CHAPTER

10

The role of the health sector in planning and response

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This chapter provides an understanding of

- The importance of coordination between the health sector and other organizations and agencies in disaster planning and response
- The role of the health sector in planning and response
- The role of the public health system in disasters
- Formal planning for disaster health care.

Unlike routine emergencies, disasters tend to cross political, jurisdictional, functional, and geographic boundaries. As a result, disasters often generate responses from multiple levels of government (city, county, special district, state, tribal, and federal), and from multiple organizations and entities in both the public and private sectors. To mount an effective response, public and private organizations that normally operate autonomously and independently must work together.[1]

Unfortunately, the policies and procedures that should be in place to ensure multiagency coordination and communications are often lacking. Many of those involved in the response may never have worked together before. They may have different training, organizational structures, equipment, and procedures, and they may use different terminology and communications frequencies. Moreover, local authorities may not be aware of all the entities and resources that are available, much less be able to integrate them into the response effort.[2] Under these circumstances, the usual means of coordinating routine responses will be ineffective.

The purpose of this chapter is to familiarize emergency managers with the role of the health sector in coordinated disaster planning and response. For the purposes of this discussion, the health sector includes medical institutions (e.g., hospitals, clinics, pharmacies), medical practitioners (e.g., doctors, nurses, emergency medical technicians), and public health agencies (e.g., state, tribal, and local health departments). After a brief discussion of the context in which coordination occurs, the chapter describes the role of the health sector in disaster-related activities. It then outlines the role of the public health system in disasters and provides an overview of formal planning for medical response.

Coordination in disaster planning and response

The health sector is not alone in providing assistance to the ill and injured in disasters. Public safety agencies, including fire and police departments, take part in search and rescue, transport of casualties, decontamination of casualties, and provision of emergency medical care and first aid. In addition, there is often substantial involvement on the part of the military and, most importantly, spontaneous volunteers (including the survivors themselves). Thus, it would seem obvious that local government—including emergency managers—and the health sector should communicate and coordinate with one another in disaster planning and response. But the challenges posed by disasters often make this difficult. In fact, health sector organizations often fail to coordinate even among themselves.[3] For example, a 2004 survey of hospitals in Los Angeles County revealed not only that 67 percent had never participated in joint training with local police and fire departments, but also that only 16 percent of them had written mutual aid agreements with other hospitals.[4]

Coordination between local governments and the health sector is complicated by the fact that most health care in the United States is provided by the private sector (e.g., private hospitals, private physicians, and private ambulance services) and is therefore largely outside of the direct operational and fiscal control of government. As a result, coordination with these private entities requires skills in negotiation, mediation, facilitation, and compromise—skills that, while not generally associated with the top-down, command-and-control approach characteristic of the civil defense era, have become increasingly important in modern emergency management.[5]

The emergency manager may be the only person in the community whose constant focus is on preparation for disaster.[6] Thus, he or she is in a unique position to promote interorganizational planning and preparedness, and to ensure that the local government and health care organizations and agencies work together. The emergency manager must also ensure that all organizations, including those in the health sector, understand that they *need* to cooperate with one another. Readiness for medical emergencies depends on the ability of local government, public safety agencies, *and* the health sector to plan, train, drill, respond, and evaluate jointly.

In some communities, established groups (such as local emergency planning committees or the local Metropolitan Medical Response System) may serve as the focal point for

Failure of coordination: The Station Nightclub Fire

The 2003 response to the Station Nightclub Fire in West Warwick, Rhode Island, illustrated the inadequate coordination between the local government and health care organizations. Shortly after 11 PM, during a rock band performance, a pyrotechnic display set off a fire in the nightclub, injuring more than 200 patrons and killing 100 others. While at the individual tactical level the response was remarkable and heroic, at the strategic level there were numerous system problems:

- Private ambulances in Rhode Island do not normally respond to 911 calls, nor was there a plan for using them in disasters. Thus, when they were needed to supplement the number of available public ambulances, the fire department had to look in the Yellow Pages to get contact information. Moreover, because of the lack of coordination, the police and fire departments independently requested private ambulances at the same time, and local officials made no attempt to periodically assess the location and safety of those ambulances while they were being used to transport patients from the nightclub to hospitals. Moreover, none of the ambulances in use—whether fire department, municipal, or private—knew how to contact the local hospitals to which they were transporting patients.

- No plan existed to guide the use of medical helicopters in disasters.

- Although both police officers and firefighters from all over the state provided care for the injured, they set up separate command posts and did not coordinate their efforts.

- The state emergency management agency did not declare a disaster and did not activate the statewide mass casualty plan, nor were any emergency operations centers activated in this incident. In the absence of a declaration, and concerned about patient privacy protection, hospitals were reticent to share desperately needed victim information with the emergency management agency so it could compose accurate lists of the missing.

No one was designated to coordinate the overall responses of the various hospitals. For example, hospitals did not coordinate with one another or with the emergency management agency in requesting medical help through the U.S. Department of Homeland Security. Such coordination was also absent when it came to the transfer of patients to out-of-state hospitals.

Source: Titan Corporation, *The Station Club Fire: After-Action Report,* Contract no. GS10F0084K2001F_341 (Washington, D.C.: Office for Domestic Preparedness, U.S. Department of Homeland Security, 2004); available at llis.dhs.gov/member/secure/getfile .cfm?id=10806 (accessed August 22, 2007).

community-wide emergency planning.[7] If a community-wide emergency planning committee does not exist, the emergency manager should establish one and ensure that it includes government and health sector representatives. One approach is to establish a health sector planning subcommittee as part of a larger group; examples of who should be represented on this subcommittee are shown in Figure 10–1. Provisions for a community-wide joint emergency operations center, the use of joint incident command following disasters, and the establishment of an intercommunity and interagency radio system and mutual aid plan also facilitate collaborative, strategic responses.

Figure 10-1 Recommended representation on a community- or areawide disaster health planning subcommittee

Hospitals
Clinics
Mental health agencies, clinics, and hospitals
Urgent care centers
Emergency medical service agencies, providers, and dispatchers
Medical societies (private physicians)
Poison centers
Dialysis (artificial kidney) centers
Environmental protection agencies
Public health agencies
Nursing associations
Nursing registries[1]

Red Cross
Medical Reserve Corps
Psychiatrists, psychologists
Disaster medical assistance teams
Jail infirmaries
Physician paging services
Social workers
Rehabilitation centers
Rescue teams
Hospices
Assisted living facilities
Nursing homes

[1]A nursing registry is an organization that registers local nurses who are available for work. This work could be providing temporary coverage at hospitals, making nurses available for private work in the home, or other situations where nurses are needed on a temporary basis.

The role of the health sector in disaster planning and response

As discussed in Chapter 1 of this volume, disasters differ from emergencies qualitatively as well as quantitatively: disasters often require health sector responders to carry out tasks that are different from those called for in routine emergencies, and to do so under conditions of great urgency and uncertainty. This is why specific planning and training for disasters is necessary. Among the most important tasks are

- Communication
- Search and rescue
- Triage
- Hospital and nursing home evacuations
- Victim tracking and handling public inquiries
- Managing medical donations
- Managing contamination
- Ensuring access to nonhospital sources of medical care
- Dealing with loss of response infrastructure.

Communication

As noted earlier, disasters require different organizations—often from different jurisdictions and levels of government as well as from the private sector—to work collaboratively. One of the keys to successful collaboration is clear, accurate, and timely communication. Hospitals need prompt notification of disasters so that they can, for example, transfer or discharge stable patients to make room for incoming victims; expedite the transfer of patients from the emergency department to floor beds; open up and staff auxiliary rooms to treat disaster victims; call in off-duty staff; and, if needed, set up decontamination areas and distribute personal protective equipment. Often, however, hospitals are taken completely by surprise: the earliest notification they receive is from the first arriving casualties or the news media, rather than from officials in the field.[8]

In the event of disaster, the following information needs to be shared:

- The nature and scope of the disaster
- Whether hazardous substances are involved
- Whether physician teams are needed at the site
- What arrangements are being made to get health care staff and suppliers through police security lines
- Estimates of the number, types, and severities of casualties
- The number and types of casualties that each hospital can accommodate
- The number and types of casualties being sent by ambulance to each hospital, along with estimated times of arrival
- Whether outside health sector resources are needed
- Where incoming resources should report (e.g., at a designated staging or check-in area, as shown in Figure 10–2)
- What hospitals and health facilities need traffic control or security assistance from police
- What hospitals or health facilities need to be evacuated
- Whether hospitals need fire department assistance because of hazardous material (hazmat) spills, or loss of fire alarm systems or sprinklers
- What hospitals need water, food, supplies, supplementary staff, or electrical generators (or fuel for them)
- When the last casualty will be being transported
- What precautions fire and police need to take to protect themselves (e.g., against exposure to biological, chemical, or radioactive substances contaminating victims or the disaster site) during response and recovery activities.
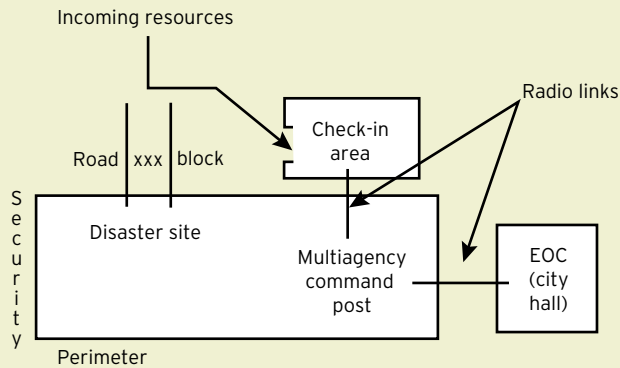
Source: Erik Auf der Heide, *Disaster Response: Principles of Preparation and Coordination* (St. Louis, Mo.: C. V. Mosby, 1989), 77, available at orgmail2.coe-dmha.org/dr/index.htm (accessed August 22, 2007).

Telephone and radio technologies   More than half a century of experience has shown that even if the usual means of communication—land lines and cellular phones—are not damaged, circuits or networks rapidly become overloaded and unusable. Pagers, two-way radios, and Internet connections that rely on telephone connections are also prone to failure.[9] One of the most common observations in disaster after-action reports is the need for interoperable radio communication networks to tie the various emergency response organizations together.[10] This need was recognized as far back as 1983 in a report titled *California's Emergency Communications Crisis,* published by the California legislature's Joint Committee on Fire, Police, Emergency and Disaster Services.[11] But twenty-five years later, the need has still not been met,[12] largely because of a lack of funding.[13]

Dealing with overresponse and self-dispatch

A disaster often sets off a larger response than may actually be desirable. For example, those who first arrive on the scene may request assistance ("It's a big one. Send everything you've got") before fully assessing the need. Both trained and untrained volunteers may hear of the disaster on police scanners or via the news media, assume that help is needed, and "self-dispatch." Although it is unlikely that overresponse, or convergence, and self-dispatch can be eliminated in disasters, some measures can be taken to reduce it:

- Avoid appeals to send "all available ambulances" or have "anyone with first aid training" go to the scene. The response is often far greater than intended, and the request is difficult to cancel once issued.

- Be proactive in announcing over the media and public safety radio frequencies when additional help is *not needed*.

- Initiate a needs assessment (or "situation assessment") and mutual aid plans as rapidly as possible. With mutual aid plans to guide dispatch, ad hoc mobilization and self-dispatch of unneeded resources may be reduced. Mutual aid plans can also specify staging or check-in areas near but not in the impact zone, thereby allowing the command post to identify what resources have responded and to keep them out of the way until they're actually needed. Mutual aid plans should include provisions for proactively notifying mutual aid resources when they are not needed. In the absence of mutual aid plans (and associated mutual aid communications systems), outside responders have difficulty finding out if their help is needed and, assuming that too much help is better than too little, will self-dispatch.

- Have emergency personnel and vehicles respond to a staging or check-in area where they can be held until needed, released if unneeded, or assigned a response task as required. These areas can be situated adjacent to, but outside of, the impacted zones to reduce unnecessary emergency vehicle congestion (see Figure 10–2 above).

Ultimately, however, planners will need to train local responders to expect unsolicited assistance and should designate persons to help coordinate their efforts.

Emergency managers can take a number of steps to improve disaster communications. For instance, they can

- Promote the creation of a community-wide emergency communications committee with the responsibility to establish (1) common communication frequencies for mutual aid requests and (2) procedures to link health sector organizations with one another and with public safety organizations and dispatchers

- Work with surrounding communities or the state to establish mutual aid systems (with associated communications networks) with those entities

- Work with cellular and telephone companies to give electronic priority ("essential service" designation) to health sector organizations when circuits are overloaded

- Make arrangements to distribute mobile cellular towers ("cells on wheels") and antenna towers, portable and mobile two-way radios, and portable radio repeaters

- Find other creative ways to communicate, such as using motorcycle club members as couriers.

The role of the media   Emergency management has traditionally focused on what local government and other disaster responders should do to protect the public. However, increasing attention is being given to the role of the media in assisting and informing the public.

In the event of disaster, many factors can compromise the media's ability to reach the public; some of these factors are related to the inherent limitations of warning systems, others to the effects of the disaster itself, and still others to inadequate preparedness. Sirens are a notoriously poor means of warning the public: they may not be heard, and even if they are, they cannot provide specific information on the nature of the threat or on steps the public should take to protect itself. Although tone-alert weather radios can now be used for all-hazards disaster notifications, few people own these devices. If a disaster occurs at night, when most people are asleep, warnings broadcast over commercial television and radio stations may not be heard; moreover, a disaster may lead to the loss of electrical power, which means that most people will lose television, satellite, and cable services. Commercial broadcast stations may themselves lose power as the result of a disaster and may not have emergency generators; these stations may also have no one on duty to receive warnings from local officials, especially in smaller communities where they merely rebroadcast satellite feeds during nighttime hours.

Emergency managers need to work with media outlets to ensure that those outlets can survive and function after disasters—for example, that they have emergency backup power, backup antennas, food and provisions for long staff stays at the station, a means for emergency officials to contact station staff after normal business hours, and agreements with surrounding stations to broadcast information into the local area if the local station cannot broadcast. Stations should be educated about local disaster threats, such as high winds, flooding, and seismic risks, so that they can take protective action for their facilities and staff. In the event that communication through mass media fails, emergency managers need contingency plans for providing door-to-door warnings and information on protective actions.[14]

The role of citizens   Increasing attention is also being given to how members of the public can help themselves and others. They can, for example, evacuate the area, shelter in place, help locate victims, decontaminate themselves, obtain vaccinations, maintain sanitary conditions, take antibiotics, and exercise proper precautions when using emergency generators to protect against carbon monoxide poisoning. During the first outbreak of West Nile virus in the United States, for example, the public was enlisted to identify and eliminate the breeding areas of mosquitoes that spread the disease.[15] During the 2003 pandemic of severe acute respiratory syndrome (SARS), studies showed that transmission of the disease was significantly reduced by simple measures taken by the public, such as frequent hand washing and use of surgical masks.[16]

In order to take self-protective actions, the public needs accurate and consistent information on

- The nature of the health threat

- The location and geographical extent of the threat (e.g., in the case of a plume of hazardous material, where it is, where it is going, and how fast it is moving)

Public response to a bioterrorism attack

Federal, state, and local planners are developing strategies to rapidly vaccinate the public in the event of a smallpox attack. Such strategies include procedures for quickly obtaining smallpox vaccine from national stockpile locations around the country, setting up clinics in schools and other locations, and triaging and vaccinating large numbers of people within a few days. Strategies should also include provisions for notifying the public about the availability of vaccines and about priorities for who should receive the vaccine, especially if there are shortages.

However, a 2004 report by the Center for the Advancement of Collaborative Strategies in Health points out the problems that can occur with planning for catastrophes with which we have no previous experience,[1] such as a smallpox bioterrorist attack. Planners have assumed that in the event of an attack, the public would be very worried about catching smallpox and would follow instructions to go to clinics and be vaccinated. In fact, plans detail crowd control measures to deal with the anticipated flood of people who would show up at the vaccination sites. But interviews with citizens revealed that only 24 percent would rush to vaccination sites, 19 percent would go later when it was most convenient, 2 percent definitely would not go, and 55 percent would need more information before they decided to go.

Interviewees gave a number of reasons for not getting a vaccination, including the mistaken beliefs that they were already immune because of a previous vaccination or that they were not at risk because their lifestyles did not bring them into contact with many people. Other reasons included such fears as that they might contract smallpox at the triage-and-vaccination clinics, that they might be carrying the disease and would expose others at clinics, or that the government would not tell them about dangerous side effects or risks of the vaccine.[2]

[1]Roz D. Lasker, *Redefining Readiness: Terrorism Planning through the Eyes of the Public* (New York: Center for the Advancement of Collaborative Strategies in Health, New York Academy of Medicine, September 2004), available at redefiningreadiness.net/pdf/RedefiningReadinessStudy.pdf (accessed July 20, 2007).

[2]Ibid.

- How people can determine whether they have been exposed to a communicable disease or hazardous substance
- What symptoms the disease or exposure to it causes
- How the illness or contamination spreads
- What to do in case of illness or exposure—for example, where to get treatment or preventive care (e.g., antibiotics or immunizations)
- The risks of illness or exposure at hospitals or other treatment locations
- The long-term effects of exposure
- The effectiveness of recommended self-protective measures
- If evacuation is ordered, what specific areas need to be evacuated, what the evacuation routes are, where shelter is available, and how to obtain assistance in complying with evacuation orders.

When it comes to providing information about a disaster, *how* communication occurs is often as important as *what* is communicated. The following guidelines will help emergency managers improve the effectiveness of risk communication:

- Before disaster strikes, work with health sector organizations and other agencies to develop procedures for ensuring that the public receives information that is consistent and up-to-date. Assign subject matter experts to listen to and watch all media broadcasts to identify inaccuracies and inconsistencies and bring such problems to the attention of those who can resolve them.
- Communicate openly and honestly. Officials are sometimes reluctant to share information with the public, either because they don't want to cause panic or because they feel that the public will not comprehend the complexities of the situation. But in fact, panic is extremely rare in disasters, and the public usually responds in an adaptive and productive manner. Officials should be candid about how much they do or do not know about health risks, and should give the public some indication of when additional information will be available.

- When disaster strikes, provide accurate, consistent information through multiple sources trusted by the public, recognizing that different segments of the public differ in what languages they understand, where they routinely seek information, and whom they trust. The effectiveness of a warning is enhanced if it is issued repeatedly.

- Tailor disaster-related communication to the specific needs of the community. For example, in Hurricane Katrina, those in low-income neighborhoods needed to know how to access public transportation for evacuation, while those in more affluent neighborhoods who owned private vehicles needed to know what roads were open.

- Ensure that communication is two-way. Establish call centers to expeditiously address inquiries from concerned citizens (which, of course, presumes an intact telephone system—by no means a given), and make sure those call centers receive continual updates. Plan and talk with formal and informal community groups.

- Use technology effectively to get meaningful information to the public. Warning sirens, for example, carry the least specific information but may be successful in getting the public to turn to sources of more specific information, such as broadcast radio or television.[17]

Search and rescue

Initial post-disaster search and rescue is not usually well-coordinated—in part because most of it is usually carried out by the survivors themselves.[18] However, because the need for widespread search and rescue is rare in routine emergencies, and because the roles and responsibilities related to this task often have not been previously worked out or practiced, this lack of coordination often persists even when official emergency response agencies become involved.[19]

It is unrealistic to believe that massive spontaneous citizen involvement in post-disaster search and rescue can be controlled or prevented. (There is even some question as to whether preventing it—if it were possible—might result in the loss of life because of delays in locating trapped victims.) However, the effectiveness of disaster search and rescue can be improved by training law enforcement officers and firefighters to coordinate the work of spontaneous volunteers and by agreeing on who should be responsible for coordinating the volunteers.[20]

Because survivors of a disaster are the ones most likely to know where the missing are located, it is beneficial to involve them in the search and rescue effort. Those coordinating search and rescue should make it a point to interview survivors—both those in the field and those who have been transported to hospitals—to find out where victims were last seen before disaster struck. Registration clerks in hospital emergency departments should have protocols for obtaining this information (or, at least, contact information for persons who have this information) and relaying it to rescue officials in the field. It is important for hospitals to note not just who the victims are but who brought them to the hospital, because these persons may also have information on other missing persons or may be reported as missing themselves. In the same way, Neighborhood Watch, Citizen Corps, and other community organizations can also assist with search and rescue.

Triage

The word *triage* is derived from the French verb *trier,* which means "to sort." The fundamental principle of triage is to do the greatest good for the greatest number. Generally, care is provided first to the most serious casualties and to those most likely to survive as a result of that care (see Figure 10–3).

During the triage process, casualties are assigned to priority categories—often designated by a number or color—for treatment and transport. Because categories are not currently governed by a universally accepted standard, they may vary depending on the locality. However, many localities use a four-category system, such as red (critical), yellow (urgent), green (minor), and black (dead, or "unsalvageable" given the resources available).

Despite its importance, field triage is often not carried out in disasters. Among the reasons for this may be the lack of training for emergency medical service (EMS) providers on how to carry out and coordinate triage in multiagency, multijurisdictional responses; a lack of medical authority and direction in the field; and the tendency of untrained survivors who are involved

Source: T. Okumura et al., "The Tokyo Subway Sarin Attack: Disaster Management, Part 1: Community Emergency Response," *Academic Emergency Medicine* 5, no. 6 (June 1998): 813–617.

in search and rescue to transport casualties to the closest hospital, bypassing any field triage station either because its existence and location are unknown or because such care is considered inferior to that available in hospitals.[21]

Doing the greatest good for the greatest number in a disaster involves more than assigning priorities for treatment and transport. It also means using available medical resources as efficiently as possible. For example, patient destinations should be coordinated on a community-wide basis so that no hospital receives a disproportionate share of the casualties. Further, casualties should be sent to those hospitals that are best suited to provide the care needed. For example, it is preferable to send patients with minor injuries to facilities other than the trauma center, and to send severely burned victims to facilities that are specifically equipped to handle burn injuries.

Unfortunately, this is not what usually happens in disasters. Instead, the majority of casualties—including the most serious cases and those who are dead on arrival—often end up at the hospitals that are closest to the high-impact areas, that are more familiar to those performing the transport, or that are renowned for providing emergency care. A study conducted by the Disaster Research Center, at the University of Delaware, found that in 75 percent of the disaster events studied, more than half of the casualties were transported to the closest hospital.[22] Numerous other disaster case studies have reported similar findings.[23]

Uneven or inappropriate distribution of casualties occurs for a number of reasons, including lack of planning and training, failure to assign responsibility for coordinating casualty distribution, and lack of interagency radio communications. Another reason is the ad hoc transport of casualties by nonambulance vehicles such as private cars, police cars, buses, and taxis.[24] Many individuals who are searching for and rescuing victims believe that the best emergency care is transport to the closest hospital by any means as quickly as possible. If enough ambulances are not readily available, volunteer rescuers don't tend to sit by idly awaiting their arrival but instead use the most expedient transportation means at hand to get casualties to medical care. After the 2001 World Trade Center attack, for example, only 7 percent of the casualties transported to area hospitals arrived by ambulance.[25] Similarly,

after a sarin gas attack on the Tokyo subway system in 1995, Tokyo's St. Luke's hospital, one of the medical facilities closest to the attack, received the most casualties, only 7 percent of which arrived by ambulance; of the rest, 35 percent arrived on foot, 24 percent by taxi, 14 percent by private car, 13 percent by nonambulance fire department vehicle, just over 1 percent by police car, and 6 percent by other means.[26] Nonambulance transport also helps to explain why, during disasters, hospitals rarely receive timely notification from authorities in the field or estimates of the numbers, types, and severities of casualties they will receive.[27]

> **Doing the greatest good for the greatest number in a disaster involves more than assigning priorities for treatment and transport. It also means using available medical resources as efficiently as possible.**

Another pattern commonly seen in disasters is a sort of "reverse triage": that is, the first casualties to arrive at hospitals are the least serious ones. This happens because the least injured are those who are the most able to rapidly transport themselves, while the most serious casualties tend to be those who are entrapped in the rubble and require the use of complicated rescue techniques and heavy equipment—which untrained survivors cannot provide—before they can be transported.[28]

Even though most disaster casualties bypass field triage efforts and the attempts to distribute the patient load among area medical facilities, there are still some who will be transported by ambulance. Therefore, procedures should be established to poll area medical facilities when disasters strike to identify which facilities are overloaded, which can receive more patients, and which are damaged or evacuating. (Such procedures, of course, require the existence of an interoperable radio communications network.) The information that is gathered should be used to guide ambulance destinations. Even without such information, however, ambulance dispatchers and drivers can be fairly certain that hospitals closest to the impacted areas are most likely to become overloaded and so should consider bypassing those facilities. Medical mutual aid plans and joint training and exercises should address triage and casualty distribution,[29] and police and firefighters, who carry out much of the nonbystander search and rescue in disasters, should be familiarized with area triage plans and procedures.[30]

Hospital and nursing home evacuations

Sometimes disasters or hazard threats necessitate the evacuation of hospitals, nursing homes, and other congregate care facilities. Even medical care facilities that are not damaged may have to evacuate stable patients to make room for expected disaster cases. This, of course, requires that these facilities receive timely information about impending threats or incoming casualties. At that point the following tasks need to be undertaken:

- Communication with other hospitals to assess how many transferred patients they can receive
- Coordination with ambulance services to transport patients (and to make sure that ambulances do not transport casualties to hospitals that are themselves being evacuated)
- Coordination with public safety agencies to assess the most appropriate evacuation routes
- Implementation of effective patient tracking systems
- Notification of evacuated patients' family members.

These tasks should be coordinated at the community (or intercommunity) level, for example, by a designated "disaster coordination hospital," the 911 dispatch center, the local EMS agency, or the hospital association. And often these tasks must be undertaken in the face of serious damage to the hospital; spillage of hazardous materials; leaking water; blocked roads; loss of power, communications, and elevator function; and the continued arrival of casualties. Evacuations of facilities may be especially challenging because ambulances may be tied up at the disaster. In addition, coordination of evacuation may be difficult because cellular and telephone lines are often damaged or jammed.

Unfortunately, community-wide plans for hospital and nursing home evacuations are not always in place (and even when they exist, they are not always implemented), and facilities sometimes carry out evacuations independently and in an uncoordinated manner. Thus, emergency managers should work with community health sector organizations to develop areawide plans, training, and exercises for evacuating hospitals, nursing homes, jail infirmaries, and other health facilities. This planning should

- Include the availability of backup portable generators, sump pumps, water, and supplies, so that hospitals may be able to avoid evacuating and shutting down
- Identify the individuals or entities that will coordinate evacuation (both within the community and with neighboring communities)
- Specify the criteria for evacuation and identify who has on-site authority to make the decision
- Provide for local authorities to receive rapid notification of any facilities that are threatened by hazards and thus might require evacuation
- Provide for engineers to rapidly evaluate a facility to determine whether it is safe for continued occupation
- Establish protocols for the transfer of patient records and medications
- Provide for the transfer of staff (including temporary medical privileges) to the host facility
- Arrange for incoming ambulance patients to be detoured to other facilities
- Provide for the notification of patient families
- Provide for the return of patients and staff to evacuated facilities after the disaster
- Assign responsibility and provide guidelines for the management of those who spontaneously volunteer to assist with evacuation or patient care
- Include arrangements for alternative means of transportation (e.g., boat, helicopter) when roads are impassible
- Include alternative arrangements for patients who receive regular outpatient treatment at the hospital (e.g., dialysis patients).

In a widespread destructive event, however, it may be necessary for facilities to keep open even if they have suffered damage.

Handling inquiries and victim tracking

Because it is common to have family members living in other parts of the country or world, or for family members living in the same household to spend part of the day apart from each other, family members may not be together when a disaster occurs. In a 2005 randomized survey of 680 adult evacuees from Hurricane Katrina who were temporarily residing in shelters in Houston, 40 percent said that they were separated from immediate family members—those with whom they normally lived—but knew where they were, while 13 percent indicated that the whereabouts of immediate family members were unknown; moreover, 32 percent did not know the whereabouts of other close relatives or friends.[31] After the 2004 Indian Ocean tsunami, call centers at foreign ministries all over the world were deluged with inquiries from persons who thought their loved ones or other people they knew may have been victims. The Canadian Office of Foreign Affairs received 100,000 calls although only twenty of the victims were Canadian.[32] And efforts to locate and communicate with family members are intensified by the fact that with modern mass media communications, even a relatively small disaster can quickly become international news. Unfortunately, news reports often fail to provide specific details about the disaster that would allow viewers to tell whether their loved ones were involved.[33]

Typically, the first response of families after a disaster is to phone their loved ones. If they cannot make contact this way, they will call hospitals, police departments, fire departments, relief agencies, 911 operators, or government offices in their search for information. Even for disasters involving a few hundred homeless, injured, or killed, inquiries may number in the thousands. To prevent hospitals and other health sector organizations from becoming

overwhelmed by phone calls, it can be helpful to anticipate key information that the public will need and, where possible, provide it through recordings or menus. For example, callers seeking information on the missing could be given a phone number to call and/or a Web site to check for a list of disaster casualties, their locations, and their general conditions. Emergency managers should ensure that press releases about disasters contain specific information (perhaps using maps) about areas affected. This will reduce the number of people who think their loved ones might have been involved. It is also essential that hospitals share information with call centers so that both can provide people with the information they seek.

Even for disasters involving a few hundred homeless, injured, or killed, inquiries may number in the thousands.

If no answers are available by phone and the disaster site is within driving distance, people will inquire in person. This can be very disruptive to hospitals, health departments, and government and public safety agencies, many of which have not developed procedures for victim tracking in disasters—procedures that can facilitate responses to inquiries and help determine who needs to be searched for and where they might be found. Victim tracking requires collecting information on the missing from hospitals, jails, shelters, morgues, and other locations; once collected, the information should be centralized for transmission to and dissemination from a toll-free number located in a different part of the country (so as to reduce phone traffic in the affected community), and thereby made available as appropriate to the public and public safety agencies. However, because telephone and cellular circuits are likely to malfunction, area- or statewide encrypted two-way radio or satellite networks must be established to successfully carry out victim-tracking efforts. Overall, it should be the responsibility of the emergency manager and/or the community-wide emergency planning committee to ensure that formal arrangements are made to have such tasks carried out, and

Massive inquiries about the missing on 9/11

"It happened throughout the United States on September 11, 2001, but nowhere like lower Manhattan. A busy signal, 'Please try your call again later,' or complete lack of dial tone met the ears of landline callers and cell phone users. And nowhere was it more crucial that a dial tone exist than in lower Manhattan, as people tried to locate family members, hospitals tried to contact reserve staff, and emergency management and public health agencies tried to coordinate a response to the day's tragedy.... Several landlines serving New York University Downtown Hospital still functioned after the collapse, but became immediately congested as people frantically called to inquire about family and friends. The effects were wide-reaching, preventing hospital staff from communicating within the hospital and with the community at large."

Not only was a major cellular antenna damaged, but cell phone demand doubled. Many New Yorkers found their cell phones useless. "At the end of the first day..., there was a flood of relatives in the emergency departments, walking from hospital to hospital, trying to find their family members."[2] At the same time, patient accountability was lacking. To some extent, the problem was attributed to the fact that triage tags were not used and ambulances did not report to staging areas upon arrival in the impact area. In addition, civilians flagged them down and crews initiated treatment and transport without reporting their actions to incident command. Another contributing factor was the failure to designate a central hospital whose responsibility would be to coordinate the dissemination of information on patient dispositions. However, at least in New York City, one of the main factors was that only 7 percent of the victims were transported by ambulance.[3] The rest completely bypassed the emergency medical services system, getting themselves to hospitals on their own.

[1]Bo Emerson, "Cellphones Come through When Emergencies Strike," *Atlanta Journal-Constitution,* September 23, 2001, G7.

[2]Susan Waltman, of the Greater New York Hospital Association, as quoted in Lara Misegades, "Phone Lines and Life Lines: How New York Reestablished Contact on September 11, 2001" (Washington, D.C.: Association of State and Territorial Health Officials, 2002), available at astho.org/?template=1bioterrorism.html (accessed August 24, 2007).

[3]M. G. Guttenberg et al., "Utilization of Ambulance Resources at the World Trade Center: Implications for Disaster Planning [Abstract]," *Annals of Emergency Medicine* 40, no. 4 (October 2002): S92.

ideally, the system should be run by an organization like the American Red Cross, so that hospitals and other health facilities are relieved of the burden of dealing with the problem.

At field triage sites, numbered triage tags with multiple "carbon" copies can be used to help keep track of patient destinations. As noted earlier, however, most casualties will bypass field triage, and overwhelmed rescuers often abandon record keeping in favor of patient care. Therefore, it is often necessary to collect information after the fact from places where those thought to be missing might be located (e.g., hospitals, morgues, shelters, and jails). Also as noted earlier, another useful strategy is to have hospital clerical staff collect information, not just on the casualties but also on those who transported the casualties to the hospital.

Hospitals are governed by the confidentiality guidelines of the Health Insurance Portability and Accountability Act (HIPAA) of 1996[34] and are therefore reluctant to release information. However, the act does allow health care providers to disclose protected health information to a person or entity that will assist in notifying a patient's family member of the patient's location, general condition, or death.[35]

Managing medical donations

Disaster-impacted communities will often receive a massive amount of donations, many of which are unsolicited. The situation can be aggravated when local elected officials or newscasters assume that medical volunteers or donations are needed and issue public appeals for them without first confirming the need with the intended recipients. Host communities, already burdened by the disaster impact, may then have to spend considerable amounts of money and time properly disposing of the donated items. When the Murrah Federal Building in Oklahoma City was bombed in 1995, medical donations came by the truckload from all across the nation. However, except for dressings and bandages, little of it was used; the Oklahoma Hospital Association conservatively estimated that more than $1.5 million worth of medical supplies and equipment was wasted.[36] Another problem may arise when massive numbers of blood donors congregate at hospitals, causing congestion and diverting the attention of facility personnel.[37]

Emergency managers should work with local health authorities, government officials, and the news media to ensure that public appeals for medical donations, including blood, are not made without the approval of the potential recipients. In fact, if donations are not needed, it may be wise to proactively notify the mass media of this fact. Once issued, appeals for donations are almost impossible to rescind. Pharmaceutical donations, in particular, cause problems when they are perishable, are sent in amounts greater than needed, include inappropriate or out-of-date medications, or have not been sorted and categorized before being sent.

If donations are requested, it is important to have them sent to a location outside of the impact area and well away from medical centers or traffic routes leading to those centers (e.g., to a school or warehouse), where they can be sorted and distributed in a manner that does not interfere with emergency operations. Serious consideration should be given to appeals for cash rather than material goods. Cash can be used more flexibly, contributes more to the local economy, is easier to transport, and does not require sorting or disposal. An essential element in disaster planning is deciding who will coordinate the overall management and distribution any donations.

Managing contamination by hazardous substances

During mass casualty incidents that do not involve hazardous materials, rescuers may suffer cuts and bruises, or worse, if they are operating under treacherous conditions, but the victims themselves usually do not pose a threat to those trying to help them. This changes when victims are chemically contaminated. For example, after the 1995 sarin attack in the Tokyo subway, 135 (nearly 10 percent) of the emergency medical technicians involved in the response developed acute symptoms and had to be treated at hospitals, and some of the hospital medical staff developed nausea, pupillary constriction, and burning in the eyes and throat from exposure to sarin vapors emanating from patients' clothing. Thus, one of the greatest concerns in dealing with hazardous substances is protecting emergency responders, hospital staff, and other patients from secondary exposure to contaminants. The arrival of even one contaminated patient can close down an entire hospital emergency department.

There have been very few large-scale chemical incidents involving mass casualties. As suggested by the limited data available, the first agency to identify the problem is often the first hospital to receive contaminated patients, which implies that the hospital does not have time to establish decontamination procedures and that hospital staff, the receiving area, and the emergency area are likely to become contaminated. (While the ideal is to have first responders decontaminate casualties in the field, this frequently does not happen.)[38] The best thing that a hospital can do is to try and warn other hospitals so that they can set up decontamination units outside their doors. Provision for such warnings should be institutionalized in the community disaster plan, written into individual hospital plans, and addressed in disaster training. To the extent practicable, contaminated patients should be diverted to the hospital already contaminated while other patients are sent to hospitals not receiving contaminated patients. Although in other disaster situations it may be best to spread the patient load among all available hospitals, this is not necessarily the case with contaminated casualties. If the presence of contaminants leads to hospital closure, it may be better to have this happen at only one facility.

It is also necessary to warn ambulance and other emergency personnel who may be responding to the incident. Such warnings should go out over all components of the public warning system, which again underscores the necessity of having an interorganizational communications system that will function even when cellular and telephone systems do not. Making such a system work requires coordination between specially trained hazmat units, poison control centers, an array of public and private entities, the mass media, and the health sector. In short, the contamination issue is a perfect illustration of why local entities cannot afford to undertake emergency planning in isolation from one another.

Effective management of contaminated casualties depends on the following factors:

- Recognition that contamination has occurred
- Identification of the contaminant so that appropriate decontamination and treatment can be carried out
- Provision of advanced notice from the field so that hospitals can prepare to receive contaminated patients

Figure 10-4 Ambulatory garage for nonambulatory decontamination

Photo courtesy of the Noble Training Center, Anniston, Alabama

- Provision of rapid notice from receiving hospitals to other hospitals, which might otherwise unknowingly admit contaminated patients
- Use of personal protective equipment by hospital staff to prevent secondary exposure
- Establishment of decontamination facilities (see Figures 10–4 and 10–5)
- Isolation of patients pending decontamination
- Safe removal of contaminants (e.g., by showering)
- Prevention of hypothermia if outdoor showering is required during inclement weather.

Emergency managers should not assume that EMS providers and hospitals are adequately prepared for hazmat disasters, particularly when such events involve "exotic" contaminants. If it has not already been done, emergency managers should work with local health care organizations to assess health sector preparedness. The following questions may be helpful to ask:

- Does the hospital have a plan for dealing with contaminated casualties?
- Have the staff members who will come into contact with contaminated casualties received training in the plan?
- Is there a community-wide plan for hazmat response that has been jointly developed by police departments, fire departments, EMS providers, hospitals, health departments, poison centers, hazmat teams, environmental agencies, private industry, and 911 dispatchers?
- Do these agencies and personnel train and drill together?
- Is the hospital able, on short notice, to prevent contaminated casualties from entering the hospital except through the decontamination area?
- Are staff members provided with appropriate personal protective equipment (i.e., chemical suites with booties, gloves, and respirators)?
- Are there facilities for isolating and decontaminating casualties while protecting them from the elements?

Figure 10-5 Dining hall patio for ambulatory decontamination

Photo courtesy of the Noble Training Center, Anniston, Alabama

Protecting the public and health care workers

Health care risks associated with various types of bioterrorism attacks, as well as with naturally occurring epidemics such as avian flu, have led policy makers and planners to focus increasingly on methods that might be needed to protect exposed or potentially exposed populations. Key issues in risk management for such events include quarantine and isolation. *Quarantine* is the separation of asymptomatic persons who might have been exposed to a contagious disease until the time has passed during which they would be expected to come down with the disease (the incubation period). *Isolation,* which is often confused with quarantine, is the separation of persons who have actually come down with the disease. Planning for and implementing such measures require a focus on legal, logistical, and other issues.

Regarding the legalities, quarantine and isolation became important issues during the severe acute respiratory syndrome (SARS) epidemic, which occurred between November 2002 and July 2003. But while public health laws were on the books in Canada, China, Hong Kong, Singapore, Taiwan, and Vietnam, the legal authority to require quarantine and isolation existed only for *specific,* previously known diseases. Thus, laws had to be amended to cover this new illness.

Law enforcement personnel were used to serve quarantine orders and to enforce quarantine.[1] Although the SARS epidemic showed that most people comply voluntarily with quarantine provisions, a few individuals—such as those with mental illnesses and illicit drug users—needed to have activity restrictions enforced.

Logistically, large-scale quarantine requires processes for delivering food, medicine, supplies, and financial support to those who are confined but still have car payments, mortgages, electrical bills, and other ongoing financial obligations. It also requires provisions for those who need health care for preexisting chronic medical conditions or those who need to arrange for the care of pets or livestock.[2]

Epidemics pose unique problems for health care workers: because they may work or visit more than one location, these workers could conceivably become carriers during a pandemic. (Like physicians, clergy may also visit the ill at more than one hospital.) A 2004 report by the Institute of Medicine suggested that separate hospitals (isolated from one another) be used to treat epidemic patients and other patients.[3] This would help ensure the continued availability of treatment facilities, not only to epidemic patients but also to those without contagious disease.

[1]David M. Bell, "Public Health Interventions and SARS Spread, 2003," *Emerging Infectious Diseases* 10, no. 11 (2004): 1900–1906; Mark A. Rothstein et al., *Quarantine and Isolation: Lessons Learned from SARS* (Louisville, Ky.: Institute for Bioethics, Health Policy and Law, University of Louisville School of Medicine, 2003), available at archive.naccho.org/documents/Quarantine-Isolation-Lessons-Learned-from-SARS.pdf (accessed August 24, 2007).

[2]Rothstein et al., *Quarantine and Isolation*.

[3]Stacey Knobler et al., eds., "Summary and Assessment," in *Learning from SARS: Preparing for the Next Disease Outbreak–Workshop Summary* (Washington, D.C.: National Academies Press, 2004), available at nap.edu/catalog.php?record_id=10915 (accessed August 24, 2007).

- When contaminated casualties arrive unannounced, is there an interim process for rapid decontamination outside (e.g., a fire hose with spray nozzle and warm water) until decontamination showers can be set up?

- If decontamination occurs indoors, is the area ventilated to the outside and not into other areas of the hospital where staff, visitors, or other patients might be exposed?

- Do ambulances and hospitals have an adequate stock of antidotes (e.g., 2-PAM, atropine)?

- Does the hospital emergency department have immediate access to medical information on specific chemicals?

- Have law enforcement agencies worked with hospitals to provide adequate traffic control and security?

Ensuring access to nonhospital sources of medical care

Because disaster medical planning has traditionally focused on hospitals, the threat of mass casualties from terrorism or naturally occurring epidemics has increased concern about the need for hospital surge capacity. However, case studies suggest that disasters also interrupt the public's access to sources of routine health care,[39] which, in turn, can create risk for people who have chronic health problems such as asthma, high blood pressure, diabetes, heart disease, mental illness, and kidney ailments.[40] Moreover, many disaster victims have

minor injuries, such as lacerations, cuts, bruises, puncture wounds, sunburn, heat exposure, and animal bites and stings, most of which can be addressed by nonhospital sources of medical care. To the extent that these sources of care can survive and function after a disaster, the burden on hospitals may be reduced.[41] Unfortunately, however, the disaster may render these routine sources of medical care inaccessible.

Emergency planning for nonhospital medical care should focus on two goals: preventing damage and loss of function, and enhancing capacity for patient care. Among the actions that communities can take to prevent damage and loss of function are (1) securing zoning ordinances that discourage the construction of health care facilities in or near hazard zones such as floodplains, chemical plants, or earthquake faults; and (2) establishing building codes to protect the health care facilities from local hazards, such as earthquakes, tornadoes, and hurricanes. In addition, health care facilities can take a number of precautions on their own. For example, in seismically active areas, they can take simple measures (e.g., Velcro straps, cabinet latches, lips on shelves) to prevent key equipment and supplies from falling and breaking. In flood-prone areas, they can avoid storing important equipment and supplies in basements.

Emergency managers should encourage, assist, and support the development of disaster plans by nonhospital medical service providers. Plans should include provisions for

- Calling in off-duty staff and making sure they can pass through police security lines
- Extending office hours
- Providing on-site sleeping arrangements for staff
- Providing on-site feeding and sanitation for staff as well as for their family members and pets
- Obtaining assistance as needed to reopen and recommence patient care activities
- Obtaining supplementary office and medical supplies
- Notifying patients when the office must be relocated
- Providing alternative transportation for patients needing medical care
- Requesting an "essential service" designation from telephone and cellular providers so that medical facilities have electronic priority when circuits are overloaded
- Making plans to relocate when the facility can no longer function at its current location
- Making provisions for backup power, alternative sources of water, data backup, and surge protection
- Having waterless hand cleaner.

Emergency managers should also work with the health sector to ensure that nonhospital medical facilities are integrated into community disaster plans and that there is a means of communicating with these facilities when telephone and cellular circuits are not functioning. To help prevent inaccurate or distorted messages from being broadcast to the public, emergency managers should prepare announcements for the mass media before a disaster—ideally in both audio and video formats—which the media can then be instructed to release upon notification. The news media can also help during a disaster by notifying patients when and where their physicians or other routine sources of medical care may have relocated and by reminding them, in the event of an evacuation, to bring with them enough of their medications for an extended stay.[42] And emergency managers can encourage health insurers to allow people to get prescription refills wherever possible—and, if necessary, to allow pharmacies to refill prescriptions temporarily without a physician's authorization.

Emergency managers should see that systems are in place to rapidly assess which hospital and nonhospital health care facilities are functioning, which are destroyed, and which are in need of assistance to restore services, as well as to ensure that such assistance is provided (e.g., by loaning them portable electrical generators and helping them obtain priority for the repair of phone lines, power, and other utilities). Regulations and insurance incentives or disincentives should be used to discourage the construction of medical facilities in areas subject to disasters (e.g., floodplains, seismic zones, hurricane surge areas). Local government should also ensure that building codes require disaster-resistant design for medical facilities. Government plans may include provisions to deal with facilities that have been identified as "vital services" or that carry some similar designation.

Dealing with the loss of response infrastructure

"Response infrastructure" refers to the resources used to carry out the disaster response. This includes trained emergency personnel, buildings (e.g., fire departments, hospitals), communications systems, supplies, equipment, emergency vehicles, transportation routes (e.g., roads, rail lines, airports), and transportation systems (e.g., cars, buses, aircraft, boats, trains).

While infrastructure damage has occurred in U.S. disasters, the extent of loss has usually not been enough to paralyze response. Generally speaking, hospital damage has not been so extensive as to shut down all hospitals in affected areas or seriously compromise the delivery of medical services. When massive loss of infrastructure does occur, the event falls into the definition of a *catastrophe* (see accompanying sidebar). Hurricane Katrina, which was categorized as a catastrophe, paralyzed the medical infrastructure in the impact region.

While medical supply shortages can happen, this does not appear to happen in many U.S. disasters. In one study of twenty-nine U.S. disasters, only 6 percent of hospitals experienced supply shortages.[43] (With the increasing reliance on just-in-time inventory, however, shortages could be more frequent in future disasters.) When shortages do occur, communities can request support, via their state emergency management agency, from the Strategic National Stockpile (SNS), which is maintained by the Centers for Disease Control and Prevention (CDC) headquartered in Atlanta. The SNS contains medications, medical supplies, and equipment to supplement and resupply state and local health responders in the event of a national emergency. Beginning within twelve hours of a federal decision to deploy them, stockpile assets can be delivered anywhere in the United States and its territories.[44]

In the event of disaster, hospitals and ambulance services can generally double or triple their staffs by sending out a call for off-duty personnel, and large numbers of medical volunteers will offer their services. Nevertheless, health care operations may be seriously compromised by the loss of lifeline services such as water and electrical power. Working with health care facility administrators, emergency managers should request inspections by qualified engineers to ensure that lifeline services will not be lost during disasters, because of either problems with outside

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Disasters versus catastrophes

Just as there are important differences between disasters and routine emergencies, there are important differences between disasters and catastrophes. In disasters, there may be temporary shortages of personnel, supplies, and materials, or shortages of very specialized resources (e.g., neurosurgeons), but usually enough infrastructure survives to carry on. Moreover, vast amounts of help rapidly pour in from neighboring areas unaffected by the disaster. In fact, it is not uncommon for disaster-stricken communities to get much more help than is actually needed.

In catastrophes, on the other hand, there is massive infrastructure damage. Local health care personnel and emergency responders are themselves often rendered homeless, injured, or too ill to join in the response. Health care facilities suffer so much damage that they are unable to provide care and must evacuate their patients to other cities or states. Ambulances are either damaged or unable to operate because roads and bridges are inaccessible. Large numbers of citizens with ongoing health problems have to seek shelter and care in distant cities and states. Furthermore, damage is so widespread that neighboring areas cannot send help.

Because catastrophes are so rare, they are extremely difficult to plan for—particularly in times of budget constraints. Moreover, the effectiveness of preparedness plans for domestic catastrophes has been hard to assess because the plans have been so rarely tested. And the impacts associated with catastrophic events are so difficult to predict that there is a risk of creating elegant "paper plans" based on invalid or unproven assumptions[1]—which, while appearing adequate, may create a false sense of security. The terrible toll taken by Hurricane Katrina is a reminder of the dangers involved in failing to plan realistically for low-probability, high-consequence events. Because experience with routine emergencies provides an inadequate basis from which to plan for both disasters and catastrophes, emergency managers need to avail themselves of the important lessons and guidance derived from the study of such events.

[1]Lee Clarke, *Mission Improbable: Using Fantasy Documents to Tame Disaster* (Chicago: University of Chicago Press, 1999).

supply or damage to internal systems. Specifically, emergency managers should work with hospitals ensure that

- Essential equipment and hospital rooms that will be used for patient care and ancillary services in the event of disaster are on backup power circuits
- Generators are tested for sustained operations
- Cooling systems for generators can function even when municipal water systems lose pressure; generators (as well as their batteries, switching equipment, and fuel lines) are protected from disaster damage.

Emergency managers should also arrange to obtain high-capacity portable or mobile generators in case generators at hospitals or other health care facilities fail, and they should encourage hospitals to establish mutual aid networks to handle shortages of supplies, personnel, and equipment in disasters.

The role of the public health system in disasters

In contrast to medical practitioners and hospitals, public health agencies are concerned with the health of the *community as a whole.* In public health, a major focus is on prevention rather than cure. Preventive measures are particularly important in diseases for which there is no cure and in diseases for which vaccines are available.

Increasingly, federal funding is being channeled through public health departments to support preparedness for terrorist and other threats, and the involvement of public health agencies (and the EMS providers under their authority) in this effort is growing. Some examples of what public health agencies do in emergencies include

- Investigating disease outbreaks caused by improperly prepared or refrigerated food and taking the food item off the market
- Recommending to state or local mosquito abatement agencies (should an increase in mosquitos carrying infectious diseases [e.g., dengue fever, West Nile virus] be discovered) that spraying for disease-carrying mosquitoes be conducted
- Conducting "public health surveillance"—that is, collecting reports from medical laboratories and health care practitioners and facilities on new cases of diseases to provide early warning of outbreaks
- Undertaking "epidemiological investigations"—that is, using case investigations and statistical techniques to identify sources of disease outbreaks and how they spread
- Tracking down those who have been exposed to dangerous infectious diseases, so that they can be provided with early treatment and preventive vaccines or antibiotics
- Ensuring that those with serious contagious diseases, such as bacterial meningitis or tuberculosis, are isolated until they are no longer contagious
- Quarantining those who may have been exposed to a dangerous contagious disease until the incubation period (the length of time it takes from exposure until symptoms appear) has passed
- Making certain that persons living in temporary shelters, such as school gymnasiums or churches, are not exposed to health risks (e.g., from inadequate food-handling procedures)
- Ensuring that community water supplies are safe and uncontaminated
- Providing information to the public on health hazards and on ways to prevent illness and injury in disasters[45]
- Providing laboratory resources in support of public health (e.g., in case of infectious diseases or environmental exposures).

In disasters caused by epidemics, toxic releases, and other public health threats—either natural or man-made—public health and law enforcement authorities will be carrying out investigations simultaneously. Each may collect information and evidence that will be of importance to the other. Therefore, it is crucial that they plan, train, and respond together. Representatives

Challenges to the public health system

Recent public health emergencies, such as severe acute respiratory syndrome (SARS) and anthrax, have posed some problems not faced during previous infectious disease emergencies. During the anthrax attacks of 2001, for example,

- The Centers for Disease Control and Prevention (CDC) was called upon for the first time to respond to disease outbreaks occurring nearly simultaneously in five separate geographic areas.
- Few public health or medical practitioners had ever seen or treated a single case of this highly uncommon disease, much less dealt with a terrorist attack. Moreover, it was eventually discovered that some of the anthrax was of a special weaponized grade, which had different characteristics from the naturally occurring variety.
- Investigations were being carried out simultaneously by public health and law enforcement agencies, so that public health officials who lacked security clearances sometimes had difficulty getting information they needed.[1]
- Federal and state public health agencies were bombarded with information from disparate sources that included local and state health departments, postal distribution sites, unions, physicians, hospitals, clinics, and laboratories. At the same time, health agencies were being bombarded with calls for information about anthrax from physicians and the public.
- Public health laboratories had great difficulty keeping up with the demands of the outbreak. One state laboratory, which normally processed one anthrax analysis a year, analyzed more than 2,000 samples in two months' time.[2] Overall, more than 120,000 laboratory tests for anthrax had to be carried out during the response, and the need was generated to develop procedures for prioritizing which samples needed to be tested.[3]

The anthrax attacks of 2001 revealed that few health departments had planned how they would procure critical resources in a disaster. The normal procurement procedures were too lengthy and cumbersome for the demands of the crisis. One public health lab director indicated that, while he had enough money in the budget to purchase the additional equipment he needed for analyzing anthrax samples, it would take the state office of general services two months to process the request.[4] The ability of public health agencies to respond to the attacks was also hindered by a lack of mutual aid planning. For example, many states had no reciprocity provisions enabling public health workers to be credentialed to work in adjoining states.[5]

[1]U.S. General Accounting Office (GAO), *Bioterrorism: Public Health Response to Anthrax Incidents of 2001* (Washington, D.C.: GAO, 2003), available at gao.gov/new.items/d04152.pdf (accessed August 24, 2007).

[2]Elin Gursky, Thomas V. Inglesby, and Tara O'Toole, "Anthrax 2001: Observations on the Medical and Public Health Response," *Biosecurity and Bioterrorism: Biodefense, Strategy, Practice, and Science* 1, no. 2 (2003): 97–110, available at upmc-biosecurity .org/website/resources/publications/2003_orig-articles/2003-06-15-anthrax2001observations.html (accessed August 24, 2007).

[3]GAO, *Bioterrorism: Public Health Response*.

[4]Gursky, Inglesby, O'Toole, "Anthrax 2001."

[5]Ibid.

from public health agencies should also be represented on community disaster planning bodies and at community emergency operations centers.

Formal planning for disaster health care

In the United States, formal planning for disaster health care varies widely, especially at the local and state levels. However, there are several programs—most notably those funded or managed at the federal level—with which emergency managers should be familiar.

The Joint Commission

Traditionally, health care planning has focused largely on hospitals. The Joint Commission (until 2007, the Joint Commission on Accreditation of Healthcare Organizations, or JCAHO) is a key player in hospital preparedness. The commission was first established in 1951 as the Joint Commission on Accreditation of Hospitals; two years later it established hospital fire protection standards. In 1965, standards were added requiring hospitals to have written mass casualty plans and drills. Currently, the commission also promulgates preparedness standards for long-term care facilities, home health care providers, behavioral health institutions, ambulatory clinics, and outpatient surgery centers.

According to Joe Cappiello, vice president of Accreditation Field Operations at the Joint Commission, the decision to accredit is based on compliance with a number of standards, not just preparedness. Currently, each facility must have an inspection score that meets a certain threshold (which differs according to such factors as institutional size). Although failing to meet the emergency management standards would not, in itself, cause a failing score, it could certainly contribute to a facility's inability to get over the threshold.[46]

The National Response Plan

In recent years, terrorist attacks and concerns about pandemic diseases such as SARS and avian flu have caused public health agencies at all levels to become more involved in disaster planning. Under the National Response Plan (NRP), Emergency Support Function (ESF) 8—Public Health and Medical Services—is concerned with providing supplementary assistance to local, tribal, and state governments in identifying and meeting public health and medical needs during incidents of national significance. The key elements of this assistance include assessment of public health, medical, and behavioral health needs; public health surveillance;[47] and provision of medical personnel, equipment, and supplies.

Under the NRP, the lead agency for federal health care response to disasters is the U.S. Department of Health and Human Services (HHS); HHS is assisted by a number of component agencies, including the CDC, the U.S. Public Health Service, the Occupational Safety and Health Administration, and the Food and Drug Administration. ESF 8 coordinates with other emergency support functions, including transportation (ESF 1); mass care, housing, and human resources (ESF 6); urban search and rescue (ESF 9); and agriculture and natural resources (ESF 11).[48]

The National Disaster Medical System

The National Disaster Medical System (NDMS) was originally established in 1984 within HHS; its mission was to supplement state and local responses to disaster and to provide backup support to the U.S. Department of Defense and Veterans Administration medical systems during times of overseas conflict. In recent years, its mission has been expanded to provide medical response during terrorist attacks and to conduct advance staging for special events, such as political conventions, that are associated with potential risks to national security. Responsibility for NDMS had been reassigned to the U.S. Department of Homeland Security but now has been returned to HHS.

NDMS has three core components: (1) disaster medical teams, supplies, and equipment; (2) movement of patients from the disaster to unaffected areas of the nation; and (3) provision of definitive medical care at NDMS-participating hospitals in unaffected areas. Several types of medical teams are available through NDMS, including disaster medical assistance teams (DMATs); disaster mortuary operational response teams; veterinary medical assistance teams; national medical response teams, which deal with chemical, biological, and nuclear incidents; and international medical surgical response teams. DMATs have been used in numerous disasters, but prior to Hurricane Katrina there was little experience with the intrastate, interhospital movement of the ill and injured.[49]

The Medical Reserve Corps

The Medical Reserve Corps (MRC), which is administered by HHS, was formed in 2002 as a partner of the Citizen Corps.[50] Its mission is to identify, organize, credential, and train local medical and public health volunteers for disasters. Members include practicing and retired physicians, nurses, and other health professionals, as well as other citizens interested in health issues, who are willing to provide disaster health services. The exact structure, mission, and sponsorship of each MRC unit vary according to local needs.[51]

The Community Emergency Response Team program

The Community Emergency Response Team (CERT) program, another partner of the Citizen Corps, trains citizens to support first responders, to provide immediate assistance to victims,

and to organize spontaneous volunteers in disasters. CERT training includes disaster preparedness, disaster fire suppression, basic disaster medical care, and light search and rescue.[52]

The Metropolitan Medical Response System

The Metropolitan Medical Response System (MMRS) was formed in 1996 in response to the Tokyo sarin attack and the bombing of the Alfred P. Murrah Federal Building in Oklahoma City, both of which occurred in 1995. The program was originally designed to strengthen and coordinate local and regional response capabilities in highly populated areas that might be targets for attacks with weapons of mass destruction. However, it was thought that the program concepts, organizing principles, and human and material resources could also be applied to other types of large-scale disasters. As of April 2007, the Federal Emergency Management Agency (FEMA) operates the program.

MMRS supports local jurisdictions in planning, developing, equipping, and training regionalized networks of first responders drawn from law enforcement, the medical community, the public health system, the fire service, and hazmat response teams. Five areas of planning are emphasized: early recognition, mass immunization and prophylaxis, mass patient care, mass fatality management, and environmental issues.

The Emergency Management Assistance Compact

The Emergency Management Assistance Compact (EMAC) is an interstate mutual aid agreement that facilitates the sharing of resources, personnel, and equipment across state lines in times of emergency or disaster. While not specifically focused on health care, EMAC has been used successfully for sharing medical, evacuation, and search and rescue assets, most notably during Hurricane Katrina.[53]

State emergency response commissions and local emergency planning committees

The Emergency Planning and Community Right-to-Know Act, passed in 1986, requires that each state establish a state emergency response commission (SERC) to oversee planning for hazmat emergencies. The SERC, in turn, establishes planning districts within the state, each with a local emergency planning committee (LEPC). Each LEPC must have, at a minimum, representation from elected state and local officials; the local law enforcement, emergency management, emergency medical services, fire services, first aid, public health, environmental, hospital, and transportation sectors; broadcast and print media; community groups; and owners and operators of hazmat facilities. Although these committees are formed for the purposes of hazmat planning, their members are often involved with state and local all-hazards planning as well.

Summary

Some of the principal responsibilities of the health sector in disaster are communications, triage, hospital and nursing home evacuations, handling inquiries and victim tracking, managing medical donations, managing contamination by hazardous substances, ensuring access to nonhospital sources of medical care, and dealing with the loss of response infrastructure. However, the health sector cannot undertake any of these activities on its own. Disaster planning and response require coordination across political, geographical, jurisdictional, and functional boundaries.

Notes

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19 One reason for the lack of coordination among providers of emergency services is the traditional independence and autonomy of these agencies. See Auf der Heide, *Disaster Response;* Freeman, Van Ness, and Morales, *Hurricane Andrew: Lessons for California;* Oklahoma City Document Management Team, *Murrah Rescue and Recovery Operation;* Tierney, *Project Summary: Disaster Analysis;* Tierney, Lindell, and Perry, *Facing the Unexpected;* and Alberta Public Safety Services, *Tornado, a Report: Edmonton and Strathcona County, July 31st, 1987* (Edmonton, Ontario: Alberta Public Safety Services, 1991).

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41 Auf der Heide, "Principles of Hospital Disaster Planning."

42 In 2004, following Hurricane Charley, a survey of Florida residents over age sixty with preexisting medical conditions revealed that 28 percent in Charlotte County, 21 percent in DeSoto County, and 18 percent in Hardee County reported having lost access to routine care for those conditions.

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44 More information on the Strategic National Stockpile is available via the Internet at bt.cdc.gov/stockpile/ (accessed August 22, 2007) or from the local or state public health agency.

45 Fact sheets and press releases covering the various types of public health threats can be obtained through the U.S. Agency for Toxic Substances and Disease Registry at atsdr.cdc.gov and through the CDC at cdc.gov (accessed August 2007).

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47 Public health surveillance involves monitoring communities to detect significant changes in health conditions.

48 For more information on the National Response Plan, go to dhs.gov/dhspublic/interapp/editorial/editorial_0566 .xml (accessed August 22, 2007).

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