**Chapter 28   
Disaster preparedness and management**

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**Introduction**

Disasters are natural or man-made events which cause such an overwhelming loss of life, injury, destruction of property, or loss of infrastructure as to prevent a community’s ability to respond without outside assistance. Emergency medical services are vital for disaster management, and the administrative and medical leadership of EMS should be actively involved in all of its phases: planning, mitigation, response, and recovery [1].

While all disasters are local, a national framework for disaster management has been defined by the Federal Emergency Management Agency to coordinate federal assets and to assist local communities to develop disaster management strategies that are effective and allow for cross-jurisdictional communication.

The national framework is risk based, referencing the findings of the Strategic National Risk Assessment [2], which identifies the greatest threats facing the nation’s homeland security, in three categories.

* **Natural hazards**. This category includes floods, earthquakes, hurricanes, wildfires, human pandemic outbreak, animal disease outbreak, volcanic eruption, and space weather (solar flares with electromagnetic disruption).
* **Technological/accidental hazards**. This category includes biological food contamination, chemical substance spill or release, dam failure, and radiological substance release.
* **Adversarial/human-caused threats**. This category includes aircraft as a weapon, armed assault, bioterrorism, chemical terrorism, cyber attack, explosive terrorism attack, nuclear terrorism attack, and radiological terrorism attack.

The list of risks considered on a national level is not comprehensive yet it helped to identify core capability requirements and contributed to the development of the federal framework for disaster management. Local and regional jurisdictions will conduct assessments that will identify other threats and hazards (drought, heat wave, tornado, etc.) that are appropriate for their preparedness planning and will largely be served by the core capabilities required to respond to all hazards.

**Federal framework for disaster management**

The federal framework for disaster management is based on Presidential Policy Directive 8 (PPD-8) [3]. Presidential directives are a form of executive order issued by the President of the United States that address the policy of the executive branch in relation to matters of national security, and carry the full force and effect of the law. PPD-8 aimed to strengthen the security and resilience of the United States through systematic preparation for all hazards. It established that preparedness is a shared responsibility of all levels of government, the private and non-profit sector, and individuals. PPD-8 defined a National Preparedness Goal: “A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to and recover from the threats and hazards that pose the greatest risk.” It established a National Response System, which outlines the approach, resources, and tools for achieving the goal. It also defined National Planning Frameworks which define how to best meet the needs of individuals, families, communities, and states in their ongoing efforts to prevent, protect, mitigate, respond to and recover from any disaster event.

* Prevention – avoid, prevent, or stop imminent threats
* Protection – secure the community against man-made or natural disaster
* Mitigation – reduce loss of life and property by curtailing the impact of disaster
* Response – save lives, protect property and the environment, and meet basic needs
* Recovery – return the community to a state of normality after disaster

The frameworks address how the whole community works toward achieving the National Preparedness Goal across the five defined mission areas. Among these, the National Response Framework (NRF) defines the doctrine by which the nation *responds* to any type of disaster or emergency. The term *response* is defined to include actions which “save lives, protect property and the environment, stabilize communities, and meet basic human needs following an incident.” This includes the execution of emergency response plans to support short-term recovery. The core capabilities for response defined by the NRF are as follows [4].

* **Planning**. A systematic process which will engage all community partners in the development of strategies for disaster response
* **Public information and warning**. Delivery of timely, credible, and actionable information relaying the nature of the threat, actions being taken, and available assistance
* **Operational coordination**. Organize and maintain a unified command structure which involves all stakeholders
* **Critical transportation**. Provide transportation to meet mission objectives including evacuation of people and animals, and delivery of vital goods
* **Environmental response/health and safety**. Provide guidance and resources to address all hazards in support of the responder and community
* **Fatality management services**. Provide for body recovery, victim identification, victim processing, and counseling for the bereaved
* **Infrastructure systems.** Stabilize critical infrastructure functions
* **Mass care services.** Provide hydration, feeding, and sheltering to those most in need
* **Mass search and rescue operations**. Provide search and rescue resources with the goal of saving the greatest number in the shortest time
* **On-scene security and protection**. Ensure a safe and secure environment through law enforcement and security measures
* **Operational communications.** Ensure communications in support of security, situational awareness, and operations
* **Public and private services and resources.** Ensure essential services such as emergency power, fuel support for responders, and access to community staples
* **Public health and medical services.** Provide life-saving medical treatment via EMS; prevent injury and disease through public health and medical support
* **Situational assessment**. Provide leaders with decision-relevant information

The NRF also describes “emergency support functions” which serve as a means to organize response resources and capabilities. These are used by the federal government and many states, and have been adopted locally to build, sustain, and deliver the core response capabilities. For more information on ESF 8, see Volume 2, [Chapter 29](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/Vol2/c29.xhtml#c29).

Response operations involve many partners and stakeholders. The NRF is aligned with the National Incident Management System (NIMS) [5], which defines the command and management structures that allow for scalable, multijurisdictional response to any type of disaster. The NIMS provides templates for the management of incidents, while the NRF provides the structure and mechanisms for incident management policy development. The NIMS is based on the principle that use of a common incident management framework will give response personnel a flexible but standardized system for incident response and disaster management. The NIMS has five major components.

1. **Preparedness**. Assessment, planning, procedures and protocols, training and exercises, licensure and certification, evaluation and revision ([Figure 28.1](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/Vol2/c28.xhtml#c28-fig-0001)).
2. **Communications and information management**. A standardized framework for communications that provides a common operating picture for all stakeholders. Communications should be interoperable, reliable, scalable, and portable. The system should be resilient and redundant.
3. **Resource management**. Personnel, equipment, and supply flow must be fluid and adaptable to the requirements of the incident.
4. **Command and management.** Efficient and effective management through flexible standardized incident command structures.
5. **Ongoing management and maintenance** – of the NIMS via the federal government.

The incident command system (ICS), well recognized by emergency responders and adopted by federal, state, and local governments as well as the private sector for incident management, is a component of this system. The ICS is structured to facilitate activity in five functional areas: command, operations, planning, logistics, and finance/administration ([Figure 28.2](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/Vol2/c28.xhtml#c28-fig-0002)

[**Figure 28.2**](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/Vol2/c28.xhtml#R_c28-fig-0002) Incident command system: command and general staffs. .

Source: <http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf>, pp 53

The ICS organizational structure develops in a modular fashion based on the size and complexity of the incident as well as the specifics of the hazard. As the magnitude and complexity of the incident increase, the organization expands as functional responsibilities are delegated.

The Federal Emergency Management Agency (FEMA) provides an independent study program through its Emergency Management Institute that allows those with emergency management responsibilities and the general public to obtain training and education through distance learning, free of charge. The training supports the mission areas identified by the National Preparedness Goal. Over 125 training courses are available. NIMS introductory courses include the following [6].

* **NIMS 100 – Introduction to Incident Command System**. This course describes the history, features, principles, and organizational structure of the ICS. It also describes the relationship between the ICS and NIMS. It serves as the foundation for higher-level ICS training. It is targeted at persons who are involved in emergency planning, response, or recovery efforts.
* **NIMS 200 – ICS for Single Resources and Initial Action Incidents**. This course is designed to enable personnel to operate efficiently during an incident or event within the ICS. It is targeted at persons who are involved in emergency planning, response, or recovery efforts, particularly those who are likely to assume supervisory positions in the ICS.
* **NIMS 700 – National Incident Management System (NIMS): An Introduction**. This course provides a basic description of the NIMS, the national framework that enables government, private, and non-governmental agencies to work together.
* **NIMS 800 – National Response Framework: An Introduction**. This course provides an introduction to the NRF, specifically the national response doctrine, and the roles, responsibilities, and actions taken by the entities described.

**Catastrophic events**

All disasters are local. Police, fire, and EMS agencies, in concert with local government, non-governmental organizations (NGOs), and the private sector, manage most incidents locally. Incident command is established and emergency operations plans are implemented. The event’s ICS is expanded as necessary to manage the event. If the incident commander determines the resources of the responding agencies are overwhelmed, he or she will communicate with the local emergency operations center (EOC) and emergency manager who may request aid from neighboring communities. If the local unified command, in concert with the local EOC, deems it necessary, state assistance will be requested, and when the state’s resources are overwhelmed, a request can be made for federal assistance.

The effectiveness of the local response depends not only on the preparedness of government pubic safety and public health officials, but on the integration of partners from the private sector, NGOs, and the preparedness of individuals.

**Non-governmental organizations**

Non-governmental organizations are organized corporate entities, separate from government and most often not for profit. These organizations are typically oriented to a particular purpose and type of activity, and can operate on a local, regional, national, or international basis. NGOs are important partners in disaster management. They assist the government and the whole community in planning for, response to, and recovery from disasters. They can make substantial contributions such as training and management of volunteers, provision of shelter, food, and water, transportation and logistics, identification of displaced survivors, interpreter services, and disability-related assistance. NGOs are a source of response core capabilities and as such should be included in community planning for disasters.

Some NGOs are officially designated as support elements to national response capabilities [7]. For example, the American Red Cross is chartered by Congress and has a legally defined and special relationship with the federal government for the provision of relief to survivors (ESF 6) and to help citizens prepare for and respond to emergencies. The National Voluntary Organizations Active in Disaster (VOAD) is a member organization composed of 55 state and territory VOADs and other NGOs committed to exchange of knowledge and resources in planning for, response to, and recovery from disasters. It is a combination of faith-based, community-based, and other non-profit NGOs representing thousands of professional staff and volunteers oriented to whole-community collaborative relationships and practices throughout the disaster cycle [8].

**Medical Reserve Corps**

The Medical Reserve Corps (MRC) is a national network of local groups of volunteers that include medical and public health professionals and others who are identified, screened, trained, and organized to improve the preparedness and response capabilities of their local jurisdictions by supporting routine public health activities and augmenting preparedness and response efforts. Activities of the local groups include training for emergencies, assisting to improve public health in the community, and participating in emergency response events. A local MRC unit coordinator leads the unit. MRCs work closely with the local health department, emergency management agency, hospitals, and other partner organizations. The MRC is a Citizen Corps partner program, federally funded to help build capacity for first responders through the use of volunteers. The Department of Health and Human Services administers the MRC, specifically the Office of the US Surgeon General, which serves as the clearing house for information and best practices for MRC units nationwide.

**Community emergency response teams**

The Community Emergency Response Team (CERT) program prepares people for disasters through education about the hazards that may affect their community, and trains them in basic disaster response skills. Through didactic and practical exercises, CERT members learn about fire safety, light search and rescue, team organization, and disaster medical operations, which allows them to assist others following an event when professional responders are not yet on scene. CERT members take a more active role in emergency preparedness projects in their community [9]. CERT is another Citizen Corps partner program, and is administered by the Federal Emergency Management Agency.

**State response and assistance**

State governments support local efforts to respond by using in-state resources as coordinated by the governor, the state emergency management agency, department of public health, and others. The governor may activate elements of the National Guard with expertise in emergency medical response, communications, logistics, search and rescue, or chemical, biological, radiological, nuclear, and high yield explosives (CBRNE) incidents. Volunteers may be solicited from established registries. The Emergency System for Advanced Registration of Volunteer Health Professionals (ESAR-VHP) is a national network of state-based registries established to standardize volunteer registration programs and verify health professionals’ licenses and credentials in advance of a disaster. Established by Congress in 2002, The ESAR-VHP is a state-managed health volunteer registration program administered by the Department of Health and Human Services, specifically the Assistant Secretary for Preparedness and Response (ASPR), which develops guidelines, policy, and requirements for the states to use in the development and implementation of their programs. The personal information collected is maintained and used in a manner consistent with all federal, state, and local laws governing security and confidentiality. State law and regulation guide workmen’s compensation and liability coverage for registrants who actively volunteer.

When the state’s resources are strained, the governor may request assistance through the Emergency Management Assistance Compact (EMAC), which functions as a mutual aid agreement between states and territories. Congress ratified the compact in 1996, and states and territories may join by passing legislation that adopts the standard language of the Compact. All states are currently members of the EMAC. Upon a governor-declared state of emergency, the Compact allows states to send personnel, equipment, and supplies to help respond to disasters in other states. Through the legal foundation of the Compact, licenses, certificates, and permits are recognized as valid in the requesting state. The agreement also manages liability and responsibilities of cost. Personnel who are deployed are protected under the workmen’s compensation and liability provisions of the affected state. The affected state also bears the cost of reimbursement for services.

Requests for assistance through the EMAC have grown substantially since its inception. In response to the World Trade Center bombing in 2001, only 26 emergency management personnel were requested through the EMAC, while an estimated 40,000 people responded to the attack. In 2005, the Gulf states requested a much greater variety of resources through the EMAC, including 46,503 National Guard personnel, 6,882 law enforcement responders, 2,825 fire and hazardous materials responders, and 9,719 other responders, many of whom were local government assets deployed directly to the affected areas [10]. The deployment of these resources is coordinated with local, state, and federal authorities.

**Federal response and assistance**

The governor of a state may request federal assistance when a disaster exceeds the ability of the state to manage with its available resources, or special capabilities held by the federal government are needed to manage the crisis. The federal government can respond to the request by providing funding or by directly providing resources and services in coordination with the local, state, tribal, or territorial jurisdiction in need. The federal response is provided in a manner that respects the sovereignty of the local jurisdiction and its responsibility to manage the consequences of the disaster.

The Robert T. Stafford Disaster Relief and Emergency Assistance Act was signed into law on November 23, 1988. This law created the system in place today in which a presidential declaration of an emergency or major disaster triggers assistance from the federal government to the states. It affords two types of declaration: an Emergency Declaration and a Major Disaster Declaration. The Major Disaster Declaration affords access to a comprehensive range of resources for response and recovery, which exceeds those available through an Emergency Declaration, but unlike an Emergency Declaration, can only be issued in the wake of a disaster. The Emergency Declaration, while more limited in scope, can be issued in *advance* of a disaster, with the goal of mitigating the impact of the event or avoiding the catastrophe altogether.

States will mobilize their resources and implement their emergency response plans in response to an incident. When the resources of the state are overwhelmed, the governor may then request federal resources after jointly assessing the affected areas with FEMA to determine the extent of damage and estimate the federal resources required for an effective response. The state typically must also guarantee its share of the cost. The governor’s request for a Stafford Act Declaration is addressed to the President, and considered by FEMA Administrator in conjunction with the Secretary of Homeland Security, who then makes a recommendation to the President.

Federal agencies may also respond using funding sources other than those made available by the Stafford Act. In this case an agency’s operating budget or funds designated by a trust or special appropriation may facilitate immediate life-saving assistance to states, such as firefighting support or support for a communicable disease outbreak or a cyber security event.

**Health and medical resources**

**National Disaster Medical System**

The National Disaster Medical System (NDMS) is a federal system coordinated by the Department of Health and Human Services (DHHS), in partnership with the Department of Homeland Security, the Department of Defense, and the Department of Veterans Affairs to provide disaster medical care to the nation. NDMS works with states and other local partners to augment their medical capabilities and capacity for response to disaster. The capabilities broadly include deployable response teams, patient movement, and definitive medical care. NDMS also supports the military and Department of Veterans Affairs medical systems by maintaining its network of civilian hospitals to receive and care for casualties that might be evacuated back to the United States in time of conflict or other type of military health emergency.

National Disaster Medical System operations entail a highly coordinated, multiagency local, state, and federal effort. The federal partners are coordinated by DHHS, which has overall authority and responsibility for NDMS.

* DHHS provides funding for training, exercising, and equipping all deployable teams. It coordinates the activities of NDMS with other public health and medical response activities (ESF 8) as well as the activities of the other ESFs. It also coordinates NDMS activity with the local and state entities.
* The Department of Homeland Security, through FEMA, develops NDMS mission assignments in the context of the NRF, and funds NDMS operations supporting emergencies under predeclaration periods and those declared under the Stafford Act.
* The Department of Defense (DoD) is responsible for patient movement using the US Transportation Command (USTRANSCOM). It also provides deployable health and medical resources required for the movement of those patients. The DoD funds NDMS operations supporting military contingencies and provides the necessary resources for receipt and distribution of patients for definitive care under those circumstances.
* The Department of Veterans Affairs (VA) alerts and activates designated VA Federal Coordinating Centers for receipt of patients and coordinates definitive medical care in the designated receiving areas across the US.

NDMS has medical, mortuary, and veterinary capabilities. Nearly 6,500 deployable personnel are organized into 90 teams [11]. Team members are volunteers and maintain their readiness, education, and training without pay. They are required to maintain the certifications and licensure appropriate for their discipline. Personnel can be activated as intermittent federal employees, which affords them pay, workmen’s compensation coverage, and protection under the Federal Tort Claims Act in which any civil complaints are defended by the federal government. Certifications and licensure are recognized in all states when members are federalized.

National Disaster Medical System response team assets include the following.

* **Disaster medical assistance teams (DMAT)**. DMATs are composed of professional and paraprofessional staff organized and resourced to provide medical triage, treatment, and preparation for transport when needed. The teams are composed of 35–50 personnel, including physicians, nurses, midlevel practitioners, paramedics, behavioral health specialists, logistical support personnel, and others. The team is designed to be self-sufficient for 72 hours, with personnel typically deploying for 14 days.
* **National medical response teams (NMRT)**. NMRTs are trained and equipped to respond to weapons of mass destruction incidents. They are designed to provide patient decontamination and specialized treatment and care for survivors of CBRNE events. One team is dedicated to response within the National Capital Region. The typical team consists of approximately 50 people.
* **International medical/surgical response teams (IMSURT)**. IMSURTs deploy at the request of the Department of State to treat survivors of disasters outside the borders of the continental United States. The IMSURTs have also been deployed in support of domestic missions such as the World Trade Center bombings and Hurricane Katrina. The team configuration is flexible and may have 30 personnel including trauma surgeons, general surgeons, orthopedic surgeons, anesthesiologists, emergency physicians, midlevel providers, nurses, paramedics, logistical support personnel, and others. The teams can supplement or temporarily replace surgical and critical care capability, and stabilize and prepare patients for evacuation when needed. Personnel are typically deployed for 14 days or until local medical resources are supplemented or recovered.
* **Disaster mortuary response teams (DMORT).** DMORTs are composed of individuals from a variety of disciplines who are deployed to provide technical assistance and personnel to identify and process deceased victims, under the guidance of local authorities. Disciplines represented include funeral directors, medical examiners, pathologists, fingerprint specialists, forensic odontologists, mental health specialists, and others. The federal government also maintains three deployable disaster portable morgue units (DPMUs), each of which contains a complete morgue with prepackaged equipment and supplies. DMORTs have deployed to mass fatality events such as the 2011 Joplin, MO, tornado (161 deaths), Hurricanes Katrina and Rita (~2500 deaths), and the 2010 Haiti earthquake (~212,000 deaths).
* **National veterinary response teams (NVRT).** NVRTs provide veterinary care to ill and injured animals housed in federally supported facilities after a disaster. This also includes lab animal support, working animals such as US&R dogs, and assistance with USDA-led outbreaks among livestock and poultry. The 22–26 member team is composed of clinical veterinarians, veterinarian pathologists, microbiologists, epidemiologists, toxicologists, and others.

When local medical systems become overwhelmed, NDMS provides the means to evacuate patients to the nearest participating hospital capable of supporting the needs of the patient. Local and state officials in coordination with federal authorities will identify patients requiring evacuation and initiate their movement. DoD has primary responsibility for coordinating the patient evacuation function of NDMS in conjunction with DHHS and FEMA. Various means of transportation can be used, including the resources at USTRANSCOM. Patients evacuated from a disaster area will arrive at a federal coordinating center patient reception area (PRA), where they will be triaged and staged for transport to a local NDMS participating hospital. PRA teams are often composed of local EMS personnel, local federal resources (such as VA Medical Center assets), local public health and health system personnel, and others. A local or deployed DMAT may also be assigned to PRA functions. The Federal Coordinating Center will track the location and status of all patients. Return movements home are coordinated by DHHS on a case-by-case basis, with those requiring continuing medical care returned when appropriate care is available at their point of origin.

**References**

1. 1 Catlett C, Jenkins J, Millin M. Role of emergency medical services in disaster response: resource document for the national association of EMS physicians position statement. *Prehosp Emerg Care* 2011;15:420–5.
2. 2 Department of Homeland Security. *Strategic National Risk Assessment: The Strategic National Risk Assessment in Support of PPD 8: A Comprehensive Risk –Based Approach toward a Secure and Resilient Nation*. Available at: [www.dhs.gov/xlibrary/assets/rma-strategic-national-risk-assessment-ppd8.pdf](http://www.dhs.gov/xlibrary/assets/rma-strategic-national-risk-assessment-ppd8.pdf)
3. 3 Presidential Policy Directive/PPD-8. *National Preparedness*. Available at: [www.dhs.gov/presidential-policy-directive-8-national-preparedness](http://www.dhs.gov/presidential-policy-directive-8-national-preparedness)
4. 4 Department of Homeland Security. *National Response Framework*, 2nd edn, May 2013. Available at: [www.fema.gov/national-response-framework](http://www.fema.gov/national-response-framework)
5. 5 Department of Homeland Security. *National Incident Management System*. December 2008. Available at: [www.fema.gov/pdf/emergency/nims/NIMS\_core.pdf](http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf)
6. 6 Department of Homeland Security, Emergency Management Institute. Independent Study Program. Available at: <http://training.fema.gov/IS/NIMS.aspx>
7. 7 Department of Homeland Security. *National Response Framework*, 2nd edn, May 2013, page 9. Available at: [www.fema.gov/national-response-framework](http://www.fema.gov/national-response-framework)
8. 8 National Voluntary Organizations Active in Disaster. Available at: [www.nvoad.org](http://www.nvoad.org/)
9. 9 Federal Emergency Management Agency. Community Emergency Response Teams. Available at: [www.fema.gov/community-emergency-response-teams](http://www.fema.gov/community-emergency-response-teams)
10. 10 GAO Report to the Committee of Homeland Security and Governmental Affairs, US Senate. *Emergency Management Assistance Compact: Enhancing EMAC’s Collaborative and Administrative Capacity Should Improve National Disaster Response*. GAO-07-854. June 2007, p.13. Available at: [www.gao.gov/new.items/d07854.pdf](http://www.gao.gov/new.items/d07854.pdf)
11. 11 National Disaster Medical System (NDMS) Concept of Operations (CONOPS). 13 July 2009. Available at: [http://ndms.fhpr.osd.mil](http://ndms.fhpr.osd.mil/)