

LESSON 3-1

DISASTER TYPES

Lesson: Disaster Types

Authors: Robert Ellis Roush, EdD, MPH
Associate Professor of Medicine-Geriatrics
Baylor College of Medicine, Houston, Texas

Beth W. Allen, MPH
Project Consultant
Baylor College of Medicine

Brian A. Altman, PhD
Education Director, HJF
National Center for Disaster Medicine and Public Health (NCDMPH)
Uniformed Services University of the Health Sciences (USUHS)

Kelly Gulley
Project Coordinator, HJF
National Center for Disaster Medicine and Public Health (NCDMPH)
Uniformed Services University of the Health Sciences (USUHS)

Intended Audience of Learners

A broad range of health professionals who may work with the older adult population.

Competencies

This lesson supports learning related to the following competencies, with regard to *special considerations for older adults in various disaster types*:

Core Competencies and Subcompetencies from Walsh L, Subbarao I, Gebbie K, et al. Core competencies for disaster medicine and public health. *Disaster Med Public Health Prep.* 2012;6(1):44-52. doi: 10.1001/dmp.2012.4.¹

Core Competency 3.0 "Demonstrate situational awareness of actual/potential health hazards before, during, and after a disaster or public health emergency."

Learning Objectives

At the end of this lesson, the learner will be able to:

- 3-1.1 Describe particular health consequences on older adults of various natural and human-caused disaster types.

Estimated Time to Complete This Lesson

60 minutes

Content Outline

Module 3: Disaster types: Special considerations for the older adult population in disasters

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I. Disaster types

- a. Disasters, whether caused by nature or humankind, expose significant numbers of people to extreme conditions or events that often result in injury, loss of life, and destruction of or damage to property or livelihood. They have also been defined as events “with a diffuse or lack of perimeter and relatively high casualties where demand characteristics exceed locally available response capacity (hospitals, clinics, pharmacies, emergency medical services, fire public safety, transportation), systems set up for emergencies fail or work miserably, professional help is insufficient or impaired, and civilian assistance is galvanized.”²
- b. The threats include natural disasters (hurricanes, tornadoes, extreme temperatures, floods, earthquakes, tsunamis, wild fires) and infections (pandemic influenza and severe acute respiratory syndrome [SARS] as well as common infectious diseases).
- c. Exposure to hazards, including bioterrorism and terrorist threats, makes extreme demands on support systems and poses special problems for such vulnerable populations as the elderly. The Centers for Disease Control and Prevention (CDC) recognizes 6 class A agents: anthrax (*Bacillus anthracis*), botulism (*Clostridium botulinum* toxin), plague (*Yersinia pestis*), smallpox (*Variola major*), tularemia (*Francisella tularensis*), and viral hemorrhagic fevers (filoviruses, including Ebola and Marburg, and arenaviruses, including Lassa and Machupo).³ Among these, anthrax also exists as an exposure risk within normal transportation routes, for example, when shipped laboratory to laboratory.

II. General preparedness for care of elders in disasters

- a. Elders are recognized as a vulnerable population before, during, and after a disaster. The elderly are among the most vulnerable to direct or indirect harm from disaster⁴ and experience disruption from the event longer than others in different age groups. They are more likely than the general population to be susceptible to injury and disease and to be poorly nourished.⁵

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- i. *Homeostenosis* is a term that has been proposed as a way of describing the challenges older persons face. It not only incorporates the idea of diminishing strength and physiologic reserves as age increases but also recognizes that what reserves the older person may still have are already in use largely meeting the challenges of day-to-day living (see illustration below).⁶ Therefore, when an emergency or disaster occurs, the older person has fewer reserves on which to draw. This idea was emerging in 2008 in relation to an elder's diminished ability to respond effectively when challenged by persistent pain and the stress it causes.⁷
- ii. In 2005 when Hurricane Katrina made landfall, the elderly made up 11.7% of New Orleans's population, but of the 10,435 evacuees seen as patients in one medical clinic unit in Houston, 56% were older than 65 years of age, and of the 1200 people who died because of the storm, 74% were older than 60 years of age.⁸

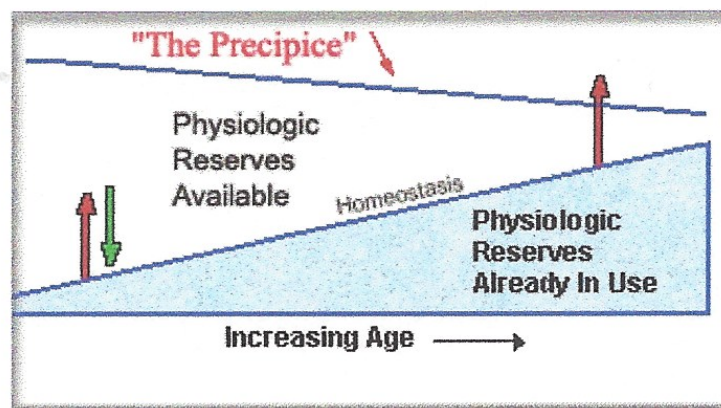


Figure. With increasing age, reserves (*blue shading*) are increasingly engaged in sustaining homeostasis; meanwhile, stress (*red arrows*) increases. (Reprinted courtesy of George Taffet, MD, and the Portal of Geriatrics Online Education at the University of Oklahoma Health Science Center.⁶)

- b. Older patients demand heightened skills in their physicians during routine care.⁹ Geriatricians remind physicians in training not to be fooled by an elder's fully immunized status or a lack of symptoms. A clinician cannot rely on such hallmarks as a pulse/temperature discrepancy, depend on a patient's old immune system, or ignore sentinels, or early indicators, of trouble. He or she cannot take comfort when an elder experiences a less-than-lethal exposure and cannot forget that symptoms are confounded when patients take beta-

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- adrenergic and procholinergic agents. Furthermore, they must remember that anxiety and depression cannot be ignored.
- c. Older adults also demand heightened skills in their physicians and other health care professionals during disasters. They merit special care,¹⁰ and disaster specialists need to train health care professionals about the following aspects of disaster-related preparation and care¹¹:
 - i. Identify where frail elders are most likely to be located before, during, and after a disaster.
 - ii. Train first responders and other frontline providers in how elders present differently.
 - iii. Teach an approach that considers all hazards—physical, mental, and psychosocial dimensions—whether the disaster is natural in origin or human-caused.
 - iv. Ensure providers have a foundation in culturally and linguistically appropriate care.
 - v. Ensure that older persons as well as health care providers are engaged in practical planning regarding emergencies and disasters, including receiving emergency alerts, undertaking evacuations, and living in shelters.
 - d. Preparations for disaster should address risk of infections.

Apart from vaccines commonly administered during childhood, vaccines for adults 65 years of age and older include an annual flu vaccine; a tetanus, diphtheria, pertussis vaccine once with a booster every 10 years; a shingles vaccine; a pneumonia vaccine; and a *Haemophilus influenzae* type b vaccine (physicians will provide counsel on the number of doses needed). See the CDC's guide to immunizations at <http://www.cdc.gov/vaccines/schedules/downloads/adult/adult-schedule-easy-read.pdf>.¹² Discussed below are the seasonal influenza vaccine and the pneumonia vaccine, for which recommendations have recently changed.

 - i. Seasonal influenza—Boyd et al. (2006)¹³ report that influenza in the elderly, who specifically are most often at risk of complicated, serious disease, may present uncharacteristically (e.g., with undifferentiated syndromes of sepsis in old age—incontinence, immobility, falls, and delirium). Risk is also higher for those with chronic medical conditions and those who live in chronic care facilities. The elderly in nursing homes have a higher risk of flu complications. Although seasonal influenza may occur mainly in winter in temperate zones, travelers to tropical areas, where it occurs year-round, may become infected at any time. Annual flu vaccines are important to emphasize as an important component of infection control.

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- ii. Pneumonia—Pneumonia, a life-threatening lung infection, is caused most commonly by pneumococcus, but other bacteria, viruses, and fungi can cause it also.¹⁴ About 90% of deaths that result from pneumonia occur in patients ≥ 65 years of age,¹⁵ and 18,000 adults ≥ 65 years of age die from pneumonia annually in the United States.¹⁴ In a recent European study, mortality increased with age and was associated with increased comorbidities in 2149 patients with community-acquired pneumonia who were 65 years of age and older.¹⁶ Decline in function or a change in mental status are common presenting characteristics, whereas the familiar signs of fever and leukocytosis are often absent.¹⁵
 - e. Preparations for disaster should address the elderly and their risk of pandemic influenza and SARS-like infections.
 - i. The government recognizes that the elderly are at high risk of death or severe complications during pandemic influenza. In as much as a vaccine most likely will not be available early in an influenza pandemic, the federal government has identified those older than 65 as being in general population tiers 2, 3, or 4, depending on if the pandemic is less severe, moderate, or severe, respectively.¹⁹
 - ii. SARS—Severe acute respiratory syndrome (2002–2003) cost the economy of the Far East alone \$30 billion and had a case fatality rate of 11%.²⁰ The mean incubation period of SARS of 6.4 days (range, 2–10 days) facilitated its spread globally by symptomless infected air travelers.²⁰ Approximately 900 people died, and 20% were health care workers.²⁰ Old age and comorbidities, particularly diabetes, were major characteristics associated with risk of death.²⁰
 - iii. Elders live, as do all, in a global village.
 - (a) International travel makes infectious disease control an international issue.²¹
 - (b) To prevent mass casualties from a pandemic would require resources few countries have, making management solutions a cooperative imperative.²¹
 - f. Preparations for disaster should address the preservation of ethics and the importance of providing culturally and linguistically appropriate care despite challenges presented during disaster.
- III. Natural disasters—consequences for the elderly
- a. Hurricanes
 - i. Evacuation may be difficult for immobile seniors, those with diabetes or kidney disease requiring dialysis, those with cancer undergoing

- chemotherapy or radiotherapy, or those without support or transportation. Compromised immune systems mean greater risk of infection.
- ii. Frail elders and those with cognitive impairment may only be able to navigate shelter services with help and may need to call on others to prevent theft or coercion.
 - iii. Social support and community in the shelter may be more important to older patients than medical care.⁸
- b. Tornadoes—Fanfair et al (2011)²² reported necrotizing cutaneous mucormycosis in tornado-torn Joplin, Missouri, in 13 patients, 5 of whom died. The authors alerted emergency personnel to these cases, caused by necrotizing soft-tissue infections.
- c. Extreme temperatures—Older adults have more difficulty than others, just as do children, adjusting to variations in temperatures.²³ Affecting their ability to adjust to climatic change are age-altered thermoregulatory mechanisms and age-altered cardiovascular, respiratory, and central nervous system function. Furthermore, trauma can exacerbate these conditions. Patients may experience, on a continuum, heat edema, heat syncope, heat exhaustion, or hyperpyrexia (heatstroke), the last of which can be fatal.
- i. Extreme heat—Climate change is expected by mid to late 21st century to intensify and increase warm spells and heat waves, increasing death rates not only among the elderly but also among the chronically ill and the socially isolated—which could also include older persons—and the very young.²⁴
 - (a) In Chicago during a week-long heat wave, deaths indicated that poor African Americans were extremely vulnerable, but differences in mortality rates across poor black neighborhoods indicated that the least resilient were those neighborhoods that over the preceding 30 to 40 years had lost jobs, a police presence, and infrastructure.² Seven hundred people died, and most of them were old, living alone, or poor.²
 - (b) In 2003, a heat wave lasting 3 weeks in France claimed the lives of 14,000 persons, most of whom were elderly.²
 - ii. Extreme cold—Hypothermia is defined as a core temperature below 94°F.²³ It can occur as a result of a catastrophic event or as the result of a sequence of physical, mental, and pharmaceutical insults.
- d. Floods—In a cohort of 274 adults 60 years of age or older surveyed before and after experiencing a flood, investigators found resilience in those using acceptance, positive reframing, and humor, which were a deterrent to

- deterioration.²⁵ Post-traumatic stress disorder (PTSD) possibly requiring clinical attention was reported in 16.7% of those personally affected by the disaster.²⁵
- e. Climate change—A review of the literature assessed the vulnerability of older Americans to climate change and found them likely to be at risk. The reviewers determined that, apart from the proven adverse effect of heat on older adults, gaps in research remain for other risks related to climate and that these gaps need to be closed.²⁶ They also pointed out that if trends toward higher education levels and decreasing poverty continued for older Americans, their vulnerability would likely be less for future elders than for current elders.
- IV. Disasters caused by biological, nuclear/radiological, incendiary, chemical, and explosive agents—concerns in the elderly
- a. In exposures to biological, nuclear/radiological, incendiary, chemical, and explosive agents (BNICE), as in other disasters, the elderly are vulnerable because of age-related changes,²⁷ including their tendency to have responses that are delayed, sensory deficits, and chronic conditions (including chronic obstructive pulmonary disease) and to be less readily mobile than other age groups. Cardiovascular disease, cognitive impairment, atypical presentation of disease, and age-related debilitation of major organ systems also can make the elderly more vulnerable, not only to external insults but also to delayed diagnosis or misdiagnosis when professional help is available.
 - b. Professional preparedness—Emergency responders need to ask themselves how prepared they are to meet the needs of elderly citizens who have been exposed to one or more BNICE agents.
 - c. Personal preparedness and response
 - i. Follow general directions of government— See *Ready: Prepare. Plan. Stay Informed*.²⁸ The Federal Emergency Management Agency publication offers guidance for many hazards, including exposure to BNICE agents. Overall guidance remains (a) be informed, (b) make a plan, (c) build a kit, and (d) get involved.
 - ii. Protect body integrity—One of the most critical decisions to be made when approach of a disaster is known is whether to evacuate or shelter in place. Assessing personal abilities and limitations is important in deciding how to respond to a disaster.²⁹ Those elders who cannot drive or do not have a vehicle should make a plan with family, neighbors, or community services. Or, if living with other elders, seniors should find out what emergency plans there are for the residents.²⁹ Likewise, making a plan ahead of time for the safety of the family pet or personal service animal should include

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identifying people (family, friends, veterinarians) and places (boarding facilities and pet-friendly hotels) that will shelter the animal.²⁹

- iii. Protect airways—Because of the critical importance of lung function and because aging is commonly linked with respiratory function decline,²⁸ special attention is required to pulmonary issues. Physiologic changes in the elderly affecting the pulmonary system include a loss of vital capacity, decreased lung elasticity and forced respiratory volume,³⁰ and an increased risk of infection and toxicity.³¹ Risks from exposure include bronchiolitis or pneumonia, and cases become more complex when exposure occurs and acute bronchitis or upper respiratory tract infection already exists. Studies with agent-based modeling of fluid dynamics have indicated in some cases that forgoing evacuation might be best and that remaining in low-permeability spaces may be the best approach to minimizing exposure.² Such modeling can take into consideration the lower speed and less facile maneuverability of older adults.
 - iv. Recognize the demands of chronic illness—In those with chronic illness, conditions of an alien post-disaster environment—severe heat or cold, lack of electricity, absence of pharmacy and health care services, risk of infection, absence of home services that made independent living possible, separation from loved ones (family, friends, pets, and community), and stress—can worsen chronic conditions. When these conditions outlast medication supplies, emergencies ensue.
- V. Complications from disaster experience
- a. Whatever ailment health care providers treat, they should use evidence-based interventions.³²
 - b. Whatever the disaster, those who are psychological casualties may be expected to outnumber the physical casualties 2 to 1.³³
 - i. Though conventional wisdom may promote immediate psychological help, research indicates that what disaster victims need most immediately after exposure is support from those they trust and a return to normalcy.^{34,35}
 - ii. Older people more commonly experience delayed onset of post-traumatic stress disorder (PTSD), which can occur 6 months after disaster.^{36,37} Some have found that rates of PTSD differ little between the young and the old^{36,37}; nonetheless, elders have unexpectedly been found to have better long-term psychological outcomes than do young adults.²
 - iii. Psychological problems may have physical implications. PTSD after disaster was linked in a population of almost 900 survivors of a natural disaster to an

- increased risk of new vascular problems (odds ratio = 1.92; 95% confidence interval, 1.04-3.55) and musculoskeletal and dermatological problems.³⁵
- d. Displaced elderly patients may experience psychological and physical symptoms. Low back pain, enhanced by heightened norepinephrine and sympathetic nervous system activity, may occur, making relapses and chronic pain in older patients more likely.³⁸
 - e. Older adults may be slower to seek and more reluctant than others to register for post-disaster assistance.³⁹ Outreach may mitigate this problem.
 - e. Scams, including financial exploitation, meant to take advantage of the elderly are initiated by unscrupulous people after disasters.²⁹ See warnings from the Federal Trade Commission.⁴⁰

Suggested Learner Activities for Use in and Beyond the Classroom

1. Ask the learners to form small groups and discuss the following questions:
 - Of the disaster types discussed in this lesson, which are more likely in your community?
 - Discuss current preparedness initiatives in your community related to these disaster types and how the needs of older adults are being incorporated.
 - Based on your role as a health professional, what can you do to improve the health consequences for older adults within your community for the disaster types you just discussed?
2. You have been asked by your local public health department to create a communication campaign for older adults/elderly in your community. The funding for this campaign allows you to select the disaster type that you wish to focus on. Your funding also allows you to decide which media can be used for this campaign (social media, e-mail, flyers, posters, radio ads, TV commercials, communications to local organizations, phone messaging, text messages, etc.) The funding requires that your communications address the preparedness, response, and recovery phases. Work in groups to create communication messages of your choosing and then present them to the full group.
3. You are invited to give a Grand Rounds presentation to your colleagues about disaster types and the special considerations for the geriatric population. In order for your session to be accredited for continuing education, you need to provide 3 learning objectives. You also will prepare a bulleted list of the main points to present in your presentation. Learners should work individually and create the learning objectives and a bulleted list and present to the group or hand in to the instructor.

Readings and Resources for the Learner

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- Required Resources
 - Walsh L, Subbarao I, Gebbie K, et al. Core competencies for disaster medicine and public health. *Disaster Med Public Health Prep.* 2012;6:44-52.
- Supplemental Resources
 - Gibson MJ. We can do better: lessons learned protecting older persons in disasters. AARP website. <http://www.aarp.org/home-garden/livable-communities/info-2006/better.html>. Published May 2006. Accessed February 4, 2015.

Learner Assessment Strategies

1. On the basis of the content in this lesson, list at least 3 disaster types and 1 health consequence for older adults associated with that disaster type.

Readings and Resources for the Educators

- Required Resources
 - None
- Supplemental Resources
 - None

Sources Cited in Preparing Outline and Activities Above

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