstable health*).

Table 2. Percent of Residents With High CPS Scores Who Died At 30 and 90 Days (2006 to 2008)

	Death 30 Days			Death 90 Days		
	2006	2007	2008	2006	2007	2008
Sheltered in place	4.00%	2.84%	3.04%	9.71%	10.09%	11.03%
Evacuated	3.32%	4.86%	6.72%	9.65%	11.35%	15.01%

Hurricane Gustav. Over the study period, approximately 2.4% of residents died at 30 days and 6.7% of residents died within 90 days and death rates were higher in 2008 compared to the 2 prior years (Table 2). Results from a series of 2 sample *t* tests indicate that there were no significant differences at baseline in resident characteristics and acuity between facilities that evacuated and those that sheltered in place (results not presented).

The difference-in-differences estimator (evacuated \times high CPS score, which is indicative of severe cognitive impairment) indicate there is a 2.8% point increase in death at 30 days for residents with high CPS scores who evacuated for Hurricane Gustav, controlling for resident demographics and acuity (Table 3). When benchmarked against the average nursing home resident rate of death at 30 days, this finding translates into a 218% increase in mortality at 30 days for individuals with high CPS scores that evacuated for Hurricane Gustav. Thus, if all residents with a high CPS score were evacuated, there would be approximately 1400 additional deaths over the period of study. Results from the difference-in-differences regression modeling the outcome resident death at 90 days, indicated there was a 3.9% point increase in the mortality rate at 90 days for individuals with a high CPS score that evacuated for Hurricane Gustav (Table 4). If all nursing homes evacuated their residents with high CPS scores, a 158% increase in mortality at 90 days relative to the dependent

Table 3. Evacuation and 30-Day Mortality, Regression Results^a

	Robust			95% Confidence Interval
	Coef.	SE	P Value	
High CPS ^b	0.005	0.004	.262	-0.003-0.012
Evacuated	-0.002	0.005	.747	-0.012-0.009
High CPS \times Evacuated	0.028	0.010	.007	0.008-0.048
Year 2006	-0.004	0.005	.360	-0.014-0.005
Year 2007	-0.005	0.005	.318	-0.014-0.004
ADL Score ^c	0.001	0.000	.000	0.001-0.001
Male	0.012	0.003	.000	0.006-0.019
Black	-0.008	0.003	.015	-0.014 - -0.002
Age	0.001	0.000	.000	0.000-0.001
CHESS Score ^d	0.009	0.001	.000	0.006-0.012
BMI	-0.001	0.000	.001	-0.001-0.000
CHF	0.012	0.004	.005	0.004-0.020
Diabetes	0.005	0.002	.053	0.000-0.009
Tube fed	0.011	0.006	.056	0.000-0.022
Constant	-0.039	0.015	.009	-0.068 - -0.010

Abbreviations: CPS, Cognitive Performance Scale; ADL, Activities of Daily Living; CHESS, Changes in Health, End-stage disease, and Signs and Symptoms Scale; BMI, body mass index; CHF, congestive heart failure; SE, standard error.

^a Model applies robust standard errors adjusted for within-facility clustering.

^b The CPS score of 5 or 6 on a scale of 0 to 6.

^c The ADL Scale scores range from 0 (*total independence*) to 28 (*total dependence*).

^d The CHESS scores range from 0 (*no instability in health*) to 5 (*highly unstable health*).

Table 4. Evacuation and 90-Day Mortality, Regression Results^a

	Robust			95% Confidence Interval
	Coef.	SE	P Value	
High CPS ^b	0.010	0.006	.126	-0.003-0.022
Evacuated	0.007	0.008	.366	-0.008-0.022
High CPS \times Evacuated	0.039	0.014	.008	0.011-0.067
Year 2006	-0.005	0.006	.412	-0.018-0.007
Year 2007	-0.004	0.007	.530	-0.018-0.009
ADL Score ^c	0.003	0.000	.000	0.002-0.003
Male	0.026	0.005	.000	0.016-0.035
Black	-0.022	0.005	.000	-0.032 - -0.013
Age	0.001	0.000	.000	0.001-0.002
CHESS Score ^d	0.016	0.002	.000	0.011-0.020
BMI	-0.002	0.000	.000	-0.002 - -0.001
CHF	0.031	0.006	.000	0.019-0.043
Diabetes	0.009	0.003	.008	0.002-0.016
Tube fed	0.025	0.009	.005	0.008-0.042
Constant	-0.050	0.023	.030	-0.095 - -0.005

Abbreviations: CPS, Cognitive Performance Scale; ADL, Activities of Daily Living; CHESS, Changes in Health, End-stage disease, and Signs and Symptoms Scale; BMI, body mass index; CHF, congestive heart failure; SE, standard error.

^a Model applies robust standard errors adjusted for within-facility clustering.

^b The CPS score of 5 or 6 on a scale of 0 to 6.

^c The ADL Scale scores range from 0 (*total independence*) to 28 (*total dependence*).

^d The CHESS Scores range from 0 (*no instability in health*) to 5 (*highly unstable health*).

variable mean over the study period would occur. This would translate into approximately 2250 additional deaths at 90 days over the period of study.

Discussion

Nursing home staff encounter unique challenges when providing care to residents during hurricanes.²⁰⁻²⁷ For nursing home residents, it is documented that existing physical and mental health conditions are exacerbated by disaster-related activities such as evacuation to another facility and disruption of day-to-day activities. Additionally, they face increased risk for adverse outcomes, such as morbidity, mortality, and hospitalizations.²⁸⁻³¹ This study reveals that residents with severe cognitive impairment who are evacuated are at increased risk of death at 30 and 90 days post-move.

The findings from this study are important for several reasons. As our population ages and an increasing number of older adults live with dementia, it is reasonable to anticipate that use of nursing home services for the later stages of dementia will likely increase during the next 3 decades. Moreover, to reduce Medicaid costs for nursing homes and to respond to consumers' requests to remain in the community, both the federal government and states have launched programs to "rebalance" long-term care services. Under such programs, individuals with personal care needs that qualify them for nursing home benefits, receive Medicaid payments for home and community-based services in lieu of nursing home care.³² Many of these programs have reduced the costs of caring for frail elders and disabled individuals who may now live in the community. However, reducing the numbers of low-care residents increases the average acuity of the remaining long-stay nursing home residents.³³

Although hurricanes are just one type of disaster, we speculate that the findings of this research are generalizable to other types of disasters with some advance warning, such as floods, fires, and tornados. By identifying residents who are at greatest risk during catastrophic events and by developing policies, programs, and training that might serve to protect the most vulnerable, long-term care providers, clinicians, public health workers, and emergency responders will be better equipped to prepare for and respond to the needs of this subgroup.

For example, if evacuation is imperative, it may be beneficial for at-risk residents to be moved into the homes of family members where temporary care can be provided in an environment that may be less chaotic. It is unknown whether earlier evacuation, under more calm conditions, would be advantageous for people with severe dementia. On the other hand, managing the environment to reduce stressors can include simple actions that have potentially profound effects. For example, a study conducted with nursing home residents after the terrorist attacks on September 11, 2001, showed the adverse effects of prolonged TV viewing of the event. The investigators speculated that because intentional death and harm is considered especially heinous, it elicits strong reactions that appear to enhance retention of information, even in residents diagnosed with Alzheimer's disease.³⁴ Although when compared to cognitively intact residents, those with dementia were more likely to remember personal (eg, how they heard the news) rather than factual information (eg, details of the attack); these 2 groups did not differ in their level of emotional intensity (ie, sadness, anger fear,

frustration, confusion, and shock).³⁴ It is possible that turning off the TV or limiting exposure to disturbing programming may reduce residents' psychological distress when their facility is under hurricane threat. Constantly viewing the trajectory of the "cone of uncertainty" and listening to animated descriptions of where the storm might make landfall, does little to calm those who have limited ability to independently take action or fully understand the imminent danger.

A study of nursing home administrators and directors of nursing found that nearly 90% would be interested in providing some type of predisaster, resilience intervention to residents if a program was made available.³⁵ At present, the emphasis is on maintaining the physical safety of residents and not on training staff to meet their mental health needs during disasters. Yet, numerous studies have consistently demonstrated that physical and mental health are closely intertwined.³⁶ Although a growing body of research shows that evidence-based programs to build resilience are effective,³⁷⁻³⁹ a number of constraints hinder the formal development and testing of a resilience building interventions within long-term care settings. There are no regulations that require this type of training, no reimbursement for staff providing resilience building interventions, and limited recognition of the potential value of implementing such a program. Moreover, the development and testing of a new, evidence-based predisaster resilience intervention is costly and time consuming.

Two programs, both in the public domain, maybe useful to nursing home staff who would benefit from training on managing the adverse mental health effects of disasters on residents postdisaster. Psychological first aid techniques can be used by all staff, not just licensed clinical practitioners, to enhance resident adaptive coping and resilience when evacuating or sheltering in place. The psychological first aid manual for nursing homes also includes behavioral interventions that are appropriate with residents with moderate-to-severe dementia.²⁰ An e-learning tool, "Frailty, Dementia and Disasters: What Health Care Providers Need to Know" increases the awareness of factors that contribute to vulnerability of residents and guides staff on how to help make the environment safer for older adults during emergencies and disasters.⁴⁰ Although additional research needs to be conducted to better understand how these programs are used during disasters and to explicate what types of mental health and quality of life benefits are derived by residents, both programs show promise and have been well received by staff.

Beyond mental health care, programs that generally prepare nursing homes for disasters include Mather LifeWays' PRE-PARE⁴¹ program and the Emergency Management Guide for Nursing Homes: National Concepts and Practices for All-Hazards Planning, developed by the Florida Health Care Association and the University of South Florida.⁴² Both programs provide essential information needed for facilities to develop all-hazard plans, train staff in preparedness activities, including disaster drills and table top exercises, and recommend ways to recover after the event. These preparedness programs were developed in response to the post-Hurricane Katrina nursing home resident deaths and the highly critical Department of

Health and Human Services' Office of the Inspector General report that charged nursing homes with having inadequate disaster preparedness plans.⁴³

In response to the report, the Center for Medicare and Medicaid Statistics recommended new emergency preparedness checklists for nursing homes, but did not promulgate any new rules. Consequently, the Office of the Inspector General in a follow-up report indicated that many of the gaps identified after Hurricane Katrina, such as poor collaboration with local emergency management agencies and unreliable transportation contracts, remained problems for nursing homes.⁴⁴ This report also reinforced the importance of more attention to the preparedness activities of nursing homes when caring for their frail and cognitively impaired elders during disasters.

This research has several limitations. First, partitioning out mortality and morbidity-related storm effects versus other disruptions is not possible. Second, our research assumed that all residents in a nursing home evacuated together (in groups dispersed to various other facilities) and remained together during the hurricane. Because of the lack of data about the precise location of individual residents during the days of the storm, it is possible that some residents were temporarily sheltered by local family or friends instead of evacuating to another facility and were returned to the nursing home after the storm without ever having been discharged from MDS. However, even if some residents remained with family during the storm, they still evacuated, and our study captures the impact of relocation for these residents as well as for residents who relocated to less familiar surroundings.

Despite these limitations, this study is the first to quantify the deleterious effects of evacuation on residents with severe dementia. Although additional research needs to be done to fully understand the impact of evacuation on residents, our findings offer a cautionary warning to disaster planners, policymakers, and long-term care administrators. Research needs to be conducted that determines the optimal time for evacuation of residents that is based on cognitive status and health conditions, identification of best methods and conditions for transporting those who are at high risk, modifications to the environment that could prove beneficial in reducing resident distress, and refinement of psychological first aid techniques to enhance coping and resilience. Interventions need to be developed and tested to determine the best methods for protecting this at-risk population when there are no other options than to evacuate the facility.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

1. Blanchard G, Dosa D. A comparison of the nursing home evacuation experience between Hurricanes Katrina (2005) and Gustav (2008). *J Am Med Dir Assoc.* 2009;10(9):639-643.
2. Dosa D, Hyer K, Thomas K, et al. To evacuate or shelter in place: implications of universal hurricane evacuation policies on nursing home residents. *J Am Med Dir Assoc.* 2012;13(2):e1-e7.
3. Dosa DM, Hyer K, Brown LM, Artenstein AW, Polivka-West L, Mor V. The controversy inherent in managing frail nursing home residents during complex hurricane emergencies. *J Am Med Dir Assoc.* 2008;9(8):599-604.
4. Office of Inspector General. *Nursing Home Emergency Preparedness and Response During Recent Hurricanes.* Department of Health and Human Services. 2006; 1-39.OEI-06-06-00020.
5. United States Government Accountability Office. *Disaster Preparedness: Limitations in Federal Evacuation Assistance for Health Facilities Should be Addressed.* Report to Congressional Committees. 2006; 1-52.GAO-06-826.
6. Dosa D, Feng Z, Hyer K, et al. Effects of Hurricane Katrina on nursing facility resident mortality, hospitalization, and functional decline. *Disaster Med Public Health Prep.* 2010;(suppl 1):S28-S32.
7. Jones AL, Sonnenfeld NL, Harris-Kojetin LD. Racial differences in functioning among elderly nursing home residents, 2004. *NCHS Data Brief.* 2009;(25):1-8.
8. Kane RL, Ouslander JG, Abrass IB, Resnick B. *Essentials of Clinical Geriatrics.* 6th ed. 2008, New York, NY: McGraw-Hill Professional.
9. Dosa DM, Grossman N, Wetle 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(3):142-149.
10. Castle NG. Relocation of the elderly. *Med Care Res Rev.* 2001; 58(3):291-333.
11. Gass KA, Gaustad G, Oberst MT, Hughes S. Relocation appraisal, function independence, morale, and health of nursing homes residents. *Issues Ment Health Nurs.* 1992;13(3):239-253.
12. Grant PR, Skinkle RR, Lipps G. The impact of an interinstitutional relocation on nursing home residents requiring a high level of care. *Gerontologist.* 1992;32(6):834-842.
13. Cefalu CA. Disaster preparedness for LTC facilities. *Ann Long Term Care.* 2006;14(9):31-33.
14. State of Louisiana Governor's Office of Homeland Security and Emergency Preparedness, *State of Louisiana. After-Action Report and Improvement Plan: Hurricanes Gustav & Ike, 2008,* Author: Baton Rouge, LA.
15. Cefalu CA. Lessons learned from Hurricane Gustav—the second time around. *J Med Dir Assoc.* 2009;10(1):76-77.
16. Morris JN, Hawes C, Fries BE, et al. Designing the national resident assessment instrument for nursing homes. *Gerontologist.* 1990;30(3):293-307.
17. Morris JN, Fries BE, Mehr DR, et al. MDS Cognitive Performance Scale. *J Gerontol.* 1994;49(4):M174-M182.
18. Athey S, Imbens GW. Identification and inference in nonlinear difference-in-differences models. *Econometrica.* 2006;74(2): 431-497.

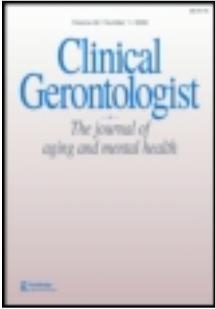
19. Bertrand M, Duflo E, Mullainathan S. How much should we trust differences-in-differences estimates? *Q J Econ*. 2004;119(1):249-275.
20. Brown LM, Bruce ML, Hyer K, Mills WL, Vongxaiburana E, Polivka-West L. A pilot study evaluating the feasibility of psychological first aid for nursing home residents. *Clin Gerontologist*. 2009;32(3):293-308.
21. Hyer K, Brown LM, Berman A, Polivka-West L. Establishing and refining emergency evacuation and response systems with long-term care facilities. *Health Aff*. 2006;25(5):407-411.
22. Hyer K, Brown LM, Christensen JJ, Thomas KS. Weathering the storm: challenges to nurses providing care to nursing home residents during hurricanes. *Appl Nurs Res*. 2009;22(4):e9-e14.
23. Hyer K, Brown LM, Polivka-West L, Berman A. Helping nursing homes prepare for disasters. *Health Aff*. 2010;29(10):1961-1965.
24. Hyer K, Polivka-West L, Brown LM. nursing homes and assisted living facilities: planning and decision making for sheltering in place or evacuation. *Generations*. 2007;31(4):29-35.
25. Laditka SB, Laditka JN, Cornman CB, Davis CB, Richter JV. Resilience and challenges among staff of gulf coast nursing homes sheltering frail evacuees following Hurricane Katrina, 2005: implications for planning and training. *Prehosp Disaster Med*. 2009;24(1):54-62.
26. Laditka SB, Laditka JN, Xirasagar S, Cornman CB, Davis CB, Richter JV. Providing shelter to nursing home evacuees in disasters: lessons from Hurricane Katrina. *Am J Public Health*. 2008;98(7):1288-1293.
27. Laditka SB, Laditka JN, Xirasagar S, Cornman CB, Davis CB, Richter JV. Protecting nursing home residents during emergencies or disasters: an exploratory study from South Carolina. *Prehosp Disaster Med*. 2007;22(1):42-48.
28. Brown LM, Hyer K, Polivka-West L. A comparative study of laws, rules, codes and other influences on nursing homes' disaster preparedness in the Gulf Coast states. *Behav Sci Law*. 2007;25(5):655-675.
29. Brown LM, Rothman M, Norris F. Issues in mental health care for older adults after disasters. *Generations*. 2007-2008;31(4):21-26.
30. Elmore DL, Brown LM. Emergency Preparedness and Response: Health and Social Policy Implications for Older Adults. *Generations*. 2007;31(4):59-67.
31. Rothman M, Brown LM. The vulnerable geriatric casualty: medical needs of frail older adults during disasters. *Generations*. 2007;31(4):20-24.
32. Hahn EA, Thomas KS, Hyer K, An del R, Meng H. Predictors of low-care prevalence in Florida nursing homes: The role of Medicaid waiver programs. *Gerontologist* 2011;51(4):495-503.
33. Mor V, Grunier A, Feng Z, Grabowski DC, Intrator O, Zinn J. Effects of state policies on nursing home resident outcomes. *J Am Geriatr Soc*. 2011;59(1):3-9.
34. Budson AE, Simons JS, Sullivan, et al. Memory and emotions for the September 11, 2001, terrorist attacks in patients with Alzheimer's disease, patients with mild cognitive impairment, and healthy older adults. *Neuropsychology*. 2004;18(2):315-327.
35. Brown LM, Hyer K, Schinka JA, Mando A, Frazier D, Polivka-West LM. Use of mental health services by nursing home residents after hurricanes. *Psychiatr Serv*. 2010;61(1):74-77.
36. Prince M, Patel V, Saxena S, et al. No health without mental health. *Lancet*. 2007;370(9590):859-877.
37. Bonanno GA, Westphal M, Mancini AD. Resilience to loss and potential trauma. *Annu Rev Clin Psychol*. 2011;7(1):511-535.
38. Nucifora F, Jr, Langlieb AM, Siegal E, Everly GS, Jr, Kaminsky M. Building resistance, resilience, and recovery in the wake of school and workplace violence. *Disaster Med Public Health Prep*. 2007;1(suppl 1):S33-S37.
39. Tidball KG, Krasny ME, Svendsen E, Campbell L, Helphand K. Stewardship, learning, and memory in disaster resilience. *Environ Educ Res*. 2010;16(5-6):591-609.
40. Gibson M. Emergency management, frailty, dementia and disasters: what health care providers need to know: E-learning training. 2010. <http://www.dementiaknowledgebroker.ca/emergency-management>. Accessed August 19, 2011.
41. Sangram TA. Lessons Learned Information Sharing. 2007. http://www.matherlifeways.com/re_prepare.asp. Accessed May 23, 2012.
42. Florida Health Care Association. *Emergency Management Guide for Nursing Homes*, 2008; Tallahassee, FL: USA.
43. U.S.Department of Health and Human Services Office of Inspector General, *Nursing Home Emergency Preparedness and Response during Recent Hurricanes*. 2006.
44. U.S. Department of Health and Human Services. *Office of Inspector General, Gaps Continue To Exist In Nursing Home Emergency Preparedness And Response During Disasters: 2007-2010*. 2012.

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A Pilot Study Evaluating the Feasibility of Psychological First Aid for Nursing Home Residents

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A Pilot Study Evaluating the Feasibility of Psychological First Aid for Nursing Home Residents

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The objectives of the pilot study were to modify existing psychological first aid (PFA) materials so they would be appropriate for use with institutionalized elders, to evaluate the feasibility of using nursing home staff to deliver the intervention to residents, and to solicit feedback from residents about the intervention. The STORM

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Study (STORM is an acronym for “services for treating older residents’ mental health”) is the first step in the development of an evidence-based disaster mental health intervention for this vulnerable and underserved population. Demographic characteristics were collected on participating residents and staff. Program evaluation forms were completed by staff participants during the pilot test and nurse training session. Staff and resident discussion groups were conducted during the pilot test to collect qualitative data on the use of PFA in nursing homes. Results demonstrate the feasibility of the PFA program to train staff to provide residents with PFA during disasters. Future research should focus on whether PFA improves coping and reduces stress in disaster-exposed nursing home residents.

KEYWORDS psychological first aid, disaster mental health, nursing homes, older adults, trauma, training, intervention

INTRODUCTION

In contrast to community-dwelling elders, nursing home (NH) residents are at greater risk for disaster-related adverse psychological outcomes (Brown, Rothman, & Norris, 2007; Dosa et al., 2008; Laditka et al., 2008); yet during the recovery phase they are consistently underserved in regards to psychological intervention (Brown, Hyer, & Polivka-West, 2007; Brown, Hyer, Schinka, Frazier, & Mando, 2008; Centers for Medicare and Medicaid Services [CMS], 2006). Until the publication of several government reports that specifically noted that NH residents experienced adverse psychological consequences due to the 2005 hurricanes, the disaster mental health needs of this subgroup were generally not recognized (Administration On Aging, 2006; CMS, 2006; Department of Health and Human Services, 2006). These government investigations concluded that evacuated residents experienced disaster-related mental distress and recommended that NH facilities provide counseling services (CMS, 2006). Notably, CMS’ recommendations focused exclusively on those who evacuated and did not consider residents who sheltered in place, despite their vulnerability for adverse psychological outcomes from direct exposure to the event.

Consistent with the findings of these government investigations, a statewide survey of Florida NH directors of nursing and administrators also revealed a need for disaster mental health services for residents (Brown et al., 2008). Yet a review of facility disaster plans and NH regulations in 2006 showed that procedures for providing residents with disaster mental health interventions were not included as part of the recovery process. Few facilities provided residents with needed disaster mental health services and

most facilities did not have ready access to licensed social workers, counselors, psychologists, or psychiatrists to provide intervention when desired (Brown et al., 2008; Hyer, Brown, Berman, & Polivka-West, 2006).

A survey of 194 NHs in 30 states revealed that 91% of the long-term care health professionals felt they were “. . . ill prepared to deal with public health emergencies” and that “. . . their workforce lack[ed] the knowledge, skills, and abilities to recognize the impact of a disaster on residents' mental or emotional health.” Although 80% had received some type of disaster-related training (i.e., amount of supplies to store, safety issues) only 10% endorsed that they learned how to deal with cognitively impaired NH residents in emergency situations and only 8% were taught strategies to help residents cope (Mather LifeWays Institute on Aging, 2005, p. 2).

Disaster-related activities that are intended to ensure resident safety, such as sheltering in place and evacuating to another facility, disrupt daily schedules and degrade provision of routine care. In turn, the interruption in care exacerbates existing psychological and medical conditions that can potentially lead to further impairment in resident functioning (Brown, Cohen, & Kohlmaier, 2007; Laditka et al., 2008). Cognitive deficits in combination with other factors such as physical disability, psychiatric disorders, sensory impairment, and various acute and chronic medical illnesses place NH residents at high risk for experiencing disaster-related trauma (Brown, Rothman, & Norris, 2007; Rothman & Brown, 2007).

Although psychological first aid (PFA) is increasingly recognized as the intervention of choice for disaster-affected populations, it has not been used with NH residents. The PFA intervention was funded by the Substance Abuse and Mental Health Services Administration and the U.S. Department of Health and Human Services and developed by the National Child Traumatic Stress Network (NCTSN) and the National Center for PTSD (NCPTSD). PFA was designed to be used in the immediate aftermath of a disaster to reduce initial distress and promote adaptive functioning and coping. Lack of adoption of PFA by NHs, in part, is because the existing PFA materials need to be modified to meet the needs of residents living in institutional settings. The current PFA materials focus primarily on children, adolescents, and community dwelling adults. In this paper, we describe the development and pilot testing of an intervention to provide PFA to NH residents.

PFA is based on research that demonstrates that disaster survivors experience a broad range of physical, psychological, behavioral, and spiritual reactions that have the potential to interfere with adaptive coping and impede the recovery process. Each of the eight modules that comprise PFA is evidenced-based or informed. *The Psychological First Aid: Field Operations Guide*, Second Edition, describes the basic objectives of early assistance, provides detailed background information about each of the eight modules, and contains instruction about how to implement the core

TABLE 1 Psychological First Aid Core Components

Core component title	Description of contents
1. Contact and Engagement	To respond to contacts initiated by survivors, or to initiate contacts in a non-intrusive, compassionate, and helpful manner.
2. Safety and Comfort	To enhance immediate and ongoing safety, and provide physical and emotional comfort.
3. Stabilization	To calm and orient emotionally overwhelmed or disoriented survivors.
4. Information Gathering: Current Needs and Concerns	To identify immediate needs and concerns, gather additional information and tailor Psychological First Aid interventions.
5. Practical Assistance	To offer practical help to survivors in addressing immediate needs and concerns.
6. Connection with Social Supports	To help establish brief or ongoing contacts with primary support persons and other sources of support, including family members, friends, and community helping resources
7. Information on Coping	To provide information about stress reactions and coping skills to reduce distress and promote adaptive functioning.
8. Linkage with Collaborative Services	To link survivors with available services needed at the present time or in the future.

actions of the intervention (NCTSN/NCPTSD, 2006). Table 1 provides a brief description of each of the core components in *The Psychological First Aid: Field Operations Guide*, Second Edition.

Because PFA, like medical first aid, does not have to be delivered by a highly trained licensed mental health clinician, NH staff who provide direct care to residents could be trained to provide the intervention. A number of recent studies have demonstrated the benefits of training Certified Nursing Assistants (CNAs) to administer assessments and deliver interventions to NH residents (Burgio, Stevens, Burgio, Roth, Paul, & Gurstle, 2002; Fischer, Wei, Rolnick, Jackson, Rush, Garrard, et al., 2002; Fitzwater & Gates, 2002; Hutt et al., 2006; Mentes, Teer, & Cadogan, 2004).

The STORM Study, an acronym for “services for treating older residents’ mental health,” is the first step in the development of an evidence-based disaster mental health intervention for this vulnerable and underserved population. The STORM Study modified existing PFA materials by removing content that pertained exclusively to children and adolescents, and adding information that was specific to the needs of institutionalized elders. Next, we evaluated the feasibility of NH direct care staff to deliver the intervention to residents, and obtained feedback from residents who received selected modules of the modified intervention. In addition to feasibility, evidence of acceptability of the intervention and perceived ability of NH staff to train other staff to provide PFA was solicited.

INTERVENTION DEVELOPMENT

A pilot test using the modified PFA materials and training program was conducted with staff and residents from a local NH before proceeding with the larger evaluation, called the STORM Study, of the materials and training at the Florida Health Care Association (FHCA) Nurse Leadership Conference. FHCA represents 80% of the NHs in Florida. As a service to its members, this organization sponsors annual state meetings and trainings to enhance delivery of NH services and improve resident care. This study was driven by five elements that are commonly used for creating effective training programs: analysis, design, development, implementation, and evaluation (ADDIE) (Dick & Carey, 1996).

Analysis Phase

The analysis step was completed prior to initiating study activities. A state-wide needs assessment was conducted with NH personnel to learn what types of disaster mental health services were currently provided by facilities, if staff perceived residents needed disaster mental health intervention, and if staff would be interested in learning how to use PFA (Brown et al., 2008).

Design Phase

The design phase addressed how the learning objectives could be achieved with assessment instruments (i.e., pre- and post-course evaluation), class exercises, appropriate content matter for NH staff and residents in the modified PFA guide, and media support (i.e., Power Point presentation, handouts, and newsletters). A literature review was conducted to identify PFA content areas requiring adaptation and evidence-based material to potentially include in the modified version.

Development Phase

During the development phase, information in the existing *Psychological First Aid Field Operations Guide*, Second Edition (NCTSN/NCPTSD, 2006) that pertained to children and adolescents or was highly specific to treating community dwelling residents was deleted. For instance, the core action Linkage with Collaborative Services presumes that adult disaster survivors live independently in the community and will assume responsibility for seeking external assistance after a disaster. Another example is the Contact and Engagement core which is based on the fact that many relief workers come from outside the impacted area. This section provides instruction about how to approach or initiate contact with disaster affected people.

Given that NH staff are generally familiar with their residents, much of this core's information is not directly relevant.

An example of information that was added to the PFA guide is "Determine if the resident is experiencing difficulty with health-related issues or in performing daily activities (i.e., assistance with dressing, use of the bathroom, daily grooming, and feeding) that he or she was able to perform prior to the disaster" (Brown & Hyer, 2008, p. 26). A second example is "Residents having specialized needs such as ventilator and dialysis care may benefit from Psychological First Aid to address their fears associated with the threat of interrupted services as a result of the disaster" (Brown & Hyer, 2008, p. 18). Content in the modified PFA guide and instructional materials that were developed were reviewed for accuracy and clarity by the Principal Investigator and four research assistants with training in geriatric issues.

The modified PFA guide was titled *Psychological First Aid Field Operations Guide for Nursing Homes* (PFA Guide). Next, the modified PFA Guide was reviewed by a multidisciplinary team that was comprised of a social worker, nurse, CNA, and administrator who worked at a NH facility. They provided comments on the content and readability of the PFA Guide as well as the feasibility of use and delivery of the PFA intervention to residents. The revised materials were then reviewed by a panel of 14 national experts who served on the project's national advisory committee. Members of the national advisory committee were leading experts in geriatric medicine, nursing, gerontology, sociology, long-term care, public health, and social work. Additional revisions were made to the PFA Guide according to the feedback given. These changes were incorporated and a modified version of the PFA Guide, handouts, and related educational materials were printed and prepared for final review by FHCA Disaster Preparedness Committee. The FHCA Disaster Preparedness Committee is comprised of experts from diverse fields who have extensive experience with NHs and disasters. An iterative process was used to evaluate and revise the PFA Guide and instructional materials.

Implementation Phase

During the implementation phase, procedures for training PFA facilitators were developed. The facilitators' training included learning how to use course evaluations to inform delivery of the PFA program (i.e., pre- and post-course assessment), techniques to implement curriculum materials (i.e., PowerpointTM presentation, PFA Guide, handouts), and general information about methods of training. Train-the-trainer (TTT) and just-in-time (JIT) were the two approaches selected for delivering the PFA program to NH staff. Both of these training models have been used extensively in

non-disaster settings to train laypeople to provide a variety of services and programs.

A TTT approach has been used to teach end of life skills to NH staff (Kelly, Ersek, Virani, Malloy & Ferrell, 2008; Ersek, Kraybill & Hansen, 2006). For the STORM Study a TTT format required an expert to present the curriculum and training materials to NH nurses who in turn conducted trainings for direct care staff in their respective facilities. The goal was to teach select NH staff to become trainers by developing their knowledge of PFA and skills in delivering and teaching the intervention. Each nurse trainer was provided with materials (i.e., slides, handouts, manuals) that would be helpful in teaching others. It was expected that the TTT approach would be used to train NH staff prior to a disaster. For facilities who had not received training in PFA prior to a disaster, a JIT approach would be used to train staff. Nurses attending the training were asked if they would be willing to serve as TTT or JIT trainers.

Evaluation Phase

The evaluation phase consisted of formative and summative evaluations. Formative evaluation was used during each stage of the ADDIE process. Reviewers and participants had an opportunity to share their impressions, suggestions, or concerns about the PFA program during group discussions or in response to open ended questions placed on the questionnaire. Summative evaluation consisted of findings from a quantitative questionnaire that was designed to assess domain specific criterion-related items and administered to NH staff who pilot tested the materials. A second summative evaluation was completed during the STORM Study by nurses who participated in the PFA training at the annual FHCA nursing leadership conference.

Rationale for Pilot Testing the PFA Program

Once the extensive and multiple reviews of the PFA materials were completed, a local NH administrator provided access to staff and residents to pilot test the modified PFA training materials and intervention. Conducting a pilot test with a population (i.e., nurses and CNAs) that was as similar as possible to the target group prior to formal implementation, was a critical step in determining potential problems in delivering the program, evaluating the methods used to collect evaluation information, assessing potential logistical and practical problems in implementing a full-scale study, determining key issues that would hinder or facilitate adoption of the PFA program, and identifying resources needed to conduct the training and sustain use of the intervention overtime.

Pilot Test Participants

Three nurses and three CNAs agreed to participate in the training and then to practice administering select modules from the PFA intervention to four residents. To participate in the pilot test NH staff had to be 18 years or older, English speaking, and willing to provide informed consent. NH staff prescreened residents to exclude those with a psychotic disorder or significant cognitive, communication, hearing, or vision impairment that would preclude reliable participation in the pilot testing. The four residents who agreed to participate in the role-playing portion of the pilot test had to be English speaking and willing to provide informed consent. Demographic information was obtained from participating staff and residents.

Pilot Test

The research team facilitated a three-hour session to train staff to train others and use the modified version of PFA with residents. After seeing specific techniques demonstrated by the research team, NH staff participated in an observed role play where they administered select core modules to the residents. The modules chosen for the role play were selected based on their content. Because we wanted to avoid suggesting to residents that a disaster had actually occurred, one of the selected modules featured relaxation and stress-reduction techniques that could be implemented at any time in the NH. The objectives of the role play were to determine if NH staff were comfortable delivering portions of the PFA intervention, to see if residents were receptive to the material being presented, and to assess fidelity. Immediately following the administration of the selected modules, residents were asked to provide feedback about their experience.

At the end of the PFA training, NH staff completed a program evaluation questionnaire to assess the following: The PFA Guide, training presentation, handouts, classroom environment, the presenter, overall course, training outcomes, confidence in ability to train others to use PFA, and likelihood to use PFA now and in the future. Participants rated a total of 47 statements on a 5-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Unsure, 4 = Agree, 5 = Strongly Agree). Then staff participated in a discussion group to further ascertain their comfort in using the intervention, intention to use PFA with residents, and confidence in training other staff to use PFA. Residents also participated in a discussion group and were asked to share their impressions of the PFA modules. Based on the feedback of staff and residents, minor refinements were made to the PFA program.

STORM Study

After the pilot test, the second stage, called the STORM Study, was conducted and 22 NH nurses who were attending the FHCA nurse leadership conference were trained using the TTT approach. The PFA training was offered as one of five concurrent programs during the three-hour morning session. The modified version of the PFA Guide, handouts, and related educational materials were printed and distributed to attendees. At the close of the session, the program evaluation questionnaire was administered and attendees were invited to participate in a future follow-up evaluation and to volunteer to serve as a TTT or JIT trainer.

Analyses

For both the pilot test and the STORM Study, standard descriptive statistical analyses, including calculation of means, standard deviations, and frequencies, were generated from the demographic forms and items assessed in the program evaluation questionnaires. In addition, open-ended questions on the questionnaire allowed for collection of qualitative data, which were analyzed for common themes. Themes identified from the pilot test focus group were compared with the answers they provided to the open-ended questions on the program evaluation questionnaire.

RESULTS

Pilot Test Participants

The four female residents who agreed to participate in the role play had been living in the facility for an average of 2.6 years, but the length of residency ranged from one month to five years. The residents had a mean age of 71.3 (± 14.3) and identified as White ($n = 2$) or African American ($n = 2$). Two participants had completed some college, one had earned a high school diploma, and one had received a GED.

The three nurses and three CNAs who evaluated the course training and participated in role-playing with the residents were females who identified as being African American or Black non-Hispanic. The mean age of these participants was 44 (± 10.2) and most ($n = 5$) endorsed high school as their highest level of attained education. On average, these participants had 23.5 (± 9.9) years of experience in long-term care with an average of 14.3 (± 5.8) of those years at the current NH.

STORM Study Participants

Twenty-two participants took part in the PFA training at the FHCA nurse leadership conference. This sample consisted mainly of female ($n = 21$)

nurses, with an average age of 42.9 (\pm 11.1) years. Most of these participants were White ($n = 17$) and had earned a degree from a junior or technical college ($n = 11$) or a four-year college ($n = 9$). These nurses had an average of 14.2 (\pm 6.4) years of experience in long-term care and had spent, on average 4 (\pm 3.3) years in their current position. Several participants had some experience responding to a hurricane as a NH staff member, including evacuation ($n = 6$), sheltering in place ($n = 6$), or both evacuating and sheltering in place ($n = 6$).

Pilot Test Evaluation of Training Materials

On average, participants responded to most statements on the program evaluation questionnaire with a rating of either 4 (Agree) or 5 (Strongly Agree). The PFA Guide and the presenter were most highly rated, with each statement in those categories receiving average ratings of 5. The participants strongly agreed that the guide was well organized, easily understood, readable, and comprehensive and that the presenter was knowledgeable about PFA, encouraged participation, clearly presented the course content, answered questions completely, and effectively used the instructional materials.

Although participants were given the opportunity to provide written comments, very few written comments were provided. In regards to the PFA Guide, the participants felt it was “helpful, educational,” and “very informative.” One participant felt the handouts could effectively be used with friends and family in addition to NH residents. In terms of the course training itself, participants recommended that “PFA should be taught to medical students” and “CEU credit should be provided.” All participants endorsed that the PFA training would improve resident care, is worth recommending to colleagues, and increased their knowledge about disasters. No written suggestions were made for additions, deletions, or modifications to the PFA Guide or the PFA training.

In general, the qualitative findings from the discussion group that followed the pilot training mirrored the positive responses endorsed on the questionnaire. Participants were enthusiastic about using PFA, but reticent about having to participate in an observed role play with residents. They also indicated that PFA would be useful with distressed elders during non-disaster times and that the skills they learned during the training would enhance overall care of residents. Staff especially liked the sections in the PFA Guide that provided specific examples of comments to use or avoid with traumatized people. For example, the section on Safety and Comfort includes a list of five statements to say and twenty phrases not to say to people who had experienced a death of a loved one or close friend. For example, three phrases that are not recommended are “I know how you feel,” “It was probably for the best,” and “He is better off now.” These

statements engendered considerable discussion about the potential negative effects these well intended comments could have on grieving people.

From the pilot test, the Principal Investigator realized the potential for dedicating too much time to the core components of PFA that included experiential learning. In response to this issue, a time guide was prepared with suggested times for completing each of the core components within a three hour training session. No changes were made to the content covered in the program evaluation questionnaire. Overall, participants indicated that the training was a very positive experience.

STORM Study Evaluation

Of the participants at the FHCA nurse leadership conference, 55% ($n = 12$) indicated their willingness to serve as a JIT trainer and 77% ($n = 17$) planned to train other staff members in their NH. Participants also completed the program evaluation questionnaire and provided demographic information. Consistent with findings from the pilot test, respondents rated most statements with a response of either 4 or 5 on average. All of the participants “strongly agreed” that they had the ability to provide PFA to residents and train other staff to use PFA. Again, the ratings of the PFA Guide received the highest scores, with all participants endorsing “strongly agree” in response to statements that the guide was well organized, readable, and comprehensive. All participants endorsed that they knew more about disaster-related psychological distress and PFA post-training. As with the NH pilot test sample, these participants did not offer written suggestions for additions, deletions or modifications to the program. Written statements evaluating the program highlighted how “good” or “useful” the information was, with one respondent indicating how “badly needed” this training is for NH staff.

DISCUSSION

The major finding of this pilot study is that PFA can be successfully tailored to fit the needs of NH residents. Currently, the emphasis during disasters is on physical safety and provision of medical care, not on the mental health needs of NH residents. While it is of paramount importance to keep residents safe and healthy during disasters, activities to ensure safety and physical well-being need not preclude delivery of disaster mental health interventions, like PFA. In recognition of residents’ disaster mental health needs, the FHCA disaster guide will include a recommendation for facilities to provide intervention.

Because nurses and CNAs are familiar with residents under their direct care, PFA training could enhance staffs’ ability to detect changes in mood or

cognition and intervene appropriately and quickly with those who are distressed. Moreover, because NH staff remain with residents and continue to provide direct care whether they are sheltering in place or evacuating to another facility, trained staff could use PFA at any phase of the disaster (i.e., preparing, responding, and recovering). For example, residents who are evacuated prior to an event might benefit from PFA if travel is difficult or prolonged.

Given that disaster mental health professionals may not be available immediately after an event because of travel issues and safety concerns, it seems both efficient and effective to train NH staff to provide PFA to residents. PFA trained NH staff would be able to immediately intervene after disasters and provide PFA to disaster distressed residents without waiting to make a referral for mental health care. Even if disaster relief workers might be available to help residents in NHs, it is unlikely that these workers would be familiar with NH regulations, or with older adults' health concerns. Specialty trained NH disaster workers would require intensive training in geriatric clinical issues and NH regulations in addition to PFA. It seems profitable to train NH staff who are familiar with their facilities' residents and their respective health concerns to provide PFA.

TTT training is provided prior to a disaster whereas a JIT approach would introduce the PFA intervention to facility staff in the immediate aftermath of a disaster. A JIT approach might be beneficial because recall of taught information and applied skills are at the highest level immediately after training (Harden, 2005). Although there are advantages to providing training at a time when it is most needed by staff, it is unknown if it is feasible for staff to learn needed skills during this phase of recovery. Research is needed to evaluate and compare JIT and TTT methods for delivering PFA.

There are a number of limitations to the STORM Study. Because the STORM Study involved NH staff exclusively from Florida, generalizability to NH staff located in other areas is limited. Further, the Principal Investigator for the STORM Study delivered the PFA training to interested NH staff who may recognize the need for training because Florida is prone to seasonal disasters such as hurricanes and wildfires. Staff who are not routinely exposed to threat of disaster or as invested in learning a new intervention may be less motivated to use PFA; and facilitators who are less experienced and knowledgeable about disaster mental health may not provide training that is as well received. Further, both the pilot test and nurse leadership participants had been employed in long-term care settings on average for nearly two decades. It is evident that participants in both groups are experienced professionals who because of the length of their service may not be typical of most NH employees.

Because residents who were willing to learn the PFA skills and provide feedback about the intervention were recruited, these study participants may not be characteristic of other NH residents, and their positive response

to the role-playing exercises may not reflect typical reactions during disasters. More than 70% of NH residents are estimated to have some type of cognitive impairment and approximately 47% of NH residents carry a diagnosis of Alzheimer's disease (Alzheimer's Association, 2007a; Alzheimer's Association, 2007b). The STORM Study focused exclusively on cognitively intact residents because of their ability to provide reliable feedback about their experience receiving the PFA modules.

Because the majority of NH residents require interventions that accommodate decline in cognitive function, future studies should focus on further modifications to PFA to accommodate those with cognitive impairment. Modification of the intervention to include those with dementia would enhance the quality of care provided to people with mild to moderate AD who have been impacted by a disaster.

Additional research has to be conducted to determine if the positive results produced by the PFA training program during the STORM Study can be replicated in other facilities. It is unknown if the PFA skills learned will be retained by staff and used appropriately when a disaster occurs, regardless of the time interval between training and an event. Delivery of PFA training using either the JIT or TTT approach will be adversely affected by attrition of trained NH staff over time, lack of owner or administrator support, and limited resources for continued trainings. Further, the initial and ongoing expense of printing and disseminating training materials; accessing space in which to conduct the training; obtaining sufficient time for direct care staff to attend the training; and locating motivated nurses who are willing to conduct the PFA training are a few of the potential problems that need to be addressed to facilitate widespread adoption of the intervention. Despite these limitations, JIT and TTT programs provide potentially effective ways to quickly, efficiently, and relatively inexpensively expand the number of NH direct care staff who can provide the PFA intervention to residents in need.

A randomized clinical trial should be conducted to demonstrate the efficacy of PFA as an intervention to decrease distress and increase adaptive coping. PFA has eight core components which make it difficult to identify the "active ingredients" in the treatment. Further, it is challenging to measure the efficacy of the PFA intervention because it is delivered to residents as needed by all trained staff while providing direct care services, and not by a single therapist who closely adheres to a manualized treatment protocol and provides a series of six, 50-minute cognitive behavioral therapy sessions. Despite these difficulties, randomized clinical trials are needed to provide reliable evidence of the benefit of using PFA with distressed NH residents, the ability of trained staff to deliver PFA during disasters and the impact of the training and intervention on both staff and resident well-being.

People who require skilled nursing care are more vulnerable to the deleterious effects of a disaster (Dosa et al., 2008). This increased risk makes the disaster mental health needs of NH residents an important

emerging issue for clinicians, researchers, and authors of public policy (Elmore, & Brown, 2007). Approximately 1.3 million adults live in NHs and another million live in assisted living facilities nationwide (Harrington, Carillo, & LaCava, 2006; Spillman, Liu, & McGilliard, 2002). It is anticipated that between 2000 and 2030 the over 65 population will double to approximately 71.5 million older adults and comprise 20% of the total U.S. population (Federal Interagency Forum on Aging-Related Statistics, 2004). Although it is unknown if this change in population will be accompanied by a commensurate increase in the use of NH services, given the number of older adults living longer with chronic health conditions, it is reasonable to anticipate that use of such services will remain constant or increase during the next three decades. The rapidly growing number of older adults, the ongoing threat of hurricanes, and the fact that in the course of one decade, 541 officially declared disasters occurred in the United States—an average of slightly more than one disaster per week—raises concerns and underscores the need to make available disaster mental health services to institutionalized elders who require intervention (Federal Emergency Management Agency, 2008). The STORM Study is a critical step toward improving access to disaster mental health services and the development of an evidence-based intervention for NH residents.

NOTE

1. The Psychological First Aid Field Operations Guide for Nursing Homes is in the public domain. To obtain a copy of the Psychological First Aid Field Operations Guide for Nursing Homes, please refer to the web page at <http://amh.fmhi.usf.edu/pfanh.pdf>

REFERENCES

- Administration on Aging, (2006). Transfer trauma: Minimizing the impact on community based and institutionalized elders. Retrieved May 31, 2008, from http://www.aoa.gov/Prof/Disaster_Assist/07DISITRAN.pdf
- Alzheimer's Association (2007a). Alzheimer's Disease Facts and Figures. Retrieved April 19, 2008, from http://www.alz.org/national/documents/PR_FFfactsheet.pdf
- Alzheimer's Association (2007b). People with Alzheimer's disease and dementia in assisted living. Retrieved April 19, 2008, from http://www.alz.org/national/documents/prevalence_Alz_assist.pdf
- Brown, L. M., Cohen, D., & Kohlmaier, J. (2007). Older adults and terrorism. In B. Bongar, L. M. Brown., L. Beutler, P. Zimbardo, & J. Breckenridge (Eds.), *Psychology of terrorism* (pp. 288–310). New York: Oxford University Press.
- Brown, L. M., Hyer, K., Schinka, J., Frazier, D., & Mando, A. (2008). Mental health services in nursing homes after disasters. Paper presented at the 25th Academy Health Annual Research Meeting, Washington, DC.

- Brown, L. M., Hyer, K., & Polivka-West, L. M. (2007). A comparative study of laws, rules, codes and other influences on nursing homes' disaster preparedness in the Gulf Coast states. *Behavioral Sciences & the Law*, *25*(5), 655–675.
- Brown, L., M. Rothman, M., & Norris, F. (2007). Issues in mental health for older adults during disasters. *Generations*, *31*(4), 25–30.
- Burgio, L. D., Stevens, A., Burgio, K. L., Roth, D. L., Paul, P., & Gerstle, J. (2002). Teaching and maintaining behavior management skills in the nursing home. *The Gerontologist*, *42*, 487–496.
- Center for Medicare and Medicaid Services (CMS). (2006). Draft: Survey and certification, emergency preparedness & response health care provider after action reporting form. Baltimore: Author.
- Department of Health and Human Services (DHHS). (2006). Nursing home emergency preparedness and response during recent hurricanes (OEI-06-06-00020). Washington, DC: Author.
- Dick, W., & Carey, L. (1996). *The systematic design of instruction* (4th ed.). New York: Harper Collins College Publishers.
- Dosa, D. M., Hyer, K., Brown, L. M., Arntstein, A. W., Polivka-West, L. M., & Mor, V. (2008). The controversy inherent in managing frail nursing home residents during complex hurricane emergencies. *The Journal of the American Medical Directors Association*, *9*, 599–604.
- Elmore, D. L., & Brown, L. M. (2007). Emergency preparedness and response: health and social policy implications for older adults. *Generations*, *31*(4), 59–67.
- Ersek, M., Kraybill, B. M., & Hansen, N.R. (2006) Evaluation of a train-the-trainer program to enhance hospice and palliative care in nursing homes. *Journal of Hospice and Palliative Nursing*, *8*(1), 42–49.
- Federal Emergency Management Agency (2008). Declared disasters by year or state. Retrieved June, 5, 2008 from http://www.fema.gov/news/disaster_totals_annual.fema
- Federal Interagency Forum on Aging-Related Statistics (2004). Older Americans 2004: Key indicators of well-being. Retrieved November 4, 2007, from http://www.agingstats.gov/chartbook2004/OA_2004.pdf
- Fischer, L. R., Wei, F., Rolnick, S. J., Jackson, J. M., Rush, W. A., Garrard, J. M., et al. (2002). Geriatric depression, antidepressant treatment, and healthcare utilization in a health maintenance organization. *Journal of the American Geriatrics Society*, *50*(2), 307–312.
- Fitzwater, E., & Gates, D. M. (2002). Testing an intervention to reduce assaults on nursing assistants in nursing homes: A pilot study. *Geriatric Nursing*, *23*(1), 18–23.
- Harden, R. M. (2005) A new vision for distance learning and continuing medical education. *The Journal of Continuing Education in the Health Professions*, *25*, 43–51.
- Hart, B. D., & Wells, D. L. (1997). The effects of language used by caregivers on agitation in residents with dementia. *Clinical Nurse Specialist*, *11*(1), 20–23.
- Harrington, C., Carillo, H., & LaCava, C. (2006). *Nursing facilities, staffing, residents and facility deficiencies, 1999 through 2005*. San Francisco: University of California Press.
- Hutt, E., Ruscin, J., Corbett, K., Radcliff, T., Kramer, A., Williams, E., Liebrecht, D., Klenke, W., & Hartmann, S. (2006). A multifaceted intervention to implement

- guidelines improved treatment of nursing home-acquired pneumonia in a state veterans home. *Journal of the American Geriatrics Society*, 54(11), 1694–1700.
- Institute of Medicine (2008). *Retooling for an aging America: Building the health care workforce*. Washington, DC: The National Academies Press.
- Kelly, K., Ersek, M., Virani, R., Malloy, P., & Ferrell, B. (2008) End-of-life nursing education consortium geriatric training program: improving palliative care in community geriatric care settings. *Journal of Gerontological Nursing*, 34(5), 28–35.
- Laditka, S. B., Laditka, J. N., Xirasagar, S., Cornman, C. B., Davis, C. B., & Richter, J. V. (2008). Providing shelter to nursing home evacuees in disasters: lessons from Hurricane Katrina. *American Journal of Public Health*, 98(7), 1288–1293.
- Lombardo, N. E. (1994). *Barriers to mental health services for nursing home residents*. Washington, DC: American Association of Retired Persons.
- Mather LifeWays Institute on Aging. (2005) Prepare: Learning modules & teacher's guide to prepare specialists.
- Mentes, J., Teer, J., & Cadogan, M. (2004). The pain experience of cognitively impaired nursing home residents: Perceptions of family members and certified nursing assistants. *Pain Management Nursing*, 5(3), 118–125.
- Molinari, V., Hedgecock, D., & Branch, L. Brown, L. M., & Hyer, K. (in review). Mental health services in nursing homes: A survey of Florida nursing home administrative personnel.
- National Child Traumatic Stress Network (NCTSN) and National Center for PTSD (NCPTSD), (2006). Psychological first aid: Field operations guide, 2nd Edition. Retrieved May 31, 2008, from <http://www.nctsn.org> and <http://www.ncptsd.va.gov>.
- Norris, M. P., Molinari, V., & Ogland-Hand, S. (2002). *Emerging issues in psychological practice in long-term care*. New York: Haworth Press.
- Spillman, B. C., Liu, K., & McGilliard, C. (2002). Trends in residential long-term care: Use of nursing homes and assisted living and characteristics of facilities and residents. Washington, DC: U.S. Department of Health and Human Services. Retrieved March 27, 2008, from <http://aspe.hhs.gov/daltcp/reports/rltct.htm>