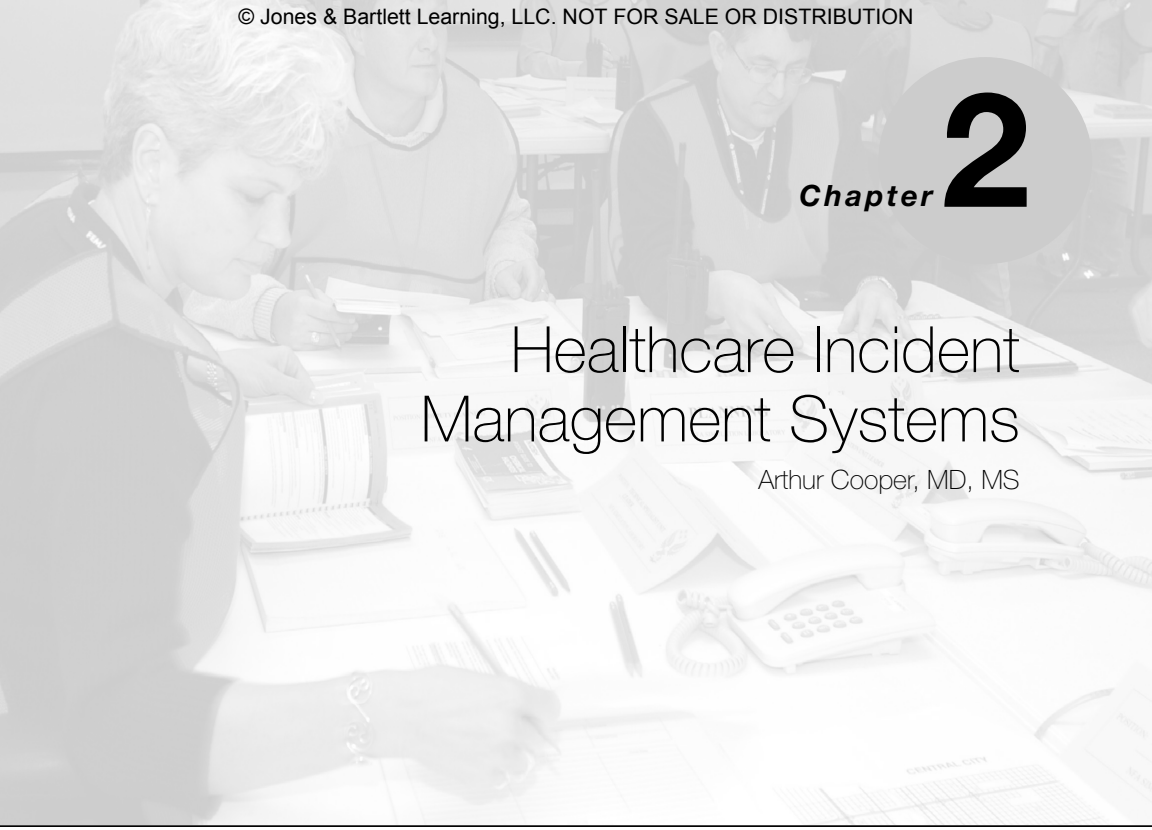


Chapter 2

Healthcare Incident Management Systems

Arthur Cooper, MD, MS

Photo by Jocelyn Augustino/FEMA News Photo

Learning Objectives

- Discuss the fundamental principles of healthcare incident management systems.
- Describe the incident command system structure and its application to the healthcare environment.
- Discuss the importance of interagency cooperation and collaboration when managing disasters and public health emergencies that impact the healthcare system.

Overview

Making method out of madness

The aim of this chapter is to arm the busy healthcare staff, clinician, or emergency manger with a basic understanding of incident management

systems as applied to the healthcare and hospital environment, including the Hospital Incident Command System (HICS), not as a substitute, but as a rationale for incident management training and the need to understand the application to a hospital or healthcare system. This chapter will cover the fundamental principles of healthcare incident management systems, including one system modified specifically for the hospital, the Hospital Incident Command System. Such systems are vital to the management of disasters, acts of terrorism, and public health emergencies involving healthcare organizations because, without the effective coordination of resources achieved through use of a healthcare incident management system, chaos, rather than order, will prevail. After a concise introduction to set the stage, the chapter will consider the historical background, foundational principles, incident leadership, command structures, HICS organization, training systems, HICS implementation, logistic concerns, practical concerns, and interagency relationships essential to successful healthcare incident management, before delivering its conclusions.

Case Study

A Cloud in the Midnight Sky

You are the administrator on duty (AOD) when you are called by the physician in charge of the emergency department, who reports that numerous arriving patients are exhibiting spasms of severe coughing triggered by "something in the air." While you consider your next steps, your spouse calls to tell you there has been a large explosion at a nearby tank farm adjacent to a large industrial facility. Television reports document widespread panic at the scene and in the immediate vicinity of your hospital, which is located about two miles (three kilometers) east of the site. It is past midnight; only caretaker staff are on duty (except in your critical and acute care units) and hospital staff await your orders.

The following questions race through your mind. How would you begin to answer them?

- Does a bona fide disaster exist?
- Should I declare a disaster now?
- Should I seek additional information before declaring a disaster?
- Should I implement the hospital's emergency operations plan?
- Should I activate the hospital's command center?
- How will I ensure the safety of staff and patients?
- Should I mobilize additional hospital staff?
- Should I lock down the facility?
- Should all emergency patients be decontaminated?
- Should public health agencies be notified?

- Who should I ask for necessary additional resources?
- Are there potential threats to the hospital itself?
- How will I coordinate and supervise all the staff?

The decisions are yours to make. The answers may be found in this chapter.

Introduction

"Who's in charge? They're all in charge!"[1]

Understanding the Incident Command System (ICS) applied during disasters may prove a daunting task, even for healthcare executives experienced in interpreting complex tables of organization that baffle other managers, clinicians accustomed to solving and treating complex medical problems, and staff prepared to work in the complex healthcare environment. However, as recently stated so eloquently by Lieutenant Thomas Martin of the Virginia State Police in the illuminating video, *The Many Hats Of Highway Incident Command* (http://cts.virginia.edu/incident_mgnt_training.htm), the principles of incident command are fundamentally no different from the everyday manners children learn as youngsters, as elegantly and clearly described in the poignant work by author Robert Fulghum, *All I Really Need To Know I Learned In Kindergarten.*[1,2] Within this simple framework, the responsible healthcare emergency manager can readily answer the question, "Who's in charge?" The answer, of course, is that *they're all in charge, of what they're in charge of*—because all those involved in the disaster response are responsible for their immediate tasks, their communication with others, and *first and foremost, their own and others' safety*.

Historical Background

"The best way to predict the future is to create it."[3]

Modern incident command grew from the experience of firefighters in combating the California wildfires of the mid 1970s. Inadequate communication and ineffective collaboration between the numerous agencies battling these natural disasters led to the deaths of many firefighters whose lives need not have been lost. The subsequent after-action reports identified numerous critical weaknesses in the organization and delivery of many responders' agencies and efforts, including lack of accountability, barriers to communication, poor planning processes,

overloaded incident commanders, and absent response integration. The dawning realization that deficient and defective command and control were mostly responsible for these tragic fatalities led California fire chiefs to develop an "interoperable" system for emergency response, whereby all the involved agencies could communicate with one another and collaborate in the field, based upon a common organizational structure that all such agencies could understand and apply.

This new system, called FIRESCOPE (Firefighting Resources of California Organized for Potential Emergencies), was based upon principles gleaned from military experience and management theory, especially the management by objectives concepts introduced in 1954 by Peter F. Drucker in his classic work, *The Practice of Management*.[4] Its core purpose was to provide a standardized, on-scene, all-hazard incident management dogma that allowed its users to quickly implement an integrated organizational structure that was not impeded by jurisdiction boundaries, and was flexible and scalable enough to match the needs and resources for single, expanding, multiple, and complex incidents, despite their special circumstances and unique demands. It rapidly evolved into the Incident Command System (ICS) that has gradually been adopted by most fire and emergency services nationwide, the purposes of which are to ensure the (1) safety of responders and others, (2) achievement of tactical objectives, and (3) efficient use of resources. As a result, ICS was subsequently designated for use throughout the United States by the federal Superfund Amendments and Reauthorization Act (SARA) of 1986 (PL 99-499), Occupational Health and Safety Administration (OSHA) rule 1910.120, and, most recently, Homeland Security Presidential Directive 5 (HSPD 5),[5] in addition to numerous other state and local regulations. Its early success also led the California Emergency Medical Services Authority to adapt and periodically revise it for use in all disasters involving hospitals, such that it now serves as the basis of the Hospital Incident Command System (HICS) used by most hospitals in the Americas and, increasingly, worldwide. Specific instruction in HICS is available through both the California Emergency Medical Services Authority HICS Web site (http://www.emsa.ca.gov/HICS/default.asp), and the Emergency Management Institute's Web site (http://training.fema.gov), within the independent study ICS courses IS-100.HC and IS-200.HC revised in 2007 for healthcare providers.[6]

Foundational Principles

"Management by objectives"[4]

The three key strategies of the disaster response, in order, are to (1) protect and preserve life, (2) stabilize the disaster scene, and (3) protect and preserve property. Healthcare providers intuitively understand the first

purpose, and intellectually understand that the third purpose is essential to the first because healthcare providers cannot perform their lifesaving tasks without the appropriate facilities, equipment, and resources. The second purpose, however, may be less obvious. This is because an organized disaster response can occur only within the context of a stable work environment—an environment that is difficult to achieve in the first minutes after disaster strikes, when chaos is the rule, even in greatly complex work environments, such as hospitals, that are highly self-regulated.

Thus, an incident management system is needed to bring order to the chaos, the *sine qua non* of which is an incident command structure characterized by the three key tactics that must underlie all of incident command—*unity of command*, *span of control*, and *clarity of text*. Unity of command refers to the principle that sharing of information among all personnel involved in a disaster response is vital, but such individuals receive formal orders from, and make formal reports to, a single supervisor in order to preserve the viability of the chain of command. Span of control refers to the principle that in a high stress environment, no line supervisor can effectively coordinate the efforts of more than three to seven, and ideally no more than five, subordinate personnel. Clarity of text refers to the principle that all communications, written and spoken, must be transmitted in the simplest, most generic language possible, avoiding the use of words or jargon likely beyond the understanding of many emergency responders, so as to ensure that all personnel involved in the disaster response understand both the general strategy of the Emergency Operations Plan (EOP) and the special tactics being applied to combat the disaster.

Incident Leadership

"Coordination, Communication, Cooperation"[1]

Healthcare incident management systems achieve their goals by ensuring what have been termed the "3 Cs" of incident command: *coordination*, *communication*, and *cooperation*, of which the most important is cooperation, because it makes coordination and communication feasible. However, effective incident management requires not only universal education in disaster management appropriate to the functional job description of the individual healthcare employee—awareness, technical, and professional—but also frequent drilling in the implementation of the hospital disaster plan, especially its incident command structure. Most texts and training rightly emphasize that the individuals designated to fulfill specific functional job descriptions must be appropriately trained to do so; therefore, hospital executives who perform similar tasks during routine hospital business must step aside and yield these responsibilities to those who have been trained

to do so. However, this notion ignores long-established realities of human behavior—the boss is still the boss, even if untrained in disaster management—so every effort should be made by senior executives to ensure that all hospital executives receive training in disaster management and incident command that will enable supervisors to function in their assigned roles even when disaster strikes.

Physicians commonly presume that because the first key purpose of incident management is to protect and preserve life, they should be in charge of emergency operations. However, physicians often overlook the fact that while they must clearly be in charge of all aspects of medical care, they generally comprise no more than approximately 10% of the total number of hospital personnel. Typically, the healthcare needs of the hospitalized patient require an average of 10 other personnel to support the treatments prescribed and the operations performed by a single physician or surgeon. Moreover, the physician's expertise—and most valuable contribution to the hospital disaster response—lies in the medical care of the hospitalized patient, rather than its operational, logistical, or planning support.

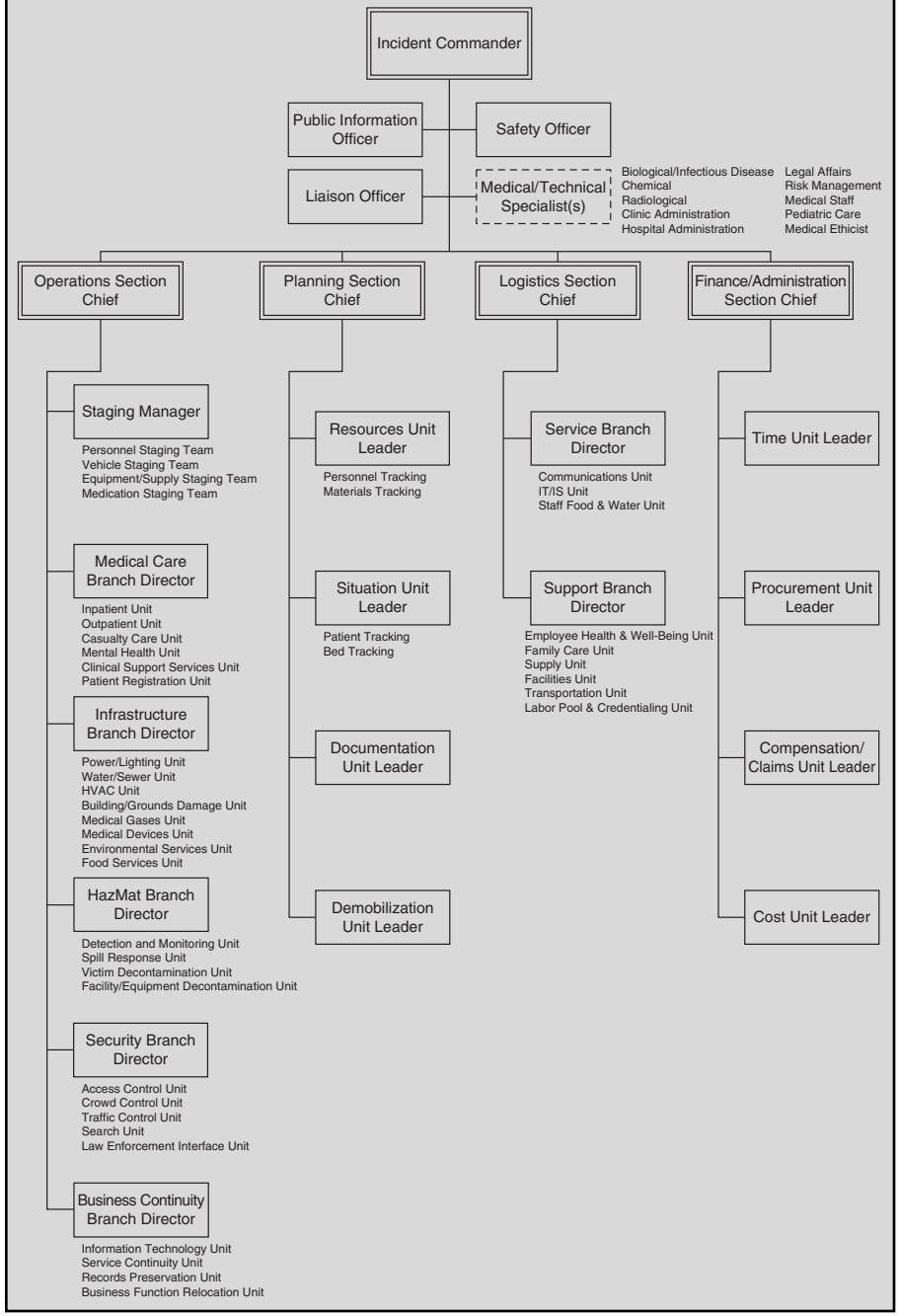
Command Structure

"[ICS is] the system to achieve the coordination necessary to carry out an effective and efficient response."[7]

Two basic command structures, and variations thereof, are utilized worldwide: (1) the Hospital Incident Command System (HICS), developed by the California Emergency Medical Services Authority and promulgated both by its originator (http://www.ems.ca.gov/HICS/default.asp) and by the Domestic Preparedness Consortium of the Federal Emergency Management Agency (http://training.fema.gov), has been adopted for use by most hospitals in the Americas (Figure 2-1), while (2) nation-specific templates are used by hospitals in Europe and Australasia, which are promulgated chiefly through the extensive disaster medicine training programs of the Emergo Train System (ETS), developed by the Linköping University Trauma Center in Sweden (http://www.emergotrain.com)[8,9] (Figure 2-2). These various systems differ chiefly in the relative independence of their medical operations units, and the specificity of their tables of organization, the former tending to be more hierarchical and the latter tending to be more collegial. In the United States, the Hospital Incident Command System (HICS) has been adopted by the Department of Homeland Security as the system most congruent with the Incident Command System (ICS) designated by the National Incident Management System (NIMS) under the authority of Homeland Security Presidential Directive

Figure 2-1

Hospital Incident Command System Incident Management Team Structure



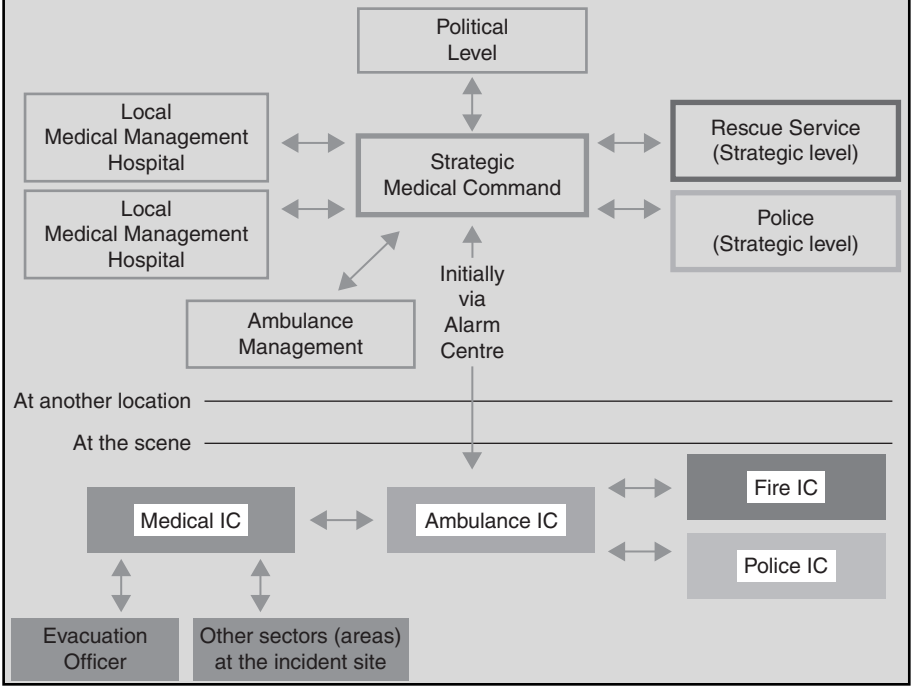
California Emergency Medical Services Authority

5 (HSPD 5).[5] However, it is less important which system is utilized than the fact that the chosen system has the support of both hospital executives and hospital staff—cooperation depends upon acceptance of a single approach to hospital incident management by all hospital personnel, because they are the ones who must implement it.

Regardless of which system is utilized, it is important to note that there are far more similarities than differences between the various systems. All systems must address the four key functions of the emergency management response: finance and administration, logistics, operations, and planning and intelligence. Moreover, with the passage of time, all disaster response systems have been evolving toward a common model for incident command that emphasizes the fundamentally different tasks of medical and logistic operations. For example, the most recent iteration of HICS includes appropriate medical/technical specialists within the command staff who assist and advise the incident commander within the hospital command center, thereby ensuring that medical concerns directly inform decisions made by the incident command team in real time.

Figure 2-2

Emergo Train System Communication Structure for the Medical Service for a Major Incident



Rüter A, Nilsson H, & Vikström T. *Medical Command and Control at Incidents and Disasters*. Lund: Studentlittatur, 2006.

Hospital Incident Command System (HICS)

"[HICS is] a methodology for using ICS in a hospital/healthcare environment."[8]

The functional job action categories that must be addressed under HICS include incident **command** and staffing, **finance** and administration, **logistics**, **operations**, and **planning** and intelligence. (Remember these categories by the mnemonic "**CFLOP,"** for without ICS, one will **"C"** [see] the disaster response **"FLOP.**") The additional command staff functions that must be addressed under HICS include **liaison**, **medical/technical**, **public information**, and **safety.** (Remember these categories by the mnemonic "[Mount O]**LMPS**," indicating their physical proximity to the incident commander.) Each of these categories is described in the following sections in greater detail. Utilization of HICS in a disaster is not intuitive, and requires far more than anecdotal familiarity with its structure and terminology for its successful implementation. Detailed presentations and all requisite forms to guide the implementation of HICS may be downloaded from its Web site free of charge (http://www.emsa.ca.gov/HICS/default.asp).

COMMAND

A single *incident commander* (IC) is responsible for all aspects of the disaster response, whether operational or medical. The initial responsibilities of the IC are to declare an internal disaster (originating within the facility) or an external disaster (originating outside the facility), to activate the *hospital emergency operation center* (HEOC), to implement the hospital *Emergency Operations Plan* (EOP), and, based upon the nature and extent of the disaster, to organize the disaster response through designation of the various section chiefs (general staff) and staff officers (command staff). All ICS section chiefs report directly to the IC and must be in constant communication with the IC, either in person or by telecommunications, for hospital incident command to be effective and efficient. In addition to coordinating and supervising the disaster response through the four ICS section chiefs, the IC is responsible for the provision of the following four key command functions: *liaison*, *medical/technical*, *public information*, and *safety*. The decision to designate section chiefs and staff officers to fulfill the various functional roles required for incident command rests solely with the IC. Not every response will require all positions to be filled, based on the size and scope of the event. In addition, in the early stages there may insufficient personnel to fill all roles, so several may be held by a single person. In fact, in the beginning one could say the IC is fulfilling all roles until they are assigned. This is

a key principle in that the IC must assume personal responsibility for any function not so assigned.

Liaison

The *liaison officer* interfaces with all appropriate government and nongovernmental agencies and health system organizations. At a minimum, these should include local public health, office of emergency management, police, fire, and emergency medical services, as well as state, county, and local departments of public health, and regional healthcare associations.

Medical/Technical

The *medical/technical specialists* are chiefly responsible for providing the IC with medical and technical advice. The medical/technical specialists may vary based on the type of disaster (infectious disease specialist for biological agents, hazardous materials specialist or medical toxicology physician for chemical agents, radiation safety physician for nuclear agents, and trauma or burn surgeon for explosive or incendiary agents).

Public Information

The *public information officer* interfaces with all appropriate communications media to provide regular reports on the progress of the disaster response. The public information officer also offers advice and assistance in developing and instituting communications to staff and families of patients potentially or actually hospitalized after a disaster to ensure that information is accurate and uniformly presented, and to provide regular reports of the outcome of each individual patient's care to the approapite parties.

Safety

The *safety officer* is chiefly responsible for the integrity of the disaster response through situational awareness of potential hazards, surveillance of staff and victims safety, and making recommendations to the IC with regard to safety. This is accomplished via review of the **S**ituation (of hospital facilities), **P**rotection (of hospital personnel), **I**dentification (of possible risks), and **N**otification (of appropriate authorities), or **SPIN**.

FINANCE

The *finance and administration* section monitors and tracks costs incurred in mounting the disaster response. It also identifies potential legal issues and liabilities, and maintains the records of the HCC, such that ex-

traordinary expenses, legal risks, and after-action reports can be accurately determined, delineated, and developed for reimbursement, reconsideration, and review.

LOGISTICS

The *logistics* section is the "quartermaster" of the disaster response. It obtains and manages all staff, facilities, and equipment needed to support the disaster response, such as food, supplies, equipment, facilities, and sanitation, as well as transport vehicles, fuel, physical space, and equipment repair.

OPERATIONS

The *operations* section is the central component of the disaster response and all other components are designed to support it. It executes the disaster plan and is responsible for all necessary medical, nursing, and ancillary functions at patient-care sites, as well as decontamination and waste control, ground and air rescue, evacuation of casualties, and crisis management.

PLANNING

The *planning and intelligence* section formulates instant changes in the response plan based upon feedback obtained from administrative, logistical, and operation personnel. The role of this section is to always be thinking several events ahead of the current time and providing the IC with the information and approach to these future eventualities and possibilities. It is responsible for the collection, organization, evaluation, and dissemination of information on the present status of, and future needs for, staff, facilities, and resources in the disaster response.

Training and Education in ICS

Talking the talk vs. walking the walk

Although disaster professionals and emergency managers have adopted a nomenclature that is unique to disaster medical and mass casualty management, it follows a pattern that can be compared to terms recognized by anyone in healthcare familiar with the principles of public health and/or injury control. Still, one must be knowledgeable of the specialized terminology used in emergency management for the

principles of emergency preparedness to be fully mastered: (1) preparation is analogous to *primary* injury prevention, which seeks to avoid injuries before they occur, chiefly through targeted educational programs; (2) mitigation (or protection) is analogous to *secondary* injury prevention, which seeks to attenuate injuries as they occur, mainly through system or product engineering strategies; (3) response is analogous to *tertiary* injury prevention, which seeks to ameliorate the effects of injury through timely application of sustentative, followed by definitive, prehospital and in-hospital emergency medical care; (4) recovery is analogous to what might be called *quaternary* injury prevention, which seeks to (re)activate local public health and healthcare systems to effectively manage intercurrent or recurrent injuries and illnesses using surviving or restored community-based resources. Note that many experts use the term "mitigation" to refer to the interdisaster phase of emergency response planning, but, in the opinion of the author, this is an incorrect usage of the word because planning efforts undertaken during this period are designed to attenuate the effects of disasters after they occur. Regardless of the terminology adopted, it is vital that all hospital personnel seek to understand and practice their disaster roles, because the cost of failure to learn is the inability to adequately prepare, respond and recover from a disaster.

It is self-evident that hospitals can no longer afford *not* to invest in disaster management training, including ICS, but portable, inexpensive training programs in hospital disaster management have yet to be developed, let alone disseminated. Among the best of those currently available are (1) the *Hospital Disaster Life Support I* and *II* (HDLS I and HDLS II) courses offered by the SiTEL program of the ER One Institute of the Washington Hospital Center (http://www.web.sitelms.org); (2) the *Hospital Emergency Response Training* and the *Healthcare Leadership and Decision-Making* courses, both still offered free of charge as of January 2010, at the Noble Training Facility of the Center for Domestic Preparedness of the Federal Emergency Management Agency in Anniston, Alabama (https://cdp.dhs.gov); and (3) the programs offered by the Emergo Train System (ETS) of the Linköping University Trauma Center in Sweden, including its *European Master in Disaster Medicine* (EMDM) program (http://www.emergotrain.com).[9–11] As stated, both the California Emergency Medical Services Authority (http://www.emsa.ca.gov/HICS/default.asp) and the Emergency Management Institute of the Federal Emergency Management Agency (http://training.fema.gov) offer independent study options online that can educate hospital executives in the fundamental principles of HICS, but *there is no substitute for frequent disaster simulations* that force hospital employees to learn and practice the roles they must play in actual disasters (see the following role descriptions). Regardless of the training program used, the functional job action categories that must be addressed are shown in Exhibit 2-1.[9]

Exhibit 2-1

Emergo Train System: Responsibilities of Incident Command in the Hospital

Logistic Commander

- personnel and their requirements
- hospital beds
- premises
- operation, electricity, water, heating, etc.
- safety
- collaboration with external authorities
- information to the media and the logistic commander's personnel
- documenting the work of the staff
- economic issues that need to be handled

Medical Commander

- contact with the strategic command (alternatively, contact with the incident site if the current staff form a part of the strategic command)
- intensive care
- emergency department
- operating theatre
- surgical wards in the widest sense (neurosurgery, thorax surgery, vascular surgery, etc.)
- contact with other groups within the unit
- psychological and psychosocial management (PPM)
- informing relatives

Rüter A, Nilsson H, & Vikström T. *Medical Command and Control at Incidents and Disasters*. Lund: Studentlittatur, 2006.

Implementing Hospital Incident Management

"Failing to plan is planning to fail."[12]

The hospital or healthcare system's *Incident Command System* (ICS) is but one component of the *incident management system* (IMS), which embraces all phases of readiness for both internal (originating within the hospital) and external (originating outside the hospital) disasters.[8] While beyond the scope of this chapter, all healthcare systems and organizations, *and each constituent unit*, must develop, implement, test, and refine both facility-wide and unit-specific *Emergency Operations Plans* (EOPs) that are comprehensive enough to embrace all foreseeable hazards—identified via a formal *hazard vulnerability analysis* (HVA), a probabilistic evaluation of the internal and

external dangers to which it is most likely to be exposed—yet simple enough to be rapidly implemented by all levels of staff. The facility-wide EOP must specify (1) who has the responsibility and authority to implement it, usually the hospital chief operating officer (COO) or designee—it is generally best not to include the chief executive officer (CEO) as part of the ICS because this individual has ultimate responsibility for the entire hospital, not only the incident, and must therefore be answerable on an ongoing ("24/7/365") basis to the governing entity—and (2) the steps to be taken to establish the *hospital emergency operation center* (HEOC), recognizing that successful implementation of the IMS depends upon the education and training of all hospital personnel in its use, based on the expected competencies of all hospital workers and leaders, as shown in Exhibits 2-2 and 2-3.[13] The "DISASTER Paradigm" developed and disseminated by the National Disaster Life Support (NDLS) courses of the National Disaster Life Support Foundation—the *Core Disaster Life Support* (CDLS) and *Basic Disaster Life Support* (BDLS) levels of which have recently been made available online (http://www.bdls.com)—provides a useful approach to implementation of the IMS, the first step of which, following detection and declaration of an internal or external disaster, is the activation of the HICS and the establishment of the HEOC, as shown in Exhibit 2-4.[14]

Exhibit 2-2

Emergency Preparedness and Response Competencies for Hospital Workers[13]

The ability of a hospital to respond to an emergency depends upon having staff who know what to do and have the needed skills. As a hospital employee, you should be able to complete the following tasks:

- Locate and use the section of the hospital emergency response plan that applies to your position.
- Describe your emergency response role and be able to demonstrate it during drills or actual emergencies.
- Demonstrate use of any equipment (such as personal protective equipment or special communication equipment) required by your emergency response role.
- Describe your responsibilities for communicating with or referring requests for information from other employees, patients and families, media, general public, or your own family, and demonstrate these responsibilities during drills or actual emergencies.
- Demonstrate the ability to seek assistance through the chain of command during emergency situations or drills.
- Demonstrate the ability to solve problems that arise while carrying out your role during emergency situations or drills.

Courtesy of the National Center for Disaster Preparedness, Center for Public Health Preparedness

Exhibit 2-3

Emergency Preparedness and Response Competencies for Hospital Leaders[13]

The following core emergency competencies are those you need as a hospital leader (hospital-wide manager, department head, or senior manager in a large department), though you may demonstrate them in a variety of ways depending upon your exact role and the specific emergency or drill. These competencies provide a template for your continued development and can be used flexibly with other emergency preparedness activities within your institution:

- Describe the mission of the hospital during response to emergencies of all kinds, including the disaster response chain of command and emergency management system (e.g., Hospital Incident Command System, Incident Command System) used in your hospital.
- Demonstrate the ability to review, write, and revise as needed those portions of the hospital emergency response plan applicable to your management responsibilities and participate in the hospital's hazard vulnerability analysis on a regular basis.
- Manage and implement the hospital's emergency response plan during drills or actual emergencies within your assigned functional role and chain of command.
- Describe the collaborative relationship of your hospital to other facilities or agencies in the local emergency response system and follow the planned system during drills and emergencies.
- Describe the key elements of your hospital's emergency preparedness and response roles and policies to other agencies and community partners.
- Initiate and maintain communication with other emergency response agencies as appropriate to your management responsibilities.
- Describe your responsibilities for communicating with other employees, patients and families, media, the general public, or your own family, and demonstrate them during drills or actual emergencies.
- Demonstrate use of any equipment (such as personal protective equipment or special communication equipment) required by your emergency response role.
- Demonstrate flexible thinking and use of resources in responding to problems that arise while carrying out your functional role during emergency situations or drills.
- Evaluate the effectiveness of the response within your area of management responsibility in drills or actual emergencies, and identify improvements needed.

Courtesy of the National Center for Disaster Preparedness, Center for Public Health Preparedness

Exhibit 2-4

National Disaster Life Support Program

"DISASTER Paradigm"[14]

Detect/**D**eclare
Incident Command
Safety/**S**ecurity
Assess Hazards
Support Resources
Triage/**T**reatment
Evacuation
Recovery

Courtesy of the American Medical Association

The HEOC is established in a secure location that is located at a distance from any potential event, but has ready access to communication with and monitoring of the decontamination unit, emergency department, operating suites, intensive care units, acute care areas, facilities plant, information systems, and family waiting areas at a minimum. The location should be isolated from potential hazards, such as contaminated heating/ventilation/air conditioning (HVAC) and drainage/sewage systems, but close enough to the environments of care that reports can be physically received and orders can be physically transmitted if electronic communication or transport systems fail—a surprisingly frequent occurrence, even in disasters limited to hospitals, giving rise to the oft repeated and highly valuable advice to ensure redundancy of all communications systems and equipment among the HCC and all hospital departments, whether based on landline telephones, cellular telephones, an intranet, or the Internet. Because incident command structures such as HICS are designed to be both flexible and scalable, only those elements of the incident command structure and staff deemed essential to the disaster response need be activated—and likewise deactivated after the disaster has been brought under control—upon determination of the incident commander (IC) or designee. The HEOC, at the direction of the IC, next activates the hospital's Emergency Operations Plan (EOP), an "all-hazards" plan with branch points designed to address not only specific threats identified by the hospital's HVA, but also generic threats, such as *chemical*, *biological*, *radiological*, *nuclear*, or *explosive* (CBRNE) events that may result from industrial mishaps or intentional mischief. Although a detailed iteration of the critical elements of hospital EOPs is beyond the scope of this chapter, the EOP should be kept as simple as possible, as shown in Exhibit 2-5, and should rely on individual Job Action Sheets to be distributed among hospital personnel assigned to affected units as soon as possible after the disaster is declared by the IC.[15]

Exhibit 2-5

Example of Simple Hospital Disaster Plan Printed on Reverse of Hospital Identification Card[15]

Styner Memorial Medical Center
In Case of Disaster

- C—Cease nonacute patient care activity
  - Delay elective operations, procedures, infusions
- A—Activate unit-specific disaster plan
  - Assign caretaker staff, reassign others
- R—Report to assigned workstation
  - Review assignment, Job Action Sheet
- E—Ensure your own and others' safety
  - Don PPE appropriate to assignment

Courtesy of the American College of Surgeons

Logistical Concerns

"Amateurs study tactics. Experts study logistics."[16]

Emergencies become disasters when the existing needs outstrip available resources. Three levels of medical disasters creating multiple casualties in a fixed time period are generally recognized:

1. "Multiple casualty incidents" (MCIs) typically involve five or more patients. Available medical assets are strained but not overwhelmed.
2. "Mass casualty events" (MCEs) typically involve 20 or more patients. Available medical assets are overwhelmed, but can be reinforced through mobilization of additional medical assets, known as surge capability. (MCEs are termed "limited" if available medical assets can be expeditiously reinforced through provision of additional staff, equipment, and resources; no specific terminology currently exists to define more egregious circumstances.)
3. Catastrophic medical disasters (also called "complex humanitarian emergencies" or CHEs), typically involve 500 or more patients per million population, thereby affecting public as well as personal health. Available medical assets are overwhelmed or destroyed, with no prospect of early reinforcement of staff, facilities, equipment, or resources.

Computer simulations have demonstrated that emergency department throughput that exceeds approximately five to seven critical casualties per hour will cause most critical care processes to become unmanageable (critical imaging studies are most often the rate-limiting

step), unless specific measures are taken through rapid mobilization of surge resources (medical response teams, provision only of minimal acceptable care, and strict reliance on unidirectional patient flow).[17] If such measures are not adopted, the critical mortality rate (the best measure of quality of medical care in disasters) can be expected to rise beyond acceptable limits, but if they are adopted, it will decrease as triage precision increases.[18]

The Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) now requires that every healthcare organization seeking its accreditation engage its community (including all locally involved public safety, health, education, and works services such as police, fire, emergency medical services, health departments, hospital associations, school districts, colleges and universities, water, and sanitation, as well as executives of businesses and industries from which logistical support may be called forth) in each of the four specific phases of its internal and external disaster planning—preparation, mitigation, response, recovery—and that it participate in a minimum of one communitywide disaster drill annually. Such drills must evaluate the communication, coordination, and command elements of the hospital's EOP developed by the healthcare organization in partnership with its community, and range from discussion-based exercise, such as seminars and workshops, to operations-based exercises, such as functional and full-scale (or field) exercises, as shown in Exhibit 2-6.[19] Assessment of each facility's ICS is best evaluated through the use of specially developed and validated performance indicators by trained observers, as well as structured review of after-action reports, both during and following hospital disaster exercises.[20–22] The Homeland Security Exercise and Evaluation Program (HSEEP) of the Federal Emergency Management Agency (FEMA) seeks to establish a national standard for all disaster management and emergency preparedness exercises through provision of a standardized methodology and terminology for exercise design, development, conduct, evaluation, and improvement planning. Extensive resources are available on its Web site (https://hseep.dhs.gov/pages/1001_HSEEP7.aspx).[22]

Exhibit 2-6

Exercise Types Defined by the Homeland Security Exercise and Evaluation Program[22]

Discussions-based exercises familiarize participants with current plans, policies, agreements, and procedures, or may be used to develop new plans, policies, agreements, and procedures. Types of discussion-based exercises include the following examples:

- **seminar**: A seminar is an informal discussion designed to orient participants to new or updated plans, policies, or pro-

cedures (e.g., a seminar to review a new evacuation standard operating procedure).
- **workshop**: A workshop resembles a seminar, but is employed to build specific products, such as a draft plan or policy (e.g., a training and exercise plan workshop is used to develop a multi-year training and exercise plan).
- **tabletop exercise (TTX)**: A tabletop exercise involves key personnel discussing simulated scenarios in an informal setting. TTXs can be used to assess plans, policies, and procedures.
- **games**: A game is a simulation of operations that often involves two or more teams, usually in a competitive environment, using rules, data, and procedures designed to depict an actual or assumed real-life situation.

Operations-based exercises validate plans, policies, agreements, and procedures; clarify roles and responsibilities; and identify resource gaps in an operation environment. Types of operations-based exercises include the following examples:

- **drill**: A drill is a coordinated, supervised activity usually employed to test a single, specific operation or function within a single entity (e.g., a fire department conducts a decontamination drill).
- **functional exercise (FE)**: A functional exercise examines and/or validates the coordination, command, and control between various multiagency coordination centers (e.g., emergency operation center, joint field office, etc.). A functional exercise does not involve any "boots on the ground" (i.e., first responders or emergency officials responding to an incident in real time).
- **full-scale exercises (FSX)**: A full-scale exercise, previously known as a field exercise, is a multiagency, multijurisdiction, multidiscipline exercise involving functional (e.g., joint field office, emergency operation centers, etc.) and "boots on the ground" response (e.g., firefighters decontaminating mock victims).

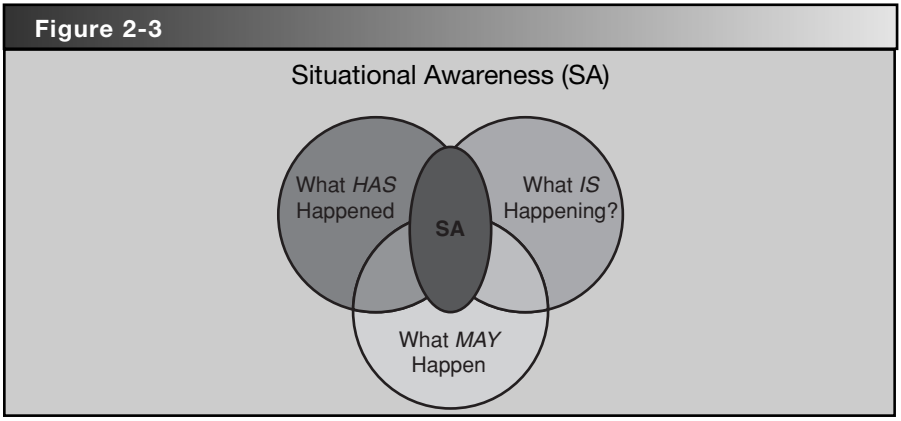
United States Department of Homeland Security

Practical Concerns

"Don't fight against chaos. Use chaos."[23]

Perhaps the most important tools with which healthcare emergency managers can equip hospital employees are *situational awareness* and *systematic reporting*, as shown in Figure 2-3 and Exhibit 2-7. The oft repeated phrase, "If you see something, say something," is at the heart of situational awareness. All hospital employees must be regularly

Figure 2-3



encouraged to report to their immediate supervisors any activity that seems out of place (or time), based on their assessment of *what has happened*, *what is happening*, and *what may happen* if the item or event that seems unusual, atypical, or out of place or time is not immediately investigated and appropriate action taken. Information is best transmitted using a standardized format known as "SBAR," which was originally developed for use by nuclear submariners. Information to be transmitted includes decisions made regarding the potential nature of any possible hazard by the individual named in the EOP as responsible for declaring a disaster, usually the COO or designee, often the administrator on duty (AOD). A useful approach for determining whether or not an identified hazard may warrant activation of the EOP has been

Exhibit 2-7

Systematic Reporting

"SBAR"

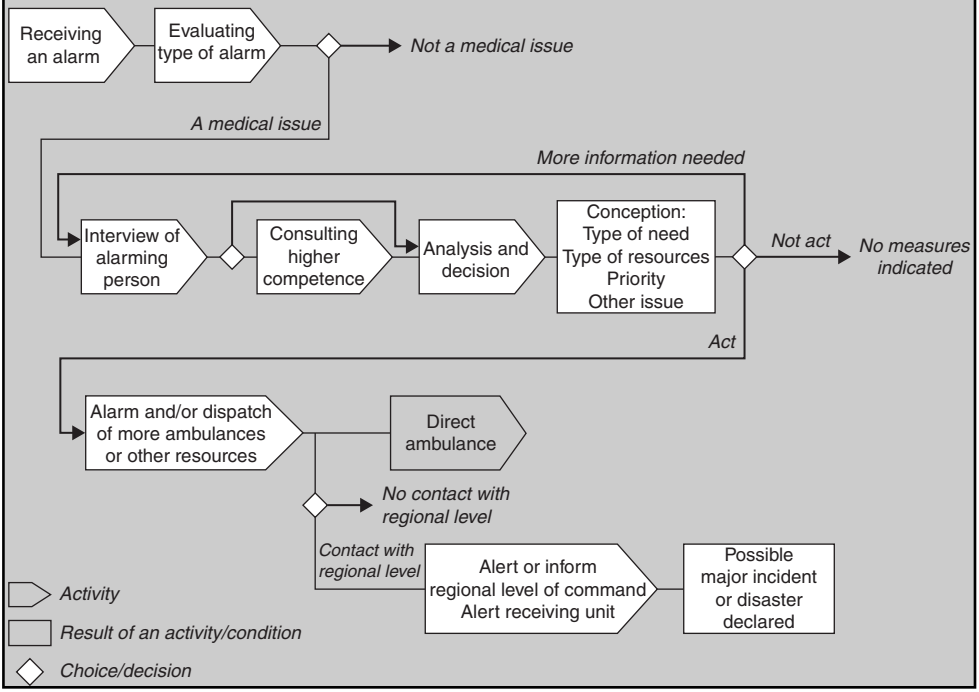
Situation
Background
Assessment
Recommendation

described for field use, as shown in Figure 2-4, but is readily adaptable to the hospital environment.[24]

The Harvard Law of Animal Behavior, originally applied to laboratory animals used in medical experiments, pertains equally to *Homo sapiens* during disasters that threaten personal or public health: "Despite the most rigorous of experimental conditions, the animal does as it

Figure 2-4

Processes Involved for the Alarm Receiving Function When This Could Possibly Be a Major Incident or Disaster



Rüter A, Lundmark T, Ödmansson E, & Vikström T. The Development of a National Doctrine for Management of Major Incidents and Disasters. Scandinavian Journal of Trauma Resuscitation and Emergency Medicine. 2006;14:177–181.

damn well pleases." Under the stress of a major disaster that may involve their families, hospital employees cannot be expected to function optimally if the safety or welfare of their families is uncertain. Because all hospital emergency response plans depend upon mobilization of adequate staff, hospitals can best ensure continuity of operations during disasters by assisting their employees in meeting their responsibilities to their families by (1) helping to identify alternative resources for care of dependent children and adults, and (2) ensuring that all employees develop and discuss family disaster plans. The following elements should be included in every family disaster plan:

1. Maintain a well-stocked first aid kit.
2. Keep waterproof flashlights and radios with extra batteries.
3. Stockpile a four-day supply of prepared food, bottled water, and necessary medications for each family member, including pets, and

at least one gallon of potable water per individual per day for drinking. (At least five extra gallons per person per day will be needed if washing and bathing are contemplated because fuel and other means to sterilize water may be in short supply. Note that poisoning of children by ingestion of hydrocarbons and bleach is an all-too-common occurrence following major disasters.)

4. Identify alternative means of telecommunication with one another, often through distant relatives, because local telephone lines, both land and mobile, will typically be overwhelmed, while long distance lines will usually be intact.
5. Establish a secure place and time to meet after a disaster if it proves impossible to reach one another by telephone.
6. Keep current photographs of all family members, especially infants and young children, to assist in family reunification in case family members become separated.

Interagency Relationships

"The problem with public health is that it's in government."[25]

For most external disasters, and some internal disasters, the hospital does not function independently, but is rather one element of what is described by the *National Response Framework* of the United States (http://www.fema.gov/emergency/nrf)—similar plans having been established by most local, regional, state, and other governments worldwide—as *Emergency Support Function* #8 (ESF #8): the Public Health and Medical Service component of the disaster response (http://www.fema.gov/emergency/nrf/nrf-esf-08.pdf). While most disasters will not rise to the level of national significance and require the assets of a federal government, most states and provinces have adopted similar terminology and structures for statewide and provincial emergency management of disasters at a regional or local level. Under such circumstances, the activities of all healthcare organizations will be coordinated by the regional or local *Emergency Operations Center* (EOC), which, for disasters requiring a public health or medical service response, will activate a "desk" for ESF #8. Assigned to such a "desk" will be an emergency manager with responsibility for coordination of healthcare functions and resources, including healthcare organizations such as hospitals, nursing homes, and urgent care centers, as well as medical transport services, including emergency medical services (EMS) as well as nonemergency, wheelchair-accessible, "ambulette" services. Each entity may send a liaison representative to assist the responsible emergency manager with asset coordination.

In complex humanitarian emergencies (CHEs), coordination of public health and medical service assets may become so complicated that a separate, but integral, *hospital emergency operations center* (HEOC) may be established by the IC. Under such circumstances, the HEOC will virtually always be a unified incident command (UIC) entity comprised of the officers in charge of all major activated public safety and public health services who make collective decisions about incident management that are duly transmitted via an appointed spokesperson.[26] Such activities are well beyond the scope of this chapter, but you can follow the same principles of emergency management for multiple or expanding, and multiagency or complex, incidents promulgated by the *Intermediate ICS for Expanding Incidents* (ICS-300) and *Advanced ICS for Complex Incidents* (ICS-400) courses of the National Wildfire Coordinating Group (NWCG) recognized by FEMA, but offered at a state level by state emergency management offices (SEMOs). It is self-evident that all such HEOCs, whether free-standing or co-located with the regional EOC, depend upon robust communications with all healthcare assets to function and succeed. It is, therefore, essential that reliable and redundant communications systems be available, because events of such magnitude as to require the activation of HEOCs are likely to be of such a scope that public utilities, including communication networks, may already have failed.

Summary

"So that next time, we respond like it's not the first time."[10]

The purposes of the response to medical disasters, in order, are to (1) protect and preserve life, (2) stabilize the disaster scene, and (3) protect and preserve property. The Incident Command System (ICS) provides a tested means to achieve the second desired purpose, which in turn facilitates achievement of the first and third. All hospital workers must be educated and trained, meaning drilled, in their expected roles within ICS. Such efforts will ensure, to quote the HDLS program of SiTEL, the ER One Institute, and the Washington Hospital Center, "So that next time, we respond like it's not the first time."[10]

References

1. Martin JT. *The Many Hats of Highway Incident Command* [video]. University of Virginia: Center for Transportation Studies. http://cts.virginia.edu/incident_mgnt_training.htm. Accessed January 1, 2010.
2. Fulghum R. *All I Really Need to Know I Learned in Kindergarten*, Fifteenth Anniversary Edition. New York: Ballantine Books; 2003.

3. Attributed to Peter F. Drucker.
4. Drucker PF. *The Practice of Management*. New York: Harper & Row; 1954.
5. Bush GW. Homeland Security Presidential Directive 5: Management of Domestic Incidents. Homeland Security Web site. http://www.dhs.gov/xabout/laws/gc_1214592333605.shtm. Published February 28, 2003. Accessed January 2, 2010.
6. Emergency Management Institute. Introduction to the Incident Command System for Healthcare/Hospitals (IS-100.HC) and Applying Incident Command System (ICS) to Healthcare Organizations (IS-200.HC). Emergency Management Institute. http://training.fema.gov. Published May 24, 2007. Accessed January 2, 2010.
7. National Response Team. Incident Command System/Unified Command (ICS/UC) Technical Assistance Document. The U.S. National Response Team Web site. http://www.nrt.org/production/NRT/NRTWeb.nsf/AllAttachmentsByTitle/SA-52ICSUCTA/$File/ICSUCTA.pdf?OpenElement. Updated 2000. Accessed January 2, 2010.
8. California Emergency Medical Services Authority. *Hospital Incident Command System Guidebook*. Sacramento, California: California Emergency Medical Services Authority; 2006. http://www.emsa.ca.gov/HICS/default.asp. Accessed January 3, 2010.
9. Rüter A, Nilsson H, Vikström T. *Medical Command and Control at Incidents and Disasters*. Lund: Studentlittatur; 2006.
10. Simulation and Training Environment Lab (SiTEL), ER One Institute, Washington Hospital Center. *Hospital Disaster Life Support I and II* (HDLS I and HDLS II) student course manuals. 2nd ed. Washington: Washington Hospital Center; 2008. Courses accessed at http://www.web.sitelms.org.
11. Center for Domestic Preparedness, Federal Emergency Management Agency, United States Department of Homeland Security. *Hospital Emergency Response Training and Healthcare Leadership and Decision-Making* student course manuals. Washington: United States Department of Homeland Security; 2009. Courses accessed at https://cdp.dhs.gov.
12. Attributed to Benjamin Franklin.
13. Center for Public Health Preparedness, Columbia University Mailman School of Public Health, Center for Health Policy, Columbia University School of Nursing, in collaboration with Greater New York Hospital Association. Emergency Preparedness and Response Competencies for Hospital Workers. New York: Columbia University; 2004. http://www.ncdp.mailman.columbia.edu/files/hospcomps.pdf. Accessed January 3, 2010.
14. National Disaster Life Support Executive Committee, National Disaster Life Support Foundation and American Medical Association. *Advanced, Basic, Core, and Decontamination Life Support* provider manuals. Chicago: American Medical Association; 2007. Courses accessed at http://www.bdls.com.
15. American College of Surgeons Committee on Trauma. Disaster management and emergency preparedness (optional lecture) and Appendix H. In: American College of Surgeons Committee on Trauma. *Advanced Trauma Life Support for Doctors Student and Faculty Manuals with DVD*, 8th ed. Chicago: American College of Surgeons; 2008. Courses accessed at http://www.facs.org/trauma/atls/index.html.
16. Attributed to Dwight D. Eisenhower.
17. Hirshberg A, Scott BG, Granchi T, Wall MJ Jr, Mattox KL, Stein M. How does ca-

sualty load affect trauma care in urban bombing incidents? A quantitative analysis. *J Trauma*. 2005;58(4);686–695.

18. Frykberg ER, Tepas JJ III. Terrorist bombings: lessons learned from Belfast to Beirut. *Ann Surg*. 1988;208(5):569–576.
19. Thomas TL, Hsu EB, Kim HK, Colli S, Arana G, Green GB. The incident command system in disasters: evaluation methods for a hospital-based exercise. *Prehosp Disast Med*. 2005;20(1):14–23.
20. Arnold JL, Paturas J, Rodoplu U. Measures of effectiveness of hospital incident command system performance [letter]. *Prehosp Disast Med*. 2005;20(3): 202–205.
21. Rüter A, Nilsson H, Vilkström T. Performance indicators as quality control for testing and evaluating hospital management groups: a pilot study. *Prehosp Disast Med*. 2006;21(6):423–426.
22. Federal Emergency Management Agency. *An Introduction to Exercises* (IS-120.A) and *Exercise Evaluation and Improvement Planning* (IS-130). Washington: United States Department of Homeland Security; 2008. Courses accessed at https://hseep.dhs.gov/pages/1001_HSEEP7.aspx.
23. Attributed to Yoel Donchin.
24. Rüter A, Lundmark T, Ödmansson E, Wikström T. The development of a national doctrine for management of major incidents and disasters. *Scand J Trauma Resusc Emerg Med*. 2006;14:189–194.
25. Attributed to Ronald J. Waldman.
26. Burkle FM Jr, Hsu EB, Loehr M, et al. Definition and functions of health unified command and emergency operations centers for large-scale bioevent disasters within the existing ICS. *Disaster Med Public Health Prep*. 2007;1(2): 135–141.