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Minimizing the Impact of Complex Emergencies on Nutrition and Geriatric Health: Planning for Prevention is Key

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Key Points

- Complex emergencies (CEs) can occur anywhere and are defined as crisis situations that greatly elevate the risk to nutrition and overall health (morbidity and mortality) of older individuals in the affected area.
- In urban areas with high population densities and heavy reliance on power-driven devices for day-to-day survival, CEs can precipitate a rapid deterioration of basic services that threatens nutritionally and medically vulnerable older adults.
- The major underlying threats to nutritional status for older adults during CEs are food insecurity, inadequate social support, and lack of access to health services.
- The most effective strategy for coping with CEs is to have detailed, individualized pre-event preparations. When a CE occurs, the immediate relief efforts focus on establishing access to food, safe water, and essential medical services.

Key Words: Disaster relief; food insecurity; humanitarian crisis; undernutrition

29.1 INTRODUCTION AND DEFINITIONS

The most common issues impacting on the nutritional well-being of elderly persons are comprehensively addressed in the preceeding 28 chapters of this edition of the *Handbook of Clinical Nutrition and Aging*. This chapter focuses on a different type of concern, one that can overshadow all other threats to health when a serious disaster strikes. That subject is the welfare of aged persons when catastrophic events pose a direct (or indirect) threat to nutrition and health (1,2). While there is a large body of literature on the health impact of natural and man-made disasters (e.g., droughts, floods, military conflicts) and associated long-term food shortages in the third world, surprisingly little information is available about the short and intermediate-term

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consequences of emergency situations in developed countries. In these situations, high population densities and heavy reliance on power-driven devices for day-to-day survival (e.g., electrical power for mass transit, elevators to reach living quarters, medical devices, and refrigeration of foods and medicines) can accelerate the speed with which a catastrophic, health-threatening situation develops. In 2005, the plight of the elderly evacuees from New Orleans (pre-storm population approaching 485,000) following Hurricane Katrina provided a dramatic demonstration of how essential services can rapidly deteriorate in a well-developed, highly populated urban environment following a major disaster and place older individuals in eminent mortal danger.

29.1.1 Definitions

In order to lay the foundation for this discussion, we begin with some definitions (See Table 29.1). While terms like “disaster relief” and “humanitarian crisis” may be

Table 29.1
Glossary of terms

Complex emergencies	Any of a number of crisis situations that greatly elevate the health risk of individuals in the affected area; examples are natural disasters like floods and earthquakes; urban health emergencies like fires, epidemics, and blackouts; and terrorist acts like massive bombings or poisonings of food or water supplies. Resolution of these emergencies requires collaboration between multiple groups.
Acute protein/calorie malnutrition (PCM)	PCM or “wasting” is associated with recent rapid weight loss, i.e., as in emergency situations (as opposed to chronic malnutrition).
Chronic energy deficiency (CED)	An intake of energy that is below the minimum requirement for a period of several months or years. In order to achieve energy steady state, the energy expenditure must drop to match the low intake, ultimately leading to underweight and low levels of physical activity.
Nutritional rehabilitation	Restoration of weight and healthy nutrition through the provision of appropriate foods based on established protocols.
Food rations	A shelf-stable pre-packaged dry ration that meets minimum daily intake recommendations for calories and other nutrients. Used to temporarily meet critical nutritional needs when food supply is inadequate. Examples: Meals Ready to Eat or MREs (1,250 kcal) are often distributed in complex emergencies in the United States; General food rations or GFRs (2,100 kcal) are distributed in many countries in sub-Saharan Africa.

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Table 29.1
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Complementary food ration	A complementary ration to the general food ration is sometimes provided. Typically, it consists of fresh fruit and vegetables, condiments, tea, etc. It is especially appropriate when the population of concern is completely reliant on food assistance.
“Wet” feeding	Food rations prepared and cooked on-site as opposed to rations that are taken home for preparation in the household (dry rations).
Fortification of foods	Typically, fortified foods have had supplemental vitamins and/or minerals added.
Hunger	The uneasy or painful sensation caused by lack of food.
Malnutrition	The medical condition caused by an improper or insufficient diet that can refer to undernutrition resulting from inadequate consumption, poor absorption, or excessive loss of nutrients. Malnutrition results from an inappropriate amount or quality of nutrient intake over a long period of time.
Food insecurity	The inability to obtain nutritionally adequate and safe food; or the inability to obtain it in socially acceptable ways
Food insufficiency	Inadequate amount of food intake due to a lack of food.
Epidemics and pandemics	An epidemic is a disease outbreak that affects numbers of the population in excess of what would normally be expected in a defined community, geographical area, or season. A pandemic refers to this type of disease outbreak that is occurring over a wide geographic area and affecting an exceptionally high proportion of the population.

Source: Borrel, A. Addressing the nutritional needs of older people in emergency situations in Africa: Ideas for action. HelpAge International Africa Regional Development Centre, Westlands, Nairobi, 2001.

more familiar, the most broadly acceptable term for these threatening situations is “complex emergency” (2). Complex emergencies (CEs) can occur anywhere and are defined as any of a number of crisis situations that greatly elevate the risk to nutrition and overall health of individuals in the affected area. Examples include natural disasters like floods and earthquakes, urban health emergencies like fires, epidemics and blackouts, and terrorist acts like massive bombings or poisonings of food or water supplies (see Table 29.2). CEs were originally associated with wars, genocide, and political strife, where innocent civilians were forced to endure loss of access to shelter, food, appropriate clothing, and timely medical care. Such emergencies have traditionally been associated with populations in developing nations, not those in the so-called developed countries. However, with increasing

Table 29.2
Examples of complex emergencies that impact nutrition and health

Natural disasters and extreme weather

- Hurricanes, tornadoes, floods, tsunamis, tidal waves
- Earthquakes, mudslides
- Ice storms and blizzards
- Heat (#1 killer of the elderly)

Unintentional and intentional man-made and population-related emergencies

- Fires and structural collapse
- Terrorism and bio-terrorism
 - Explosions and implosions
 - Intentional contamination of food and/or water supplies
- Epidemic or pandemic infectious disease cut break

globalization of the world's societies and economies and news coverage documenting world events, it has become clear that CEs can and do occur in both developed and developing world locations.

Nutritional risk is commonly elevated in CEs and is most likely to occur when the crisis is protracted or recurrent. Table 29.1 includes definitions for factors related to inadequate food intake (e.g., food insecurity, hunger), the resulting nutritional problems (e.g., malnutrition, acute protein/calorie malnutrition), and terms used to discuss interventions for undernutrition (e.g., food rations, nutritional rehabilitation).

29.1.2 Food Insecurity and Federal Food Assistance Programs

Even in the absence of a crisis, older persons are well recognized to be at greater risk than the remainder of the adult population for food insecurity and hunger. Some of the many factors that contribute to increased nutritional vulnerability of older adults are listed in Table 29.3. In 2001, food insecurity and hunger affected at least 1.4 million households in the United States that contained older members (3). People in 20% of those households also experienced hunger, in addition to food insecurity. Most of these older persons are suffering from food insecurity due to lack of income or due to their place of residence. Residents of the South are more apt to experience food insecurity, as are residents of cities and all elders who live alone (3).

Table 29.3
Risk factors for food insecurity in older persons

• Household composition	• Lacking access to nutritionally adequate diets
• Poverty	• Depression
• Functional impairments	• Reduction in taste, smell, sight, touch
• Social isolation	• Poor health
• Reduced ability to regulate energy intake	• Poor dentition

Source: Magkos et al. (41).

Recognizing the day-to-day nutritional vulnerability of its poor and elderly citizens, the U.S. government has a number of programs in place to provide assistance to elders at risk for food insecurity and hunger. Mandated by the Older American's Act, the Elderly Nutrition Program (ENP) provides a minimum of one-third of the daily calories required by recipients through daily meals and nutrition services to people aged 60 or older in group settings, such as senior centers and churches, or in the home, through home-delivered meals. The ENP provides an average of 1 million meals per day to older Americans. These meals are targeted toward highly vulnerable elderly populations, including the very old, people living alone, people below or near the poverty line, minority populations, and individuals with significant health conditions or physical or mental impairments. On an average the meals generously meet the RDA requirements, supplying more than 33% of the Recommended Dietary Allowances (RDAs) for key nutrients, thus significantly increasing the dietary intakes of ENP participants. The meals are also "nutrient dense", that is, they provide high ratios of key nutrients per calories. The most recent evaluation of the ENP program occurred in 1996 and was conducted by Mathematica Policy Research, Inc. (www.mathematica-mpr.com/nutrition/enp.asp). The resulting report clearly confirms that the ENP program recipients are at nutritional risk. It was found that between 80 and 90% of participants had incomes below 200% of the poverty level (twice the rate for the overall elderly population in the United States). More than twice as many Title III participants lived alone, compared with the overall elderly population. Approximately, two-thirds of the participants were either overweight or underweight, placing them at increased risk for nutrition and health problems. Title III home-delivered participants had more than twice as many physical impairments, compared with the overall elderly population. Although (and perhaps because) the success of the ENP program is well recognized, 41% of Title III ENP service providers have waiting lists for home-delivered meals, suggesting a significant unmet need for these meals. It would appear that even in times of relative calm and prosperity for most Americans, there are elderly citizens who are persistently in a state of nutritional crisis.

29.2 COMPLEX EMERGENCIES THAT THREATEN HEALTH

When nutritionally and medically vulnerable older persons encounter a complex emergency, there is an increase in morbidity and mortality rates. This is due to both short-term insufficient nutrition and the resulting long-term increased mental stress and disability, decreased resistance to infection, and exacerbation of chronic diseases (4), all of which make obtaining proper nutrition more difficult in a cyclic pattern. Many different types of CEs produce similar challenges. The consequences of a shortage of edible food and/or potable water, regardless of the type of emergency that produced that shortage, are multifold and can lead to increased physical and mental harm to older people (5). Reduced access to essential medical care heightens the immediate risk. A more extensive listing of the immediate impact of various complex emergencies and the resulting nutritional and health consequences is shown in Table 29.4.

Table 29.4
Immediate impact and nutritional/health consequences of complex emergencies

<i>Immediate impact</i>	<i>Consequence</i>
Loss of access to safe, adequate water supply	Dehydration; increased risk of delirium: inability to administer medications or keep sterile medical materials
Loss of safe, adequate food supply	Acute protein calorie malnutrition
Lack of access to special foods, nutritional products	Acute undernutrition due to loss of availability of pureed foods, tube feeding formulas, thickened liquids, other special foods
Loss of access to life-sustaining medical care, e.g., insulin injections, dialysis, respiratory support	Deteriorating medical condition, renal toxicity, hyperglycemia, etc.
Emotional trauma	Increased confusion; exacerbated dementia symptoms; poor food intake even if food is available
Loss of basic utilities	Extremes of heat/cold; inability to preserve foods and medications; inability to prepare foods
Damage to or loss of housing	Functional limitations, dysmobility or secondary injuries due to lack of lighting, safe environment

The likelihood of having to provide care for older persons during a CE is greater than one might think at first. As previously noted, Table 29.2 provides a list of common CEs that have the potential to cause nutrition-related health risks. The impact of these crises on the nutritional state and overall health of older adults is discussed in more detail in the following sections.

29.2.1 Natural Disasters and Extreme Weather

29.2.1.1 HURRICANES, TORNADOES, AND FLOODS

The 2005 hurricane season in the United States, most notably Hurricanes Rita and Katrina, left no doubt that older persons continue to be disproportionately affected by hurricanes (6,7) just as they were with Hurricane Andrew in 1992 (8). Older Floridians who were affected by Hurricane Charley in 2004 found that the hurricane not only disrupted their quality of life but also disrupted their medical care (9). Persons with pre-existing conditions such as diabetes mellitus, heart disease, and physical disabilities were especially affected. Approximately one-third of the older residents in the area had a worsening of their conditions post-hurricane, including a lack of access to prescription medicine and loss of routine medical care for pre-existing conditions. Medically related deaths were linked to the loss of power (resulting in loss of access to oxygen) and to exacerbation of cardiac

disease. Hurricane Iniki in Hawaii and the Great Hanshin-Awaji Earthquake in Japan were associated with an increase in the rate of diabetes mellitus-associated deaths for a year following the disaster (10,11).

In a study of residents in the high-impact area of Hurricane Andrew, one-third of persons had high levels of PTSD (12), which was attributed to variables such as property damage, exposure to life-threatening situations, and injury.

Tornadoes, while typically more limited in the size of the area affected than a hurricane, are often even more physically destructive. Although no research has been published on their specific effects on physical and mental health, it is well recognized that tornadoes can lead to many of the same dangers noted for hurricanes; the disruption of home care services and meal delivery to homebound elderly persons are of concern. The situation can become life threatening not only to the older persons who are critically dependent on these services but also to their dedicated care providers who often risk much to ensure the delivery of food and medical care to their clients (personal communication from Area Agency on Aging of Southwestern Illinois grantees to NT).

Floods are a relatively common disaster and are often associated with earthquakes or hurricanes. Besides trauma and drowning, the most common conditions associated with floods are an increase in gastrointestinal symptoms. Increased preventable conditions following the crisis include gastroenteritis (13), acute respiratory infections including asthma (10), and increased post-traumatic stress which can persist for years after the event (14).

29.2.1.2 EARTHQUAKES

In the aftermath of an earthquake, as with the other natural disasters already mentioned, access to basic life-sustaining nutrients and hydration as well as to basic and specialized medical care may be partially or completely disrupted. Due to the magnitude and scope of the destruction that occur with a major earthquake, the restoration of infrastructure to fully support the inhabitants of the region may take months or even years to be accomplished. Earthquakes result in a three-fold increase in deaths from myocardial infarction, a doubling of the frequency of strokes, increased blood pressure levels, and increased coagulability of blood (15,16). Increased rates of cardiac arrests occurring after loss of power (17) and deaths due to increased incidence of coronary heart disease (18) and myocardial infarctions (19,20) are also reported. Deterioration of mental health occurs and post-traumatic stress is also prevalent (21,22). Emotional stress can persist for months (23,21). In particular, the displacement of elderly persons from their places of residence and their social and medical supports can have a dramatic negative effect on health and quality of life (See Fig. 29.1). Displacement following a CE has been linked with a significant increase in mortality rates (15,16). The confusion of the displacement, as well as loss of access to appropriate diet and medications, prevents older individuals from monitoring and treating their medical conditions. Inappropriate diet has been directly linked to decreased glycemic control and increased mortality in diabetic patients following an earthquake (11).



Fig. 29.1 In emergency situations, evacuations displace elderly persons from their social and medical support systems and can negatively impact health and quality of life.

29.2.1.3 EXTREME HEAT AND COLD

The type of naturally occurring CE that is most threatening for older persons in terms of numbers affected each year comes during periods of temperature extremes, especially heat waves, claiming about 400 lives annually in the United States alone, more than the deaths caused by all other disasters combined. At greatest risk are poor persons who live in inner cities, those with chronic illnesses, and those homebound. Heat disasters are often aggravated by power outages, which prevent people from keeping cool, bathing properly, and storing food at proper temperatures (24). In the 1993 heat wave in Philadelphia, there was a 26% increase in total mortality, with a 98% increase in cardiovascular deaths, particularly in those persons over

65 years of age (25). In France, during the period 1971–2003, there were six major heat waves, resulting in thousands of deaths; the mortality ratios increased with age after 55 years and in the over age 75 years cohort; the death rate was higher for women than for men (26).

Although little research has been published about the health effects of ice storms and blizzards, the loss of power leaves older persons stranded at home, increasing the risk for ingestion of inadequate calories and inappropriately prepared food and/or spoiled food. The risk of exposure combined with the risk of house fires or carbon monoxide poisoning due to use of unsafe heating devices pose serious threats at a time when emergency services may not be available due to the extreme weather conditions.

29.2.2 Unintentional and Intentional Man-Made Disasters

29.2.2.1 FIRES

Fires increase the extent of cardio-respiratory problems, which results in exacerbation of chronic diseases (27). People who already suffer from mental health problems or medically unexplained physical symptoms (28) and gastrointestinal morbidity (29) can develop an exacerbation of these problems (16,29) once they become a victim of a fire. Even when no injuries result, fires almost certainly force displacement of their victims, adversely affecting quality of life and manifestation of chronic diseases.

29.2.2.2 EPIDEMICS, PANDEMICS, AND UNINTENTIONAL FOOD BORNE ILLNESS OUTBREAKS

A serious infectious global pandemic is one of the most threatening of all complex emergencies, and calls back memories of the most devastating infectious disease outbreak on record, the Great Flu Epidemic of 1918–1919, which killed an estimated 20–40 million people worldwide. The spread of this epidemic was linked to the trans-global transportation of soldiers during World War I. Today, world travel and the importation of foods and other products are very common. Thus, in the event of a serious epidemic in one country, there is a high likelihood of quick transmission to others. The outbreak of SARS, a severe acute respiratory illness caused by a coronavirus, was first reported in Asia in February 2003 and spread to more than two dozen countries in North America, South America, Europe, and Asia (sickening 8,098 and killing 774) before the global outbreak was contained (<http://www.cdc.gov/NCIDOD/SARS/factsheet.htm>). In recognition of the severe strain that a major disease outbreak can place on health systems, the World Health Organization (WHO) advocates for an “integrated global alert and response system for epidemics and other public health emergencies” that allows for “a collective approach to the prevention, detection, and timely response” for these emergencies (<http://www.who.int/csr/en/>). The WHO is currently coordinating the global response to human cases of H5N1 avian influenza (bird flu) with regards to the threat of a future influenza pandemic.

A widespread illness or intoxication from a food source could also threaten nutritional and overall health. While these outbreaks are typically limited in scope and short lived, the potential for more widespread and dangerous effects exists due to the centralized nature of the US food distribution chain and the clustering of very large populations into a small geographical area. (See more on this topic in Section 29.2.2.3.)

29.2.2.3 TERRORISM AND BIO-TERRORISM

While other complex emergencies produce far more damage and deaths each year than are caused by terrorism, the destruction of the Twin Towers in New York City and a portion of the Pentagon in Washington DC on September 11, 2001, focused the attention of Americans upon the potentially devastating effects of an intentional man-made disaster. The development of the Department of Homeland Security was a tangible product of the national response to implied threats of bio-terrorism.

A terrorist attack such as one causing explosions and collapse of buildings would result in the interruption of basic living functions in a manner similar to previously discussed emergencies like earthquakes, tornadoes, or fires. Disruptions to necessities of daily living and loss of power and access to medical care would be major concerns. A bioterrorist attack would have very different potential consequences for the well-being of the elderly, potentially causing widespread illness and/or hunger and dehydration. The propagation of an illness over a wide geographical area could be lethal for a substantial number of older adults, who are typically among the most medically vulnerable. During the anthrax attacks in 2001, all emergent cases involved adults over 50 years old, with the one fatal case affecting a 94-year-old woman (30). Intentional contamination of food or water supplies with a toxin or infectious agent also has the potential to cause an outbreak of poisonings or illness over a wide geographical area. In this situation, the outbreak could be slow and/or diffuse and the cause difficult to ascertain, delaying the recognition and treatment of the problem. For example, in 2006, bagged spinach contaminated (unintentionally) by *Escherichia coli* infected over 200 Americans (killing three) in 26 states before the strain was isolated and eradicated. Similarly, intentional waterborne diseases or toxins would be difficult to detect and could impact a vulnerable population more severely than a healthy population, due to delayed recognition and reporting of the contamination (31). In the case of deliberate food/water contamination, nutritional health is affected directly (by reducing the availability of safe food and water) as well as indirectly (by the symptoms of illness and the reduced access to an over-burdened medical care system). In fact, the deliberate poisoning of food has already occurred in the United States, when in 1984 members of the Rajneesh religious cult contaminated salad bars in The Dalles, Oregon, with *Salmonella typhimurium*. Though it was only a trial run for a more extensive attack that was planned to disrupt local elections later that year, the contamination caused 751 people to develop salmonellosis in a 2-week period. Other isolated examples of intentional food contaminations have also been reported in the United States and Canada (32).

Coping with complex emergencies due to terrorism is for the most part a new challenge, at least in the United States. Despite considerable effort to prepare for

these scenarios, our experience in dealing with the aftermath is limited, yet, unfortunately, our experience is likely to grow in the future. Experts warn that a major terrorist attack on the United States is very likely (29–50%) to occur within the next 10 years (CFR Online Debate).

29.2.2.4 SUMMARY

Heat, cold, hurricanes, tornadoes, floods, fires, illness, terrorism, and other disasters endanger health and claim elderly lives. Sometimes the effects are immediate, but more often an increase in morbidity and mortality occurs progressively after the disaster as survivors experience a continued decrease in the quality of life and increased nutritional risk due to displacement and a loss of basic resources. These events result in increased disability, which further impairs the ability of older persons to maintain access to safe food and water and sustain proper nutrition and hydration, and so the spiral continues downward. Recovery from food insecurity and poor nutrition is more difficult for persons who are poor, socially isolated, cognitively impaired, and/or old. The more risk factors people possess, the faster their decline.

29.3 MINIMIZING NUTRITIONAL AND HEALTH RISKS DUE TO CEs

All of the disasters described in this chapter threaten nutritional and metabolic health because they disrupt access to food, water, and vital medical treatment (33). Older persons with pre-existing chronic conditions are particularly vulnerable to these disruptions. Preparation for and resolution of the aftermath of these emergencies require collaboration between multiple stakeholders and takes time. There are no easy fixes to CEs.

29.3.1 *Conceptual and Programmatic Overview*

The underlying causes of malnutrition in older adults during CEs are (1) insufficient household food security, (2) inadequate social and care environments, and (3) poor public health and inadequate health services (2). The basis for current governmental and humanitarian responses to nutritional crises builds on lessons learned in the earliest organized relief efforts (circa 1940–1950). During the 1970s, guidelines began to be published following experiences with relief efforts in places like Biafra and Ethiopia (2). In the subsequent decades, the experiences of various crises have progressively shaped what are, today, the characteristic challenges, and avenues of support available to older adults who are caught in CE situations in any given country. With increasing recognition that the elderly are uniquely vulnerable to CEs, efforts are underway to develop specific recommendations and resources for this population group. Table 29.5 lists some of the resources available, along with web links. HelpAge International (www.helpage.org) is a global network of more than 70 not-for-profit organizations in 50 countries who are working for improvements in the lives of older people. This group has published a manual of guidelines for best practice during disasters and humanitarian crises (See Table 29.5). The Sphere Project Minimum Standards in Disaster Response project (<http://www.sphereproject.org/content/view/27/84>) advocates for the use of community-based systems to implement the

Table 29. 5

Resources (Web sites and links to publications and bulletins)

(Title or description, followed by web link)

American Red Crosswww.redcross.org/services/disaster/0,1082,0_217_,00.html**Federal Emergency Management Agency (FEMA)**www.fema.gov/areyouready/

Food and Water in an Emergency

<http://www.fema.gov/pdf/library/f&web.pdf>**Food and Nutrition Service (FNS) of the USDA**<http://www.fns.usda.gov/disasters/disaster.htm>**HelpAge International**

Addressing the Nutritional Needs of Older People in Emergency Situations

<http://www.helpage.org/Resources/Manuals>**National Recommendations for Disaster Food Handling**foodsafety.ifas.ufl.edu/HTML/tn001.htm**Hunger Issue Brief: Hunger and Food Insecurity Among the Elderly**<http://www.centeronhunger.org/pdf/Elderly.pdf>**Sphere Project**

Minimum Standards in Disaster Response:

<http://www.sphereproject.org/content/view/27/84>**Food Safety Risks**<http://www.ific.org/publications/other/consumersguideom.cfm>

care of older individuals in these circumstances. In the United States, a number of national organizations, including the Federal Emergency Management Agency (FEMA), The American Red Cross, and various branches of the military take responsibility for rescue and relief efforts following a major CE but the contribution of the private sector to the relief effort is traditionally also a substantial one. This type of broad-based support is necessary but makes it more difficult to consistently implement age-related guidelines for relief efforts once they are in the field. Coordinating the advance preparation efforts for CEs, however, is a more tangible goal.

29.3.2 Emergency Preparedness in Structured Living Communities

As is true for almost all health issues, the best way to address the nutritional and related health risks that accompany CEs is to take preventive measures. In the case of nursing homes and assisted living facilities, many states require that these institutions have a substantial reserve food and water supply and that they have a well-delineated disaster and evacuation plan. The specifics of these requirements vary on a state-by-state basis. However, attention to the development of specialized

evacuation plans (individualized for resident needs) is more focused since the nursing home-related deaths recorded during the hurricanes on the gulf coast in 2005. Two such incidents included the drowning of 34 nursing home residents in St. Bernard Parish, Louisiana, due to a failure to comply with evacuation orders during Hurricane Katrina, and the bus accident in which 24 Houston, Texas, nursing home residents being evacuated from Hurricane Rita died in a fire that was sparked by mechanical problems and fed by the explosions of the passengers' oxygen tanks.

Beyond the obvious need for institutions and organizations like long-term care and hospice agencies to have detailed plans for evacuations and emergency conditions, there is also a need to identify "at risk" older adults living in the community. This would involve developing registries of "vulnerable populations" of elders based on degree of factors like contact need, predominant special impairment, and predominant life-support supply need, if any. By doing so, vulnerable elders could be easily identified in the event of a disaster and better supplied with assistance. Such registries are currently implemented in some instances (examples are available in California, www.aging.ca.gov, and Florida, www.broward.org/atrisk), but a more systematic approach has yet to be employed. These registries will most likely need to be local in origin and maintenance in order that control of sensitive health data would remain confidential. However, it would be preferable for the structure of the databases to be developed in a uniform format in order to facilitate the sharing of important data across local and regional entities. Once successful programs and examples are created, their implementation by all interested parties should then be straightforward.

29.3.3 Emergency Preparedness at Home

Emergencies require flexibility and the ability to survive changes in regular routines. This flexibility can be easier to achieve if people have a few necessary and familiar objects with them to assist with performing certain everyday chores, such as eating properly, taking medications, and changing into clean clothes. In order to assist people in getting prepared for the disruptions that inevitably occur during an emergency, the FEMA and The American Red Cross recommend that every family have an emergency preparedness kit that contains food, water, clothing, medical supplies, flashlight, and other supplies that will aid their survival for 3–5 days. By the time recommended objects are placed in a backpack, the entire kit weighs between 45 and 50 pounds. This is clearly too much weight for an older person to handle safely.

29.3.3.1 HELPING OLDER ADULTS TO BE PREPARED: A QUALITY IMPROVEMENT STUDY OF EMERGENCY KITS FOR ELDERS

The Health Resources and Services Administration (HRSA) provided funding to the Gateway Geriatric Education Center of Missouri and Illinois (grant number D31HP70122) for train-the-trainer programming to teach 150 health-care professionals in the spring of 2006 how to create an emergency preparedness kit that was light, compact and specific for older adults. This kit consisted of a small satchel, a flashlight, a photo album (to store copies of prescriptions, insurance cards, evacuation plans, contact phone numbers, and family pictures), a pill box and a pamphlet

Table 29.6
Senior-specific emergency kit contents

• Bottled water	• Emergency contact information
• Family pictures	• FEMA's "Are You Ready?" booklet
• Cash (at least \$5)	• Three days to 1 week supply of medicines
• Pet evacuation plan	• Extra pair of glasses and hearing aids and extra batteries
• Identification bracelet	• List of medications and written prescriptions for those medications
• Flashlight and batteries	

introducing the FEMA Web site. The trainees were then taught what other materials should be added to the kit to make it appropriate for a particular individual (Table 29.6). Upon completion of this training each of the 150 trainees received two complete kits, one to use as an example during their subsequent training sessions of other health-care providers and the other to be given to a disadvantaged older person whom they deemed at risk during an emergency. Each participant provided an e-mail address in order to be contacted 1 year following their training to determine the outcomes of their training.

One year after training, the 150 trainees were contacted by e-mail. Twenty-three of the e-mail addresses were no longer valid. Of the remaining 127 trainees, 67 filled out and returned the survey within 2 weeks (53% response rate). An additional 18 surveys were returned after a second e-mail blast (85/127, for a final response rate of 67%).

The survey asked if, as a result of their training, had the trainees:

1. Given the extra kit to an older adult?
2. Determined if that kit had been used during an emergency?
3. Used their own emergency kits for training, and if not, why?
4. Used their own emergency kits during an emergency?

Responses to the quality improvement survey are summarized in Table 29.7. The majority of the trainees (94%) had given the extra kit to an older person and many

Table 29.7
Responses to quality improvement survey

<i>Question: Did you?</i>	<i>No. of yes responses (%)</i>	<i>No. of no responses (%)</i>
1. Did you give the extra kit to an older adult?	120 (94)	7 (6)
2. Was that kit had been used during an emergency?	59 (46)	68 (54)
3. Did you use your own emergency kits to train others?	19 (15)	108 (85)
4. Did you use your own emergency kits during an emergency?	23 (18)	104 (82)

of the respondents indicated that the person was either an older relative or a neighbor. However, few respondents (15%) had provided any training to other health-care providers on how to create these kits. Barriers cited included lack of money to purchase kit contents, lack of commitment or permission from supervisors, lack of time to provide the training, and lack of time for their colleagues to receive training.

The percentage of older adults that were reported to have used their emergency kits by the time of the end point survey was higher than expected (46%), especially given that only 18% of the (younger) trainees reported using their kits. However, a review of the disruptive weather patterns in the 11 counties in eastern Missouri and southwestern Illinois where the trainees (and therefore, presumably of the older adults receiving the extra kits) lived, indicated that three area-wide power outages had occurred between August 2006 and January 2007. All of these three power failures lasted 1–3 weeks, with the rural areas in southwestern Illinois being the last to get power restored each time. Each of these power failures affected at least a half million citizens each time. Numerous cooling or heating stations were set up for older adults, thereby allowing them to evacuate from their homes during the days in August and to receive warm meals during the November and January power failures. Multiple public service announcements encouraged people to evacuate their homes completely until power was restored, so many older adults either moved in with relatives who did have power or went to hotels. Under those conditions, it is reasonable to expect older persons to take their emergency kits with them. Many of the health-care provider trainees reported that they had gone to work daily. A brief second query to 10 trainees who had used their kits and 10 trainees who had not used their kits indicated that both sets had gone to work daily and returned home at night, even if they had no power at home. (These health-care providers worked in facilities with working generators.) Several of those that took their kits with them indicated that the kits provided them with some measure of safety while traveling icy roads in November and January. Those that had not used their kits indicated no perceived change in their normal safety.

This quality improvement study shows that emergency kits for older adults are used during an emergency. Community-dwelling older adults appear to be more vulnerable to weather emergencies than are the health-care providers who care for them, as evidenced by the differences in usage rates of the kits by both groups through three lengthy power outages. Upon review of the barriers that prevented trainees from providing training to other health-care providers, it is possible that it would have been more appropriate to provide train-the-trainer programs to older adults rather than to health-care providers. Peer-to-peer training might have had the added advantage of motivating trainers to find community funding to make kits for distribution because of a greater perceived personal need for the kits.

29.3.4 Intervention Strategies: Providing Aid During and Following a CE

Because every emergency event presents a unique challenge, this section offers general information about coping with the major nutritional concerns, namely shortages of food and water and overall loss of access to social support and

health-related resources. Optimal public health and nutrition relief includes a broad range of interventions and needs to utilize strong programmatic interconnections to meet the aforementioned needs.

29.3.4.1 COPING WITH FOOD AND WATER SHORTAGES

In the immediate aftermath of a CE, the supplies of food and water may be extremely limited. In this event, food can be more safely rationed than water. A general guideline is that the minimum adult ration be one well-balanced meal per day, with the utilization of vitamin/mineral supplements, protein drinks, “power bars”, or other fortified foods as meal extenders if available. However, water should not be rationed due to the very rapid effects of dehydration. Individuals are advised to drink what is needed today and search for more water on a daily basis. Indicators of dehydration in the elderly differ from those in younger individuals; increased thirst, reduced skin turgor are not reliable markers. Better indicators include tongue dryness, longitudinal tongue furrows, dry mucous membranes of the nose and mouth, eyes that appear sunken, upper body weakness, speech difficulty, and confusion (34).

When there is a loss of power to the home, perishable foods are to be consumed first, followed by foods from the freezer. Frozen foods should be safe to eat for at least 2 days following the power loss. At this point, nonperishable, staple foods would be the only safe source of nutrients.

As conditions stabilize, food aid will begin to become available. The recommended actions to be facilitated for older adults include (1) achieve/improve access to food aid (rations, supplemental feeding programs, etc.); (2) ensure that the rations are easy to prepare and consume; and (3) assure that the rations being used meet the nutritional requirements of older adults (35). The USDA’s Food and Nutrition Service (FNS) coordinates with State, local, and voluntary organizations to provide food for shelters and also distributes food packages and authorizes states to issue emergency food stamp benefits to individuals. As part of the National Response Plan, FNS supplies food to disaster relief organizations such as The Red Cross and the Salvation Army for mass feeding or household distribution. These organizations, along with other private donors, support the supply of water and food rations to affected areas.

There are several concerns related to the access and appropriateness of food aid for elderly individuals (again, see resources listed in Table 29.5). Access to the aid is a concern because disabilities and medical problems may prevent elderly individuals from reaching the distribution centers. Another concern is the composition of the food rations, which may not be appropriate in consistency for persons who have dentures or who lack teeth and that may not be adequate in nutritional composition. Food rations vary in composition; not all are developed for the primary purpose of post-CE relief. In the United States, the Meal, Ready-to-Eat (MRE), although first developed for use in the space program and now widely used by the armed forces, is one form of ration that is commonly distributed to civilians who need food following CEs. Having been designed for soldiers in a high activity situation, the MREs are much higher in sodium (5,500 g) and fat (136 g)

than is optimal, especially for older adults (36). Likewise, the texture, packaging, and preparation of MREs were not developed with the intention of use by older adults.

In an effort to supplement the nutritional needs of elderly citizens and to meet federal recommendations for increased emergency preparedness, the Administration on Aging (AoA) sought and received special funding to provide shelf stable meals that could be delivered to participants of the home-delivered-meal programs. These meals, which have a shelf life of approximately 16 months, are delivered with instructions to consume them during emergencies when regular home-delivered meal service is disrupted. The program is new so, to date, no evaluations have been done to determine what becomes of those meals (e.g., are they saved for emergencies or eaten to supplement other meals). No policy has been created to determine liability for any sickness caused by consumption of meals that are beyond their expiration date (*personal communication from Area Agency on Aging of Southwestern Illinois and the MidEast Area Agency on Aging to NT*).

Obtaining adequate food and water is only one step on the road to recovery where elderly persons are vulnerable to food insufficiency. Once food is obtained it must then be stored properly, prepared properly, and then ingested without health risk. In each of these steps, older persons are also at increased risk, compared to the rest of the population. This is because these older persons have additional risk factors for poor nutrition such as functional impairments, social isolation, reduced ability to regulate energy intake, greater susceptibility to depression, decreased ability to taste and smell, poor dentition, and poor health. All of these items (listed in Table 29.3) can lead to malnutrition, if not starvation, in older persons.

29.3.4.2 RE-ESTABLISHMENT OF BASIC SERVICES AND ACCESS TO MEDICAL CARE

Following a CE, the speed with which basic services such as heating/cooling, shelter, and water supply can be restored will be a major factor in the recovery of older persons. Past experience has shown that cold, loss of mobility, access to services, and psychological stress and trauma are some of the most important factors contributing to undernutrition in older people following a CE (37,38). In particular, the loss of social networks and support systems increases the vulnerability of these individuals (2) and needs to be corrected as soon as possible to prevent further deterioration as the days following the event go by. The best approach is to utilize programming strategies that address the needs of older adults without undermining their independence and discouraging their ability to support themselves (39,2).

The restoration of medical facilities and the provision of transportation to appropriate medical facilities in unaffected areas are not under the control of the individual clinician or caregiver. These efforts are usually dependent on the local police and military forces who take charge post-CE. Additionally, medical facilities will vary in their ability to handle the CE, depending on the type of emergency. For example, the response to a CE such as a hurricane (which would probably slow down access to the facility) would be very different than that required for an infectious disease epidemic (when admissions might very quickly exceed capacity) (40). The challenge for the clinician on the front line is to stabilize the older patient

until access to more formal support can be restored. Thus, the aforementioned preparedness efforts are key in preventing the acceleration of medical conditions from chronic to life threatening. The availability of medical records and prescription medicines, as recommended for the evacuation kits of older adults, can play a critical role in this regard.

29.4 RECOMMENDATIONS

In summary, the long list of complicated and threatening CEs that can affect the nutritional status and overall medical welfare of older adults underscores the fact that ALL older adults and their care givers, as well as administrators of structured living facilities, should plan for and be physically and psychologically prepared for the event of a serious CE.

1. Home-dwelling elders should be prepared for a CE by stocking a 2-week safety supply of food, water, and medications, having a carry-away disaster pack with medicines and other essential supplies, and having a delineated evacuation plan.
2. Administrators/Medical Directors should ensure that nursing homes and assisted living facilities are prepared with food and water supplies and an alternate source of power and have detailed, individualized evacuation plans for each resident. Ideally, a multidisciplinary team should utilize age-specific guidelines to design and implement a CE-preparedness plan.
3. In the future, there is a need for conceptual advances in understanding the causes of undernutrition in older adults during a CE and the development of better advance preparations and response mechanisms.

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