CONCEPTS
in Disaster Medicine

Health Care Emergency Management: Establishing the Science of Managing Mass Casualty and Mass Effect Incidents

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ABSTRACT

Particularly since 2001, the health care industry has witnessed many independent and often competing efforts to address mitigation and preparedness for emergencies. Clinicians, health care administrators, engineers, safety and security personnel, and others have each developed relatively independent efforts to improve emergency response. A broader conceptual approach through the development of a health care emergency management profession should be considered to integrate these various critical initiatives. When based on long-standing emergency management principles and practices, health care emergency management provides standardized, widely accepted management principles, application concepts, and terminology. This approach could also promote health care integration into the larger community emergency response system. The case for a formally defined health care emergency management profession is presented with discussion points outlining the advantages of this approach. (*Disaster Med Public Health Preparedness.* 2009;3(Suppl 1):S52–S58)

Emergency preparedness in the US private sector has steadily evolved over decades but at an accelerated rate since September 11, 2001. Before this increased private sector attention, the public sector had already witnessed the evolution of the discipline of emergency management. As early as the 1970s, researchers and practitioners described a framework of "comprehensive emergency management" that presents coherent strategic and tactical direction before, during, and after hazard impact.[1] As the discipline became refined over decades, central tenets emerged as valid principles and proven practices and it is now defined as a professional discipline with its associated, widely accepted terminology, research, education, and body of literature.

Delivery of medical services during emergency and disaster response is largely accomplished by the private sector.[2] Developing the optimal ability to accomplish this, however, has become increasingly complex in the face of rising medical expectations and the fragility of the everyday health care system. Traditionally, health care system preparedness efforts focused on response to mass casualties. The focus on the specific medical tactics and resources required for the care of increased numbers of patients was central to the origins of disaster medicine.[3]

Hurricane Katrina inflicted a painful experience that demonstrated the need for increased emphasis on the ways in which health care systems may be directly affected by hazards, compromising their regular medical mission.[4,5] For health care, this type of incident can be described as primarily "mass effect" in nature, being "a hazard impact which primarily affects the ability of an organization to continue its usual operations."[6] Effective health care system performance in a mass effect incident is commonly more dependent on personnel who are not directly clinical. Issues such as staff and visitor safety and security, in addition to maintaining a medically safe physical environment for patients become critical to continuity of health care services. This important focus has been increasingly recognized in multiple forums, including The Joint Commission (TJC) accreditation standards that have evolved extensively during the past 7 years.[7]

As more media attention, funded research, and programs for health care preparedness have evolved, many initiatives have arisen within health care disciplines that are not directly clinical.[8,9] These efforts commonly develop, just as disaster medicine has, in a discipline-centric fashion, creating unique terminology and concepts that differ across the spectrum of the many professional categories that make up the health care industry. They range from administrators and health care risk managers to health care engineers and safety and security professionals, to the many clinical service and clinical support professional areas. The markedly different approaches, terminology, and conceptual foundations developed by each present challenges when attempting to establish comprehensive health care preparedness guidance. The

widening disparity among these disciplines is especially concerning for unusual or large incidents, in which close cooperation across administrative, management, clinical, and nonclinical areas is essential for effective health care system performance.

This article presents the concept that a broader conceptual foundation, health care emergency management, encompasses and interrelates all of these critical initiatives. Based upon long-standing emergency management principles and practices, health care emergency management can provide standardized, widely accepted management principles, application concepts, and terminology that effectively bridge the many current initiatives. This approach can also promote health care integration into the larger community emergency response system through the use of long-established concepts that have been validated through experience in those sectors. The case for a formally defined health care emergency management profession is presented, with discussion points outlining the advantages of this approach.

DISASTER MEDICINE

The history of organized medicine is replete with standardized terminology, well-understood scopes of practice for each medical specialty, and commonly accepted principles such as those in research (eg, Koch's postulates). This principled approach extended as multiple subspecialties developed within typically well-defined frameworks and accrediting processes. The application of modern medical practice to emergencies and disasters, however, has not been as uniform in applying standardized concepts and terminology.

As with many areas of study, the origins of disaster medicine are difficult to describe. Historical records demonstrate that it evolved from many geographically and functionally disparate sources.[3] For example, principles of triage were first recorded in the applied setting during the Napoleonic wars of 1799–1815 and later extended to the civilian sector.[10] In the United States, emergency medicine was fully established as a recognized medical discipline in the 1980s and played a central role in the development of medical care concepts for disaster response. As time has passed, much of the research and writings in this medical arena have come under the formal title of disaster medicine. Multiple venues have developed for collaborating and for disseminating disaster medicine research and practice concepts.[11,12] This journal is an example of the increasing attention to disaster medicine among health care professionals.

The actual practice of disaster medicine can occur in a wide range of venues. The spectrum extends from individual health care facilities to austere field settings, and includes deployment to local, regional, national, and international arenas. As an example, the National Disaster Medical System was formally established in 1984 in the United States and is now a primary means for federal support to state or local medical response after a hazard impact.[13] Internationally, the term disaster medicine has been used in relation to efforts to address health care issues within humanitarian crises.[14] The scope of practice for disaster medicine varies among authors. Although it is generally focused at the clinical services level, some sources present a much more expansive scope.[15]

The lack of widely accepted, consistent foundational principles and terminology creates a major challenge for the emerging discipline of disaster medicine, compromising attempts at standardized application, study, or practice. This is also a problem for researchers and students of the discipline. A recent text attempting to describe the spectrum of disaster medicine demonstrates this troublesome issue, presenting terminology and definitions that conflict from chapter to chapter.[16] Furthermore, although many educational initiatives have been developed for disaster medicine, no widely accepted, standardized curriculum for practitioners exists. Some present excellent clinical material on response to individual hazards and medical situations.[17] Common processes and procedures necessary for management of the health care response, however, are less robust. Without a clear understanding of how these are established during emergencies, conducting recommended medical activities can be problematic.

Recent US government policy guidance attempts to address the lack of consistency and centrally accepted tenets. Presidential Directive 21 on public health and medical preparedness states, "the Nation must collectively support and facilitate the establishment of a discipline of disaster health. Such a discipline will provide a foundation for doctrine, education, training, and research and will integrate preparedness into the public health and medical communities."[18]

Initiatives have evolved to address many of these issues. For example, competencies have been developed for some areas[19] in an effort to delineate knowledge and skill sets for disaster medicine practitioners. Despite this, disaster medicine remains an evolving interest area with a focus on medical practitioners. Much less focus and attention is on the health care systems and the critical management and support elements necessary for effective disaster medical response. The name itself, disaster medicine, implies an area of study that is much narrower than comprehensive emergency management.

OTHER HEALTH CARE EMERGENCY PREPAREDNESS AND RESPONSE INITIATIVES

Beyond disaster medicine, many other health care–associated initiatives have demonstrated critical importance to preparedness and emergency response. Although less widely recognized than disaster medicine, all of them contribute to the knowledge and skill sets that health care systems must have to become adequately ready for emergencies and disasters:

- Distinct nursing initiatives have paralleled or overlapped with disaster medicine. Research and courses of study have emerged at the same rapid pace as for those in disaster medicine.[20,21] Graduate degrees in this subject area are offered by some institutions.[22] The terminology,

strategy, and conceptual bases are not the same as those across the spectrum of disaster medicine.

- The relatively recently developed health care specialty area of infection control holds a central role for response to specific hazards, particularly those involving contagious disease such as a few bioterrorism agents. Multiple well-thought-out initiatives have contributed greatly to the body of knowledge necessary to prepare and respond to these incidents. One such guide developed by the Association for Professionals in Infection Control and Epidemiology has been widely applied across the industry.[23]

- Providing a secure environment during emergency response has always been recognized as a central objective for health care systems. Newer initiatives are contributing to this body of knowledge.[7,9,24] Traditional security-based initiatives have focused on activities that address individual hazards such as the response to bomb threats or white powder incidents.[25,26] The all-hazards approach of emergency management may promote more effective application of these concepts.

- Health care engineering initiatives are well evolved in many areas of the country, particularly where experience with major hazards (eg, hurricanes, earthquakes) have emphasized its importance. The American Society for Healthcare Engineering has been central to many of these efforts by providing guidance, templates, and input into regulatory standards. For example, guidance has been provided on backup electrical power for health care systems.[27] In addition, organizations such as the Veterans Health Administration (VHA) have emphasized the importance of the role of health care engineers in emergency response and the continuity of operations.[28]

- Pharmacy initiatives, social service, health care public information, and others have focused on preparedness and response to major incidents affecting health care organizations.[29–32] Their concepts, preparedness, and response plans do not fall within the traditional boundaries of disaster medicine.

Health care systems administrators are also increasingly involved in emergency preparedness and response. This may in part be attributed to changes in guidance provided in TJC standards. It also reflects a growing perception that enhanced organizational resiliency is needed in the face of likely, enterprise-level hazard impacts. As an example, the American College of Healthcare Executives has provided robust guidance for its members, including a policy statement on the role of health care executives.[33]

THE CASE FOR HEALTH CARE EMERGENCY MANAGEMENT

The initiatives cited above as well as others individually contribute to health care system preparedness and response. Some, however, are limited by their discipline-centric focus and their internal inconsistencies (eg, those described above for disaster medicine). Only a few address the overarching architecture for health care systems.[34–36]

This challenge can be simplified by considering the range of affects that likely hazards may have on the health care system. They may be categorized into the following:

- *Traditional surge capacity*: The concept of traditional surge capacity implies that after hazard impact, the health care system can be challenged by an increase in patient numbers. It is important to ensure that the scenarios considered include ones in which the predominant patient types are not simply traumatic in nature.

- *Newer concept of surge capability*: Health care systems can be challenged by patients presenting with unique needs that tax daily operations. Examples include patients who are contaminated, patients whose evaluation requires close coordination with public health agencies, or the care of patient types not normally cared for at the organization (eg, pediatrics at a nonpediatric facility). These incidents can challenge health care systems even without significant numbers of patients. This has been captured in the concept of surge capability.[37]

- *Continuity of operations*: Health care systems can be challenged both in their ability to continue their services and in their ability to continue their business operations. VHA has used the term "organizational resiliency" to refer to the ability to withstand these challenges.[36] These types of incidents can range from the relatively simple (water outage to facility) to the more complex (total facility compromise requiring full, emergent evacuation). They may occur in isolation without any required medical surge. As a group, these are the most likely incidents to be experienced by any individual health care system.

Any individual system could be confronted by a combination of the above challenges. This breakdown of potential hazard impacts can be viewed as an initial step in providing an all-hazards approach to health care system emergency preparedness and response and is consistent with traditional emergency management principles. Medicine has tended to focus on hazards in an individual fashion (eg, pandemic influenza), prompted by scientific unknowns and the technical issues in providing medical care. In contrast, emergency management has sought practice validity and program efficiencies by focusing upon processes and procedures common to response for any hazard, then secondarily focusing on issues specific to individual hazards. The adaptation of this and other emergency management principles to health care can provide further benefit while providing the overarching architecture for the many disparate efforts that exist.

Several initiatives have examined health care system preparedness and response in a comprehensive fashion using methods that are consistent with emergency management principles.[7,34–36] These types of efforts are consistent with the formal establishment of a multidisciplinary profession entitled health care emergency management (and in fact, this title has already been used in reference to at least 1 bachelor of science degree program).[38]

A profession has been defined as "a calling requiring specialized knowledge and often long and intensive academic preparation."[39] It is generally agreed that professions have specific components:

- Common body of knowledge
- Common body of research
- Common terminology
- Agreed upon competencies
- Recognized study curriculum
- Accreditation process

These elements form the basis of medicine as a profession and the many medical subspecialties in existence today. Unfortunately, the independent efforts attempting to address health care emergency preparedness and response lack these collective and unifying principles. Traditional emergency management already contains many of these elements and can provide a common architecture to support health care systems.

Emergency management has been defined in different ways, but the concepts vary little between definitions. One widely promulgated definition of emergency management is:

The organized analysis, planning, decision-making, and assignment of available resources to mitigate (lessen the effect of or prevent), prepare for, respond to, and recover from the effects of all hazards. The goal of emergency management is to save lives, prevent injuries, and protect property and the environment if an emergency occurs.[40]

This definition highlights the management focus of the discipline. Other core concepts and critical documents for consideration and adaptation of emergency management to health care are listed in Figure 1.[36] With the exception of a few of these, many are not widely referenced in the medical literature.

Extending these concepts into the health care industry would permit the definition of health care emergency management as "the science of managing complex systems and multidisciplinary personnel to address emergencies and disasters in health care systems, across all hazards, and through the phases of mitigation, preparedness, response, and recovery."[36] By providing a focus on standardized management structure and processes, it augments rather than inhibits other preparedness initiatives such as disaster medicine and the emergency response itself. It can provide the substrate to unify disaster medicine with the other efforts in existence within the health care industry (Fig. 2).
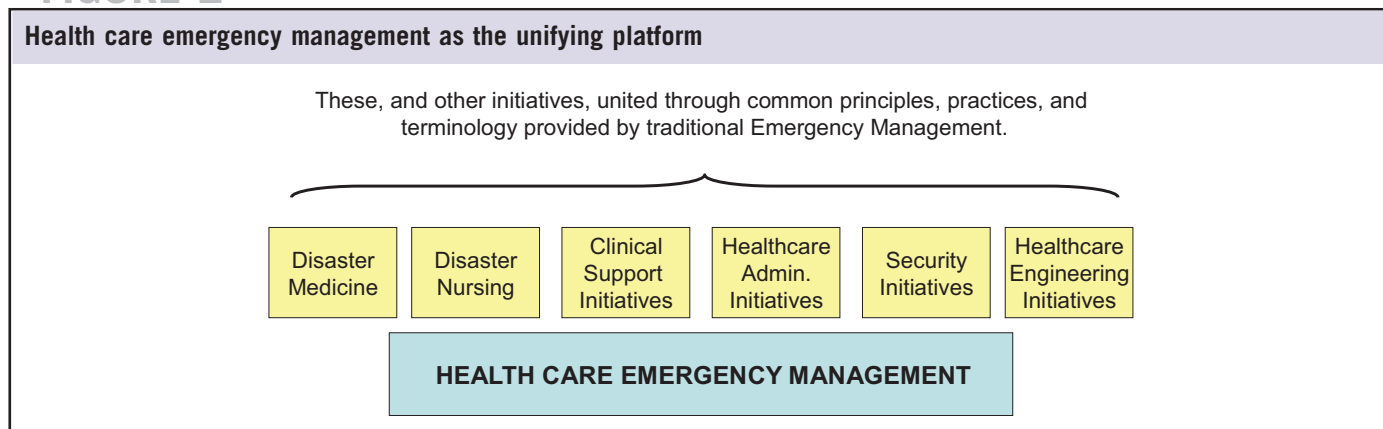
Perhaps the most critical benefit of adopting emergency management as the conceptual basis for planning health care emergency response is the use of standardized structures and

FIGURE 1

Core concepts and critical documents for health care emergency management. Adapted from Veterans Health Administration (VHA)/US Department of Veterans Affairs (VA).[36]

Emergency Management Program Development
- Disaster and organizational research
- Comprehensive Emergency Management
- Continuity planning
- Evaluation and organizational learning concepts

Incident Management
- Incident Command System

Documents
- Comprehensive Emergency Management (CEM)
- Integrated Emergency Management Systems (IEMS)
- Standardized Emergency Management Systems (SEMS)
- National Incident Management System (NIMS)
- The Federal Response Plan
- The National Response Plan (succeeding the Federal Response Plan)
- The National Response Framework (succeeding the National Response Plan)
- Federal Preparedness Circular #65 (Continuity of Operations)

Standards
- National Fire Protection Association (NFPA) 1600 Standards for Emergency/Disaster Management and Business Continuity Programs (2004 and 2007 editions)
- National Fire Protection Association (NFPA) 99 Standard for Healthcare Facilities (2005 edition)
- ASTM International 1288-90 Standard Guide for Planning for and Response to a Multiple Casualty Incident (2005 edition)
- ASTM International E 2413 Standard on Hospital Preparedness
- The Joint Commission emergency management standards for healthcare organizations

FIGURE 2

Health care emergency management as the unifying platform

These, and other initiatives, united through common principles, practices, and terminology provided by traditional Emergency Management.

| Disaster Medicine | Disaster Nursing | Clinical Support Initiatives | Healthcare Admin. Initiatives | Security Initiatives | Healthcare Engineering Initiatives |

HEALTH CARE EMERGENCY MANAGEMENT

processes. This is consistent with a systems-based approach.[36] Sequential steps are assigned to all activities to provide guidance for the ultimate product and the basis for programmatic evaluation. This can apply to preparedness planning, response planning, or any other major activity (eg, an exercise). Once the goals and objectives are established, another series of steps provides a sequential order toward developing the product in question.

One such process is the concept of the hazard vulnerability analysis, a critical activity for all emergency management programs. In this activity, an organization identifies potential risks based upon the probability of hazard occurrence and the organization's vulnerability to those individual hazards. Once established, the risks are utilized to guide all 4 phases of emergency management (mitigation, preparedness, response, and recovery). The requirement for having a hazard vulnerability analysis has become an element in TJC standards, although no detailed template has been provided.[7] Other important activities considered a part of traditional emergency management are listed[41]:

Integrated Emergency Management System (1983)
Step 1: Hazard analysis
Step 2: Capability assessment
Step 3: Emergency operations plans
Step 4: Capability maintenance
Step 5: Mitigation efforts
Step 6: Emergency operations
Step 7: Evaluation
Step 8: Capability shortfall
Step 9: Multiyear development
Step 10: Annual development increment
Step 11: State/local resources
Step 12: Federal resources
Step 13: Annual work increment.

Another critical concept that emergency management affords is the distinction between "preparedness organizations"[42] and "response organizations." Both public health and medical systems often attempt to manage incident response using processes and procedures that are better adapted to day-to-day management of the organization (eg, committee structures, delayed decision making based upon deliberate information gathering; authors' direct observations in multiple instances at state, regional, and local levels). These methods often are insufficient during the uncertain, time-urgent, and resource-limited context of emergency response. Instead, organizing personnel differently and using different response processes for incident response become critical. This is the basis for response systems such as the Incident Command System upon which the National Incident Management System is based.

There are additional arguments for providing consistency with emergency management in the health care industry:

Health care emergency management provides a broad platform for integrating the many health care–related initiatives beyond clinical medicine. It takes more than clinicians to effect adequate response by health care systems. By default, disaster medicine targets clinical practitioners (eg, MD, DO, RN, PA, EMT). Because emergency management has accepted common processes, procedures, and terminology, it can easily serve as the overarching architecture to enhance each effort while establishing the common interface between them.

By adopting many of the well-established principles of emergency management, health care will by default become more readily integrated into the broader emergency response community. Some of the efforts in health care have been created without using common, existing concepts proven useful in emergency management. For example, many in health care struggle with the format of an emergency operations plan without recognizing that a general format has been widely accepted for many years.[43]

TJC has adopted many standard emergency management principles.[7] TJC has evolved to recognize widely accepted concepts and terminology. By adopting emergency management conceptual foundations for disaster medicine and other health care–related fields, compliance with TJC standards becomes less problematic.

Emergency management is a management science that provides both strategic and tactical direction. As preparation and re-

sponse to hazard impact can be inherently complex, emergency management principles and practices provide a tested and accepted foundation for any disaster or emergency initiative. By accepting and incorporating management science with the same respect accorded to medical science, health care professionals may find development of sustainable, fully operational response systems easier to achieve.

PROPOSED NEXT STEPS AND CONCLUSIONS

Once the health care emergency management profession is defined in a widely accepted fashion, further steps are needed. VHA has addressed many of these and can serve as a model for the broader health care community[36,37]:

- Define the scope of practice.
- Provide the recommended response and recovery architecture and responsibilities and establish objective and measurable competencies.
- Outline mitigation and preparedness responsibilities and establish objective and measurable competencies.
- Identify target populations for the discipline.
- Develop an educational curriculum.
- Develop instructional activities.
- Develop a certification process for individuals (under way by VHA).
- Develop a reliable and valid evaluation process.

For this effort to be successful broadly, a consensus working group process should be initiated that incorporates representatives from the various individual discipline-specific initiatives listed above. To promote integration with other non–health care emergency response disciplines, emergency management should serve as the template when designing or agreeing to a common body of knowledge, terminology, practices, and procedures. The target population should extend beyond clinical practitioners, but be inclusive of them.

The science of health care emergency management, if embraced and further evolved, can provide more efficient and sustainable solutions that enhance integration of the many important health care–related emergency response initiatives. To be effective, this proposed effort must use principles that are well described and validated within the body of traditional emergency management. If done properly, then this can be expected to be a multiyear initiative. The results are anticipated to establish consistency among the many disaster medicine factions and the other health care disciplines focusing on emergencies and disasters, while further enhancing the integration of health care within the broader response community.

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Authors' Disclosures

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