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Major article

Infection prevention disaster preparedness planning for long-term care facilities

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Background: Long-term care facilities (LTCFs) are defined as residential institutions that provide care to people who are unable to live independently. Planning for infection prevention in disaster situations is essential for LTCFs because of the increased risk inherent in their patient population. Experiences with past disasters, such as pandemic influenza and Hurricane Katrina, have demonstrated where LTCFs are lacking in preparedness and opportunities for improvement. Little guidance is currently available to assist these facilities in creating an infection prevention component for their disaster plans. This paper is intended to guide the development of an infection prevention component of the LTCF disaster plan.
Methods: A literature review and Internet search were conducted in September 2010. A spreadsheet was created with infection prevention topics for disaster plans that were identified. Recommendations were divided into themes/domains for simplification and clarity.
Results: Fifty-eight articles, planning documents/reports, and Web-based training programs were identified and screened. Of the sources screened, 33 publications were determined to be relevant; 22 of which were peer-reviewed journal articles, and 11 were state, federal, or regulatory agency publications.
Conclusion: Whereas there were multiple publications related to the difficulties and risk factors LTCFs face in disasters, there were no publications that specifically addressed infection prevention in disasters or planning specific to infection prevention concerns in disasters in long-term care. LTCF administrators or others responsible for disaster planning in LTCFs are encouraged to use this article as a guide to developing comprehensive infection prevention policies and protocols for their emergency operations plan.

Long-term care facilities (LTCFs) can be defined as residential institutions that provide care to people who are unable to live independently. Currently, approximately 2.5 million US citizens live in LTCFs.[1] There are various types/classifications of LTCFs, based on the patient population and services provided. Examples include nursing homes, skilled nursing facilities, long-term acute care facilities, psychiatric institutions, foster and group homes, retirement homes, and rehabilitation centers. The majority of LTCFs are nursing homes that house elderly and chronically ill individuals at high risk for infection.[1,2] Therefore, this document will focus primarily on nursing homes as LTCFs. However, infection prevention recommendations in this article may be modified and applied for other LTCFs.

Disaster preparedness is essential for all health care settings, including LTCFs. Past disasters such as hurricanes Katrina, Rita, and Gustav, as well as pandemic influenza, have demonstrated the need for additional disaster preparedness planning for these types of facilities.[3,4] Hurricane Katrina resulted in the United States' largest city evacuation in history because of a natural disaster.[5] In Louisiana alone, one of the areas hit hardest by Hurricane Katrina, 21 nursing homes were evacuated prior to the hurricane hitting landfall.[5] Many of the nursing homes that chose not to evacuate during Hurricane Katrina experienced catastrophic conditions, including power failure, contaminated water, very high temperatures, and depletion

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of medical supplies.[5] Approximately 70 LTCF residents died in Louisiana nursing homes after Hurricane Katrina.[3] Residents of LTCFs tend to consist of frail elderly individuals and individuals at high risk for infection because of comorbidities, poor immune functioning, and other factors. Whereas these residents are usually one of the highest risk groups for morbidity or mortality related to seasonal influenza, epidemiologic studies indicate that individuals over the age of 65 years were one of the lowest risk groups for death related to 2009 H1N1 influenza A.[6] Despite this low infection and mortality rate, the United States did experience sporadic outbreaks of pandemic H1N1 among LTCFs. The Centers for Disease Control and Prevention (CDC) did not collect systematic epidemiologic data on these residents during the 2009 pandemic, so exact incidence rates are not available.[6] However, the CDC did report on 3 outbreaks of H1N1 that occurred during the pandemic. That report indicated that attack rates for the 2009 H1N1 pandemic among LTCFs ranged from 6% to 28%, a rate that is significantly lower than seasonal influenza rates among this population, which generally range from 20% to 70%.[6]

The epidemiology of future infectious disease disasters cannot be determined, but it is prudent to assume that LTCF residents will have a potential high risk of morbidity and mortality. This is because residents of these facilities are more likely to be elderly, immobile, and on immunosuppressive medications and suffer from chronic diseases, making them more susceptible to infections.[7] Nursing homes are also less likely to have full-time infection prevention coverage than acute care hospitals.[8] The high number of infections that occur in LTCFs during routine times coupled with the lack of infection prevention coverage put these facilities at higher risk for disease transmission during disasters.[8] Because of this, it is essential for LCTFs to be prepared to prevent infection transmission within their facilities during disasters.

Research conducted on LTCF response to past hurricanes indicates that nursing homes are often not included in community disaster plans, there is a lack of awareness among community disaster planners that nursing homes are health care settings, LTCFs need to increase the amount of supplies they keep on hand or can obtain quickly during an event, and communication/coordination between LTCFs and community response agencies needs to be improved.[3,5,9,10] To date, the majority of research examining LTCF disaster preparedness has focused only on natural disasters[3,10] with few studies addressing infectious disease disaster planning issues for LTCFs. Existing studies have reported that infectious disease disaster planning for LTCFs is lacking.[4,11,12] Much more work needs to be done in this area of research. The purpose of this paper is to outline disaster planning recommendations for LTCFs related to infection prevention based on a literature review. This project was conducted by the authors in their role as members of the Association for Professionals in Infection Control and Epidemiology's (APIC) Emergency Preparedness Committee.

METHODS

A literature review was conducted in September of 2010 using the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Healthstar, PubMed, and MEDLINE databases for years 1966 through 2010, as well as an Internet search for existing state guidelines, national recommendations, and accreditation standards. The search terms used were as follows: long-term care, nursing home, disaster preparedness, infection prevention, emergency preparedness, hurricane, pandemic influenza, and stockpiling. Only English language articles or documents from peer-reviewed journals, national organizations, or accrediting agencies were included. In addition, the snowballing technique was used to identify sources.

Infection prevention recommendations for LTCFs were divided into themes/domains for simplification and clarity. Each author was assigned a section/theme to investigate and develop recommendations to address that domain. A spreadsheet was created that delineated infection prevention recommendations for the various themes/domains that were identified by each source. The primary author collated the theme/domain recommendations into a manuscript. All authors reviewed the final themes and recommendations. After the manuscript outlining infection prevention recommendations for LTCFs was drafted and agreed upon by the authors, the manuscript was reviewed by other members of the APIC Emergency Preparedness Committee.

RESULTS

Fifty-eight articles, planning documents/reports, and Web-based training programs were identified and screened. Of the sources screened, 33 publications were determined to be relevant: 22 were peer-reviewed journal articles, and 11 were state, federal, or regulatory agency publications. Multiple publications outlined the difficulties and risk factors LTCFs face in disasters, but no publications specifically addressed LTCF planning for infection prevention in disasters. LTCF administrators or others responsible for disaster planning in LTCFs should use this article as a guide to developing comprehensive infection prevention policies and protocols for their emergency operations plan (EOP).

Infection transmission in long-term care during disasters

Patients in LTCFs are at high risk for infections because of existing comorbidities, diminished immune response, invasive devices, congregate housing, immunosuppressive medications, poor wound healing, impaired mental status, impaired skin integrity, limited mobility, and other contributing factors.[7,13,14] The most common infections seen in LTCFs include lower respiratory, skin and soft tissue, urinary tract, and gastrointestinal infections.[7,14] LTCF health care workers (HCW) are also at risk of infection because of occupational exposures. During a disaster, the risk of infection transmission increases for both patients and staff, especially during disasters involving a biologic agent, such as bioterrorism, outbreaks of emerging infectious diseases, and pandemics (ie, infectious disease disasters).[15]

Infection prevention program

LTCFs should have an infection prevention program in place for day-to-day activities as well as during disasters.[2,14] Existing sources outline critical components of LTCFs infection prevention program for routine practice.[2,14] In addition to infection prevention policies for routine practice, protocols should be developed that address infection prevention during disasters. Examples of infection prevention disaster planning policies include allocating limited supplies of personal protective equipment (PPE) and/or pharmaceuticals, isolating large numbers of patients, restricting visitors, and developing nonpunitive sick leave policies to decrease the likelihood of ill staff coming to work. Existing recommendations for allocating limited PPE[16] and improvising isolation[17] should be consulted when developing disaster preparedness policies for LTCFs.

Infection prevention coverage in LTCFs

One critical component of a successful LTCF infection prevention program is having coverage by a designated infection preventionist (IP).[18] The IP for a LTCF may be a certified infection preventionist,

epidemiologist, administrator, or clinician. If a LTCF does not employ a certified IP, it is essential that the facility's designated IP at least receive some formal training on infection prevention.[2,14,19] Studies examining the frequency with which LTCFs employ a certified or trained IP have reported conflicting findings. A 1985 study reported that most facilities in North Carolina had a person designated as the IP; however, none of the individuals had received infection prevention training.[20] In contrast, a 1990 study reported that most Connecticut LTCF IPs had received at least some training in infection prevention.[21] A 1994 study reported that about half of LTCF IPs had received formal infection prevention training.[22] A 2005 study found that only 8% of LTCF IPs received formal training on infection prevention,[23] and a 2006 study indicated that less than 10% of LTCFs reported employing a trained IP.[24] It is obvious that the level of training a LTCF IP may have varies greatly. It is critical that LTCFs have an adequately trained IP on staff because it affects routine practice and disaster response.

The IP's role and responsibilities should be outlined in facility policies and procedures, including in the EOP. It is critical for the IP to assist with the facility emergency management planning process.[2] The IP should assist in developing a facility pre- and postevent surveillance plan, monitoring surveillance and infection prevention practices, and implementing interventions during disasters. A few examples of disaster-related infection prevention interventions include enhanced environmental cleaning, isolation precautions, PPE use, and hand hygiene. Other interventions may also be needed, depending on the exact nature and scope of the disaster.

Whenever possible, the LTCF IP should be included in the incident command staff of the facility as a medical/technical specialist during infectious disease disasters. In this role, the IP will provide consultation on disease transmission relevant to the disaster. LTCFs that utilize untrained personnel as the IP should identify an infection prevention point-of-contact who can be consulted during an infectious disease disaster.[19]

Facility EOP

LTCFs must develop and maintain an EOP that addresses all hazards, including biologic threats.[5,12,18,25] Each LTCF should have a written EOP that is specific to their facility—even if the LTCF is part of a larger health care organization/system. LTCFs should have an emergency planning committee; if the facility is accredited by The Joint Commission, the existence of this committee is mandated.[18] Researchers recommend that LTCFs hold monthly emergency management planning meetings to further develop and assess the facility EOP.[5] The LTCF IP should be a member of the facility emergency management committee.[2,24] Despite this, a 2006 study reported that less than half of the participating LTCFs reported involving an IP in their emergency management committee.[24] It is recommended that LTCF's EOPs be reviewed at least once a year and updated as needed based on results from disaster exercises, actual events, and/or published evidence of best practices.[26] However, researchers indicate that few LTCFs update their EOP regularly.[5]

A LTCF's EOP should consist of multiple components: the main body of the plan that addresses tasks/needs that are applicable to all types of disasters and a series of annexes that address response to specific incidents such as chemical, nuclear, or biologic events. The IP will be critical in helping to develop and maintain a facility EOP annex that addresses infectious disease disasters[25] because these types of disasters pose the greatest risk to infection transmission. Despite this, research indicates that, whereas most LTCFs have developed an EOP to address natural disasters,[11] only half have a plan to respond to pandemic influenza,[4] and very few have addressed bioterrorism preparedness.[5] In previous research, many LTCF representatives have reported that they do not believe that their facilities should play a major role in disaster response and that they lack the resources, including knowledgeable staff, to develop an adequate EOP.[11]

Researchers and organizations have begun to outline the components of a LTCF EOP and its annexes.[11,25] However, no singular document addresses all-hazards planning for LTCFs. Some documents address only natural disasters; others provide specific recommendations based on a singular disease, such as smallpox[27] or pandemic influenza.[25] Researchers indicate that LTCFs have identified a need for more formal guidance regarding development of an EOP, especially in regards to the biologic annex.[11] A 2007 study reported that most LTCFs "do not have the time, staff, training, knowledge, or resources to develop [a bioterrorism] plan."[11]

EOP coordination with external response agencies

The facility EOP needs to be coordinated with local, state, and federal plans.[5,25] The first step in this process is to obtain copies of relevant sections of local, state, and federal plans, such as the Health and Human Services' Pandemic Influenza Plan.[25] These plans should be reviewed and incorporated into the facility's EOP. The person(s) responsible for LTCF disaster planning should also partner with local and regional health care facilities and preparedness agencies to ensure that the LTCF's role in community preparedness is clearly documented and understood. Previous research indicates that LTCFs are often left out of regional emergency management systems/plans or are considered nonessential entities,[28] which puts the facility at risk during a disaster in terms of the facility's ability to obtain services or resources. During past disasters, LTCFs have received less support from response agencies than hospitals,[3] and this was postulated to be due to the lack of coordination between LTCFs' plans and community EOPs. Researchers also indicate that most LTCFs have not pursued plan coordination or have been unsuccessful because of a lack of resources or support from local/regional governmental agencies.[4,11]

Coordinating the LTCF EOP with local, state, and federal plans should increase facility access to resources that it would otherwise not be able to obtain. LTCFs need to have the ability to shelter in place for at least 96 hours to 1 week,[3] but community-wide coordination is required for longer lasting disasters. Coordination is essential to ensure that regional disaster planners understand the critical nature of the LTCF in terms of maintaining patient capacity. For example, electricity is needed to operate patient ventilators and other equipment. Regional disaster planning agencies need to acknowledge that LTCFs are health care facilities that provide care to high-risk patients and that the LTCF staff are at high risk of infection exposure during infectious disease disasters. This will increase the likelihood that the facility be prioritized for receiving essential services and resources during a disaster, such as emergency power and vaccines.

EOP assessment

LTCFs must assess their disaster readiness. The facility EOP should state how and when a hazard vulnerability analysis will be performed.[18] The LTCF disaster planning committee should assess the facility[5] and the EOP[18] at least once a year and take steps to mitigate any identified hazards. The current best way to assess LTCF disaster preparedness is to participate in disaster exercises/drills.[5] Multiple disaster scenarios should be utilized to test different components of the facility EOP. Examples of disaster scenarios that should be used include explosive terrorism, floods, earthquakes, and pandemics.[25] Recommendations regarding the necessary frequency

Table 1
Topics for staff education related to infection prevention as part of emergency management

Education topics
-Self-screening for illness
-Screening/triaging of patients and visitors for communicable diseases/ conditions
-Internal and external reporting and communication procedures
-Surveillance for communicable diseases/conditions
-Facility disaster plan policies and procedures related to infection prevention
-Disease transmission methods/routes
-Isolation procedures
-Respiratory hygiene
-PPE use and reuse, including use of respiratory protection
-Hand hygiene protocols
-Social distancing
-Environmental cleaning/disinfection
-Disinfection and sterilization of medical equipment
-Waste management procedures
-Food and water safety
-Medical management of biologic event victims, including identification and diagnosis of disease, and clinical care procedures (treatment, isolation, and others)
-Postmortem care

PPE, personal protective equipment.

of conducting disaster drills vary, with the minimum being twice a year if the facility is accredited by The Joint Commission[18]; some researchers propose that disaster exercises be performed monthly or quarterly.[5] Research indicates that most LTCFs conduct disaster exercises annually or semiannually[11]; however, most facilities use natural disaster scenarios in their disaster exercises rather than a biologic scenario. Whenever possible, LTCFs should participate in community-wide exercises to enhance regional coordination for large-scale disasters[25]; the Joint Commission mandates that accredited LTCFs participate in at least 1 community-wide disaster exercise per year.[18] Research indicates that very few LTCFs consistently test their EOP.[5]

Infection prevention and emergency management education

Each LTCF should designate a person whose responsibility it is to create, coordinate, and track staff training on emergency management. The facility IP will likely be the best person to create and deliver infection prevention education,[25] especially related to infectious disease disasters. All LTCF staff who are HCWs need to be trained on disaster preparedness, including pandemic[25] and bioterrorism[29,30] planning. Staff education should be competency based and should be appropriate for clinical and nonclinical personnel. Infection prevention competencies have been developed for hospital-based HCWs,[31] but do not currently exist for LTCF staff. However, these competencies can be used as the basis for education development for LTCF HCWs. Suggested topics for staff education related to infection prevention during disasters are outlined in Table 1. Researchers indicate that many LTCFs provide only minimal disaster preparedness education to employees. A 2007 study indicated that LTCF employees are only educated on emergency management at new employee orientation, with no follow-up training being provided.[11] Another study, conducted in 2008, reported that new LTCF personnel are not educated on the facility EOP and that the majority of existing LTCF nursing staff are not even aware of the plan.[5]

LTCF patients and visitors will also require education related to disasters. Examples of infection prevention education needed for LTCF patients and visitors include how and when to perform hand hygiene and respiratory etiquette and how to implement isolation precautions within the facility. In addition, event- or disease-specific infection prevention information will need to be communicated/taught to LTCF staff, patients, and visitors. For instance, specific isolation, PPE recommendations, and other infection prevention measures to prevent the spread of flu will need to be taught/communicated during an influenza pandemic.[25] The facility IP should develop and keep on hand training materials that can be distributed just-in-time during disasters.[32]

Management of supplies

Ideally, LTCF should have the ability to be self-sustaining for at least 96 hours.[3] To do this, the facility EOP must address resource assessment and management. If the LTCF is accredited by The Joint Commission, resource assessment and estimating the amounts of supplies needed during a disaster are mandatory.[18] LTCFs need to estimate the quantity of supplies, such as PPE, that will be needed by the facility to be self-sustaining for at least 96 hours; the CDC recommends calculating the amount of resources that would be needed for a 6-week time period as part of pandemic planning.[25] Once a resource assessment has been completed, supply management is essential to facilitate a better disaster response. Management of resources may include making prior arrangements to obtain additional supplies during an event, conserving limited resources, and/or stockpiling.

Researchers recommend that prearranged agreements, or memorandums of agreement (MOA), be made between the LTCF and external sources that outline the amounts and types of supplies/resources that will be provided to the facility during a disaster.[18,25] MOAs may be between the LTCF and vendors (to obtain supplies) or between the LTCF and other health care organizations (to share staff/resources, transfer/accept patients, and others). Other sources for obtaining supplies during a disaster consist of regional, state, and/or federal stockpiles, such as the Strategic National Stockpile. Supply allocation and distribution from regional, state, and Strategic National Stockpile supplies are determined by the community and/or state. LTCFs must coordinate their EOP with regional planning groups to determine whether the facility will have access to stockpiled supplies during a disaster.

In addition to arranging MOAs, the LTCF EOP should include protocols for conserving resources during a disaster when supplies become limited/insufficient. For instance, water can be conserved by having LTCF staff increase their use of alcohol-based hand sanitizer rather than handwashing with soap and water, except for times when handwashing is mandated by hand hygiene protocols.[33] PPE can also be conserved,[16] provided all state and federal regulations are being followed. Supply conservation may increase infection transmission risk and should only be implemented when resources are severely limited. However, supply conservation procedures must be executed prior to resource depletion. The facility EOP should outline supply inventory levels that trigger conservation protocols.

One final option for the LTCF to have access to supplies/resources during a disaster is to develop a facility stockpile. A major obstacle to LTCF stockpiling efforts is the current lack of funding sources to pay for PPE stockpile development/maintenance.[11] Researchers have indicated that, whereas it might be feasible for LTCFs to stockpile medications, it would be logistically challenging for these facilities to stockpile other types of supplies—including PPE. Obstacles to LTCF stockpiling include a lack of on-site space, cost/reimbursement issues, and security concerns.[11] The CDC and the Agency for Healthcare Research and Quality do not currently take a stand on whether or not LTCFs should stockpile supplies. However, the Occupational Safety and Health Administration recommends that all health care agencies consider stockpiling at

least a 4-weeks' supply of PPE[34] in preparation for an influenza pandemic.

DISCUSSION

All health care settings need to have comprehensive emergency operations plans that address all hazards. LTCFs have unique challenges not experienced by other health care settings, and these issues need to be addressed as part of facility emergency management planning. Protocols need to be in place that will minimize infection transmission risk among patients, visitors, and staff during disasters. This article summarizes disaster planning considerations related to infection prevention for LTCFs, including having an infection prevention program, developing and assessing an emergency operations plan that is coordinated with regional and federal plans, creating and implementing an infection prevention education program related to disaster preparedness, and managing supplies. LTCFs should use this article to develop and assess their EOP and staff training as it relates to infection prevention procedures and protocols.

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