Medical and Health Incident Management (MaHIM) System

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A Comprehensive Functional System Description for Mass Casualty Medical and Health Incident Management

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Preface

Project Goal

This project was designed to develop a peer-reviewed, requirements-based operational model for mass casualty response, based upon medical, public health, and emergency management science. The model provides a single, comprehensive system description of the functional components critical to effective response for any mass casualty incident. It describes the functions according to management system constructs, delineating the critical relationships between functions, both within the system and with important nonmedical emergency response functions such as law enforcement and fire services. It also describes the system processes that coordinate these many component functions to work toward a common goal: the limitation of morbidity (injury or illness) and mortality (deaths) in a population exposed to a major hazard. While the model is qualified as being for “mass casualties” it is intended to be interpreted into daily operations.

The development process for the model was based upon several core themes:

• An all-hazards approach (natural, technological, and human induced) that is applicable to planning for all mass casualty incidents.

• A peer-review methodology from a range of experts to promote multidisciplinary acceptance and application of the model to diverse geographic regions.

• A focus on the central issues of incident management organization, information management, communication connectivity, medical surveillance, medical patient care capacity, and patient specialty care. This is not an attempt to define the innumerable and rapidly evolving technical requirements (“how to do it”), but rather it describes the functional requirements (“what needs to be done”) of a comprehensive system. The term “system” in this project means a clearly described functional structure, including defined processes, that coordinates otherwise diverse parts to achieve a common goal.

For the purposes of this project, the term “mass casualties” is defined using Secretary of HHS Tommy Thompson’s definition of greater than 500 casualties.*

How To Use This Document

This document provides a broad overview of the breadth and complexity of mass casualty medical incident response. The document moves through a description of the background information and science upon which this project is based (the “development process assumptions”) and provides a functional description of the model developed in the project: the Medical and Health Incident Management (MaHIM) System. Incident management and response components are designated by the term “function.” A description of each of the functions and sub-functions and how they primarily relate within the MaHIM System is provided in Chapters 5-8. A Concept of Operations (Chapter 9) assists the reader in understanding how management processes coordinate the functions to operate as a comprehensive system.

It must be emphasized that this is not an “organizational” model. To use the model as a planning tool, readers should determine which organizations within their jurisdiction are responsible for each of the described functions, sub-functions, and processes. Delineating these findings in the MaHIM layout then provides a customized organizational model for that individual jurisdiction.

The model is intended to be a primarily formative rather than an evaluative tool. In other words, this model is designed to assist a region or jurisdiction in developing an optimally effective mass casualty capability. It is not intended to be used as a pass/fail grading method for current systems and personnel.

Because of the ever-increasing importance and prevalence of the Metropolitan Medical Response System (MMRS)** across the United States, this model has been designed to meet or exceed the requirements of the MMRS contracts. It may therefore be a useful tool for the communities involved with the MMRS program.

The authors are indebted to Greg Shaw, Lissa Westerman, and John R. Harrald, Ph.D., for their research, administrative, and editing support in this project. The authors would also like to express their appreciation to the experts who participated so fully in the project review process (a list of participating reviewers is found in Appendix C). Their comments and suggestions helped greatly to improve the accuracy and focus of this project and the final model.

* 31 January 02 Letter from Secretary of Health and Human Services Tommy Thompson to state governors, copy distributed to the American Hospital Association, Enclosure 2: Critical Benchmarks for Bioterrorism Preparedness Planning : “7. Develop a time line for implementation of regional hospital Plans that would accommodate in an emergency at least 500 patients.” “Casualty” refers to any human accessing health or medical services, including mental health services and fatality care, as a result of a hazard impact.

** The Metropolitan Medical Response System is a program under the Office of Emergency Response of the U.S. Department of Health and Human Services that provides preparedness funds for communities to improve health and medical capabilities for mass casualty incidents. More information is available at: http://mmrs.dhhs.gov/index.htm.
Introduction

The attacks of September 11th, followed shortly by the anthrax dissemination event in Florida, the National Capital Region (NCR), and the New York metropolitan area, have confirmed that the United States faces a true threat of intentional mass casualty* incidents caused by terrorism. These events of 2001, coupled with the results of recent exercises (TOPOFF 2000, Dark Winter, and others), have also demonstrated that as a system, U.S. medical response is not adequately prepared, resourced, or organized to deal with mass casualty incidents, particularly those resulting from bioterrorism. There are no mass casualty response standards that organize all health and medical responses within a jurisdiction. With few exceptions, federal and state preparedness programs have not placed visible priority on establishing comprehensive medical and health emergency management systems, and no comprehensive, published system model exists. Furthermore, the effects of this poor coordination are exacerbated by the negative impact of adverse medical economic and political decisions on the surge and specialty capabilities of individual medical assets.

Examination of medical response to mass casualty events in the United States reveals several recurring concepts:

• The initial response to any event will be almost entirely based upon locally available health and medical organizations.

• The response to a mass casualty incident impacts an entire community and involves numerous diverse medical and public health entities, including healthcare facilities, public health departments, emergency medical services, medical laboratories, and individual healthcare practitioners.

• Healthcare facilities have traditionally planned and responded to emergencies as individual entities, not as part of a larger system.

• Public health departments are not traditionally integrated with emergency response operations, including the acute care medical and mental health communities.

Rather than recognizing and addressing these recurring, large-scale issues, the current approach to mass casualty incident preparedness is primarily focused upon individual problems that were experienced during the events of 2001, or are anticipated in future mass casualty incidents. Disease surveillance, patient tracking, rapid laboratory diagnostics, and many other identified issues are being addressed individually in an effort to achieve adequate preparedness for future mass casualty events. Careful examination of these issues suggests that they must be solved through processes that involve many diverse organizations, and this can only be accomplished through comprehensive management. To address these deficiencies in a rapid, effective, and community-wide manner, a well-defined and developed mass casualty response system must first be established.

The MaHIM System project was undertaken to address this critical management deficiency. The goal is to reduce future morbidity and mortality in mass casualty incidents and other emergencies by providing a model system, adaptable to any individual community, that promotes optimal medical management and response operations.

MaHIM describes an overarching system for organizing and managing the many diverse medical and public health entities involved in mass casualty response. The product of this study is a requirements-based, planning framework derived from a functional analysis of mass casualty care.

The model provides a systematic approach for a community (defined as an individual jurisdiction) to use in developing its own medical response capability. In a sense, it can be viewed as a “tool-kit” that provides assistance with everything from broad-based management strategies to more discrete, actionable items such as the requirements for processing unsolicited volunteers during a response. Though the entire system description may initially appear quite complex, the overriding management principles are straightforward and relevant to all communities, from the smallest to the largest and most diverse. Some portions of the project are stand-alone, in that a community can use

* “Casualty” refers to any human accessing health or medical services, including mental health services and fatality care, as a result of a hazard impact.
these specific components to focus on the narrower management challenges within a mass casualty emergency. MaHIM also provides a framework for interjurisdictional, regional cooperation during a large-scale response. The model is based upon established medical, public health, and emergency management science and best practice, including concepts from the Incident Command (Management) System.

It is worth noting that the Incident Command System (ICS) is a structured response framework (Figure 1-1) used by the nation’s fire and EMS agencies, by federal response organizations, and increasingly by law enforcement personnel as the means of organizing their day-to-day operations as well as major emergencies. A hierarchical approach establishes individual responsibility, lines of authority, effective span of control of resources, and defined paths for information flow. No similarly effective system description for health and medical assets has been demonstrated, in part because of the complexity created by the wide range of organizations involved. Some entities are public, others are private, and all have distinct organizational structures, agendas, and core missions that markedly differ from one another. The MaHIM System is designed to overcome these obstacles. It is therefore based upon three core principles:

1. **Medical and Health Management**

MaHIM provides a single, comprehensive system for management of medical and health assets in emergencies and disasters. Because of the inherent nature of health and medical organizations, control of these entities can only occur through “management” and not “command.” The authors of this study have purposely chosen the terminology “Incident Management” for describing the model, rather than the more commonly used vocabulary of “Incident Command.” This nomenclature emphasizes the reality that medical and health assets in the United States are generally autonomous entities, and not connected through any inherently defined “command” structure. The management framework must be based upon authority generated by responsibility, and/or a willingness to participate, rather than by only statutory or regulatory power. The motivation for many of these organizations to participate in an Incident Management System must be promoted through the de facto competence of system managers, compensation for services (preparation, response, and recovery), access to information, opportunity to participate as respected partners, and assurance that participation will result in improved capacity/security for participants. Management methodology is carefully developed in MaHIM, incorporating concepts not currently evident in most other medical mass casualty programs. For instance, a disciplined, analytical planning process is described. This process, which incorporates a planning cycle, allows transition to proactive management as an incident evolves, instead of remaining in a purely reactive management posture. The planning cycle defines processes for establishing objectives and strategy based upon the medical characteristics of an incident; addressing current needs and projecting future requirements; and providing management guidance across the system.

![Incident Command System](image)

**Figure 1-1**

2. **Information Management**

Health and medical data generated during incident response is only valuable when it is accumulated in the right places at the right times during a response. MaHIM provides an information architecture, with a description of procedures to capture, analyze, and appropriately disseminate essential information throughout the response system. Critical requirements for individual system components are described, and extend beyond “communication” (an important but much narrower topic). The model does not provide a description of technology, but it does provide a basis for defining essential technological capability.

The sharing of information among all jurisdictions that make up a “region” is critical for effective regional management coordination. Mutual trust and understanding of
each other’s evolving impact, and response actions, are fos-
tered through the existence of an information architecture that
provides for adequate information exchange between all par-
ties (Figure 1-2).

3. Functional Description of Medical Response

Medical response to mass casualty incidents can be exceeding-
ly complex, with many seemingly diverse tasks. Responsibilities for each of these actions vary significantly
among organizations in different communities, yet all neces-
sary functions must be adequately addressed for a successful
mass casualty response. MaHIM provides a description of
every major function that may be required in the medical
response to a mass casualty and organizes them into a struc-
tured framework that maximizes the effectiveness of an indi-
vidual community’s resources. It is therefore adaptable to any
community and for all hazards (terrorism, natural hazard, tech-
nological event, etc.).

It has become evident that, by clearly defining the purpose of
each function, and by grouping seemingly disconnected activ-
ities within those functions, processes and relationships can be
created to develop a more powerful health and medical response capability. For example, “surveillance” has received
much funding and attention in attempting to develop sensitive processes for detecting the onset of bioterrorism effects.
Patient tracking during the post-impact phase has also received
much, similarly narrow, focus. The reality is that the systems
used for case surveillance (to identify an incident) and for patient tracking (after an event has occurred) should be one and the same, and applicable for all types of events. Systems that
can detect an increase in fever, headache, and other flu-like symptoms in patients presenting to health care facilities should also be effective in rapidly determining the number, distribution, and identifiers of patients presenting with shrapnel and blast injuries after a high-explosive event. Moreover, deter-
mining that “something is occurring” through a surveillance system is relatively useless to the medical response community
without simultaneous capabilities for rapid epidemiological investigation and a determination of the size, scope, at-risk population, and other vital incident characteristics. Critical
diagnostic information may initially come from animal sur-
veillance, environmental evaluation, or criminal investigation
rather than patient examinations. All of these activities (many
accomplished by nonmedical or nonhealth organizations) must be coordinated and have predetermined pathways for exchange
of information. MaHIM groups these actions under the func-
tion “Incident Epidemiological Profiling” and defines the
information processing support required for these activities
(provided through Planning/Information Functions). This cre-
ates potent tools for rapidly defining an otherwise chaotic event
and, furthermore, may provide accurate measures of effective-
ness as response actions are implemented.

System Description

For this project, the defined goal of medical consequence
management in an mass casualty incident is to maximally
limit morbidity (injury or illness) and mortality (deaths) in
the population exposed to a major hazard, and to return
the community to normalcy as soon as possible. The three pri-
mary medical objectives to attain this goal are to:

1. Reduce hazard exposure.
Avoid or minimize the hazard exposure to patients and the
population after hazard “release.”

2. Increase hazard resistance.
Maximize patient and population resistance to the hazard
impact after exposure.

3. Promote/achieve healing from hazard
effects. Maximize the rate and degree of patient and
population healing from the hazard impact.

MaHIM is organized according to the architecture of
successful incident management (Figure 1-3).

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Mass Casualty Medical and Health Incident Management
The George Washington University, FINAL REPORT 12/02
Executive Summary

- Medical and Health Incident Management
- Medical and Health Operations
- Support to Medical and Health Operations and to Management including:
  - Medical and Health Logistics
  - Medical and Health Planning and Information Processing
  - Medical and Health Administration/Finance.

Medical & Health Management

The Management Function is responsible for the entire incident response, and addresses all “strategic” incident issues (Figure 1-4). It sets the overall goals and objectives for the incident response and defines the major incident management parameters. The management approach in this model is best described as “management by objectives,” with the incident-specific objectives and priorities developed during the Planning Cycle (Figure 1-5).

Management responsibilities include:

- Liaison:

  This function is important for coordinating with major organizations outside the community’s medical and health response system (e.g., federal law enforcement, the U.S. military, etc.). Medical and Health Management may also assign a liaison to political leaders, though senior management may elect to retain this role and directly brief the political leadership.

- Incident Management Systems Monitoring:

  This function provides management oversight of the overall MaHIM during the response. It monitors the adequacy and effectiveness of the system itself, and its components (i.e., it assures that the response system is functioning as designed), and has the authority to address deficiencies in the system.

- Safety:

  This is a critical management activity that provides oversight for all issues related to responder safety during incident response. This function manages very active processes, which execute overall strategic and administrative tasks as well as individual field monitoring activities. The Safety Function develops and manages the Health and Safety Plan, a written message outlining response hazards and consistent protective measures for all incident personnel.

- Public Information (Media/Public Affairs):

  This function produces timely, structured information,
approved by management, for use in briefing the media and the public. The messages serve multiple purposes: they provide general incident information, guide public actions, reassure the public, and prevent speculation and subsequent rumors.

Management is closely aligned with the community’s emergency operations center (EOC), which is expected to provide high-level support to the MaHIM System (large-scale contracts and financing, interface with the state and federal support agencies, etc.).

Medical and Health Operations

The Medical and Health Operations Function oversees and coordinates all activities that are directly responsible for accomplishing the strategic goals and objectives set by Management (Figure 1-6). Medical and Health Operations establishes the tactics (methods) necessary to achieve the incident objectives (i.e., tactics are the responsibility of the operations managers).

**Components of Medical and Health Operations include:**

- **Incident Epidemiological Profiling:**
  This encompasses all activities to identify, define, and track an incident from a medical and epidemiological perspective.

- **Pre-Hospital Care:**
  This function comprises all health and medical actions from the initial victim contact with first responders through patient arrival at a definitive care site. EMS and Operational Medical assets (medical assets attached to rescue operations such as SWAT, urban search & rescue teams, and HAZMAT teams) must coordinate closely on-scene. Processes to promote this coordination are defined.

- **Medical Care:**
  This function encompasses the delivery of all organized definitive medical interventions to meet the medical needs of the affected population. It includes coordination of acute care (through hospital and outpatient settings), post-acute medical care, patient diagnostics, and medical evacuation/patient inter-facility transports. Strategies for providing surge capacity are identified, as well as methods for addressing engineered (or “managed”) degradation of medical capabilities if capacity is exceeded (to prevent catastrophic failure of medical services).

- **Mental Health:**
  This covers mental health preventive care and counseling for injured or ill victims, for asymptomatic but possibly exposed individuals, for affected families and the general public. This function coordinates closely with Public Information and with Public Warning/Alerts & Public Education to provide strategic mental health preventive measures through targeted messages to the at-risk populations. It should be noted that individuals requiring acute and chronic psychiatric interventions are not addressed through this sub-function, but through Medical Care operations.

- **Hazard/Threat/Disease Containment:**
  This consists of all activities that intervene to control, arrest, or minimize the threat of chemical, biological, radiation, and other hazards. It includes population-based public health interventions (mass or targeted prophylaxis, patient isolation activities, evacuation strategies, Public Warning/Alerts & Public Education, and mass victim decontamination) and environmental-based interventions. Some functions listed here (e.g., hazardous scene containment or mass evacuation) may not be direct responsibilities of the medical and health response system, but critical input into decisions and strategies must be provided by the health and medical communities.

- **Mass Fatality Care:**
  This function addresses the complex requirements of processing fatalities (deceased victims) in a mass casualty incident. Attention must be paid to such critical issues as definitive body and body fragment recovery, identification, and disposition. Components include: cataloguing and protection of personal items, chain of custody, body storage, preventing cross contamination from contaminated bodies, and respect for the cultural traditions of affected groups.

**Medical and Health Support Functional Areas**

Support Functions are those that assist Management and Operations in accomplishing their goals and objectives during the incident response (Figure 1-3). They provide logistical support, planning and information support, and administrative/finance support to Management and Operations throughout the incident.

- **Logistics:**
  This area encompasses all functions that support
Management and Operations in their use of personnel, equipment, and supplies, and includes supporting the maintenance of facilities used by Operations (Figure 1-7). Critical support activities, such as receiving, managing, and transporting pharmaceutical surge supplies (the National Pharmaceutical Stockpile and other caches) are addressed through this functional area.

- **Planning:**

Planning encompasses all activities that support Management and Operations in the processing of incident information and in the development of plans for managing the incident (Figure 1-8). The key information processing function, the Medical and Health Local Information Function (MH-LIF), resides within the Planning/Information Functional Area. The MH-LIF is responsible for information collection and dissemination to and from the various response system elements (and is supported by the Communications Function under Logistics). The second critical function, Plans Development and Assessment, supports all activities through the development and maintenance of a planning process. This includes a Planning Cycle (Figure 1-4), which provides a continuous, deliberate method of defining incident objectives, evaluating their effectiveness, reacting with revised and new objectives, and forecasting future needs or contingency plans.

- **Administration/Finance:**

This functional area encompasses all activities that support Management and Operations in incident administrative issues and in the tracking and processing of incident expenses (Figure 1-9). Examples of issues that this sub-function is responsible for include:

- Licensure requirements.
- Regulatory agency compliance issues.
- Financial accounting during the incident.
- Contracting services at levels below the EOC.

Through established MaHIM processes, individual response entities (healthcare facilities, laboratories, medical clinics, and others) may request assistance with administrative and finance issues, which could otherwise compromise response capacities.

**Summary**

The complete model provides a single, comprehensive, and adaptable system for Medical and Health Management in emergencies and disasters. It delineates required mass casualty incident response functions, critical relationships between functions, and system processes that work toward the common goal of reducing morbidity and mortality and
returning the community to normalcy. The model demonstrates methods for coordinating the many disparate health and medical entities, and for maximizing general and specialty care surge capacity. Coordination is based upon strong management, developed through an effective information architecture and a clearly defined planning cycle.

In applying MaHIM within a specific community, jurisdictional organizations may be assigned functions within the model framework according to their traditional responsibilities and capabilities. This creates an organizational structure for the jurisdiction that closely matches mass casualty functional requirements. It provides a method to delineate organization responsibilities, interorganizational relationships, and critical coordination processes. The result is a defined architecture, with all elements incorporated into a single, comprehensive medical and health emergency management system for that jurisdiction. It is very likely that organizations will find that they are sharing a function with other organizations, and relationships based upon effective processes will need to be developed. It is also likely that new personnel positions will have to be created, with qualifications and operational checklists that will require further training. This is expected to occur, in order to cover the many preparedness gaps that exist in almost every jurisdiction. Further, application of the model to adjoining communities promotes regional management and response coordination. The model is structured so that implementation provides both immediate improvement (by optimizing existing capability) and long-range benefits, as demonstrated in Figure 1-10.

MaHIM has application to the management of everyday medical and public health problems as well, thus promoting both cost-effectiveness and familiarity for the response community. The model may also be useful as a guidance tool when evaluating the potential effectiveness of products offered by contractors and vendors.

The unfortunate reality is that mass terrorism will be an enduring modern phenomenon. U.S. communities will continually work towards adequate preparedness for the consequences of these horrific acts. MaHIM is intended to focus this medical planning and preparedness, and maximize the effectiveness of preparedness efforts. Response capabilities must always be effectively ready, must be cost-effective, and must be as enduring and sustainable as the mass casualty threats are to America.
A mass casualty incident is an event in which the available organizational and medical resources, or their management systems, are severely challenged or become insufficient to adequately meet the medical needs of the affected population. Deficiencies in management or response capability may result in increased morbidity and mortality. For almost 50 years, until the Murrah Building attack of 1995 and the events of September 11, 2001, the United States experienced relatively few true mass casualty events, and none deliberately created by terrorists. Accordingly, overall emergency management response and recovery planning has focused on the other consequences of disasters, such as the provision of mass sheltering and feeding, transportation infrastructure protection and repair, restoration of utilities, hazardous materials containment and cleanup, and others. Medical preparations for mass casualty management have traditionally focused on the scene and pre-hospital sectors. Comprehensive mass casualty care, from a health systems perspective, has received far less attention and has evolved in a realm separate from the rest of the emergency management and response communities. The casualty load of September 11, 2001, the health impact of the subsequent anthrax dissemination event, and the threat of future mass casualty terrorism have created an impetus to reevaluate this issue.

The range of probable etiologies for mass casualty scenarios has widened markedly as the possibilities of chemical, biological, radiological, nuclear, and (high) explosive (CBRNE) mass terrorism are acknowledged. Increasing technological hazards, the impacts of civil unrest, and the devastating impacts of natural hazards (witness the 2001 Houston Floods) have spotlighted the need for better preparedness for ALL mass casualty events. The 2001 Houston Floods were also a vivid example of how various incident factors can create serious impacts on the actual ability to deliver health and medical services in a disaster.

A critical review of the mass casualty and disaster medicine literature reveals deficiencies in widely accepted operational definitions of mass casualty care and inadequate descriptions of system requirements for comprehensive mass casualty care. Mass casualty care is often defined in relation to a specific hazard. These hazards (earthquakes, tornadoes, hurricanes) cause primarily general trauma and not the wide range of biological, chemical, or radiation injuries. Mass casualty care is therefore narrowly described. Even descriptions of mass casualty care for large-scale explosives are limited, since they are commonly based upon the military operational medicine model. A common and problematic approach to special hazards (radiation, for instance) is the independent development of hazard-based plans by specialists who deal primarily with their respective hazards, such as radiation response plans and biological response plans. The approach of developing multiple plans for a medical community risks duplication and gaps in capabilities between the multiple hazard-specific response plans. Additionally, it complicates education and training, and threatens cost-effectiveness, sustainability, and flexibility.

Neither the medical (partially due to economic factors) nor the public health (due to years of neglect) sectors are prepared and organized to adequately deal with mass casualty incidents, particularly incidents resulting from large-scale chemical or biological attacks on the civilian population. The Principal Investigator and co-authors investigated the deficits in medical and health preparedness for catastrophic terrorism in the recent past and reached the conclusion, “Without prompt action, the nation carries the risk that victims of a mass casualty-disaster might end up in ‘ambulances to nowhere’” (Barbera et al, 2001).

Medical care and public health resources are primarily locally managed assets, yet much of the current national focus has been at a higher level of government or is being directed from that level. Most troubling is that progress in local and regional planning for mass casualty care falls far short of that made in other areas of emergency management and disaster response in recent years. It can be suggested that one of the underlying causes of this national deficiency is the lack of a consensus for a conceptual framework of community and regional medical and health preparedness for response. Individual components and capabilities for medical and health response exist, but they are not comprehensively addressed in an overall system. This has led to inefficiencies

* “Casualty” refers to any human accessing health or medical services, including mental health services and fatality care, as a result of a hazard impact.

** The 1947 Texas City, TX, ammonium nitrate fertilizer explosion killed or injured more than 3,500 people.
and confusion, risking organizational failure in a truly mass casualty incident. The potential for health care organizations to fail was demonstrated during the TOPOFF exercises of 2001, where disjointed and ineffective mass casualty response reflected the lack of a coordinated systems approach to management (Inglesby, 2000, and this project’s authors’ personal observations as members of the TOPOFF exercise control team). These organizational failures were again evident during the National Capital Region anthrax incidents (October - November 2001). Added to these concerns are the daily system stressors, including emergency department overcrowding, ambulance rerouting, and nursing shortages.

Systems engineering research in emergency response demonstrates that if organizational and technological systems do not match the local reality created by an actual event, complete systems failure may occur, causing needless societal impacts. In 1989, the National Contingency Plan for Oil and Hazardous Substances failed as a coordination mechanism during the Exxon Valdez Response (“We Were Always Re-organizing…” Harrald, et al., 1992). Three years later, the new Federal Response Plan met a similar fate during the response to Hurricane Andrew (Carley and Harrald, 1992). In both cases, the national plans had defined relationships at the national level but failed to create a local response organizational system that worked. These failures were costly, with excessive environmental damage in Alaska and human suffering in Florida. In a mass casualty incident, especially terrorism that specifically targets humans, the penalty for a similar failure could be thousands of needless deaths, public confusion, societal disruption, and possibly civil unrest.

It is critical to realize that technology is not the primary solution to these problems. The proper application of technology should follow from, and not determine, the operational requirements. Determining and defining requirements first will drive the development of effective systems (information, incident management, and response), which will then define the systems’ resource and technology needs. For example, technology-based patient surveillance systems have been developed and piloted for detection of a surreptitious biological agent release. Though technologically advanced, a systems approach to these technology applications has been neglected, and the surveillance systems’ integration into the medical settings that must report data was not a major consideration. Consequently, many surveillance tools have been largely ineffective, underutilized even during high-risk, defined events, as users have found them cumbersome, confusing, and lacking de facto usefulness.

The broad concepts of mass casualty care, and preventing the hazard impact from causing population illness (including mental health), are generally well recognized and accepted. It is the effective execution of actions that accomplish these concepts that has not yet been well defined for community preparedness. Researchers for this project could find no published description of an effective, comprehensive coordination capability that has been developed and implemented in a major U.S. civilian jurisdiction.

Defining a mechanism to achieve effective action is the focus of this project. The general objectives for a medical and health model of mass casualty care are described in Figure 2-1. The strategy to implement these objectives requires close coordination of many diverse and only loosely connected health and medical entities.

Preparedness for all-hazard mass casualty response is a complex undertaking, in part because medical infrastructure resides predominantly in the private sector, in many disparate resources. It is further complicated because adequate surge capacity and specialized resources may not be organized locally to achieve maximum effectiveness. In most communities, surge capacity exists to some extent but is underleveraged. Full community preparedness must involve the coordination of health and medical assets across both jurisdictional and public-private boundaries. Adequate mass casualty management and response require systems* that achieve rapid, efficient expansion of capacity through local and regional coordination. Realistic planning must be focused at both the local and regional levels.

Besides being “all-hazards” and systems oriented, mass casualty planning must carefully address operational realities that are obvious only in large-scale events (and therefore are very infrequent). Examples of specific operational problems from recent mass casualty incidents include the following:

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* The term “system” in this project means a clearly described functional structure, with defined processes, that coordinates disparate parts to accomplish a common goal.
• Patient distribution among healthcare facilities: Murrah Building bombing in Oklahoma City, 1995. There are 16 acute care facilities in reasonable proximity to the Murrah Building in Oklahoma City. After the bombing, three facilities carried the burden of caring for most of the patients, with the nearest hospital receiving both high numbers of patients and the most severely injured. While Emergency Medical Services (EMS) organized rapidly and implemented a transport function for patient distribution, the majority of patients self-referred or reached medical care facilities through assistance outside the formal EMS system. Many EMS transports were taken to facilities that were already severely taxed by the volume of “walk-in” patients and by other non-EMS transported patients from the incident (Hogan, 1999). Even well-trained EMS personnel described transport to the nearest hospitals in the desperate early minutes/hours of the incident, while recognizing those hospitals were overburdened (personal communication from EMS providers to JAB, April 1996).

• Patient tracking among numerous healthcare facilities: World Trade Center Attack in New York City, 2001. After the collapse of the World Trade Center, mass confusion existed about the location of victims and the status of missing persons. Particularly in the initial 24-48 hours, lower Manhattan hospitals were burdened by an overwhelming number of families trying to locate loved ones. Though some hospitals were later able to share lists of patients being cared for, patient information gaps led many distraught families to multiple visits and desperate calls to many hospitals (Frank 2001, SoRelle 2001), adding to the psychological impact of the disaster.

• Coordination & information sharing among hospitals, public health, and private practitioners in adjoining jurisdictions: anthrax dissemination event in the National Capital Region (NCR), 2001. No formal information management system was developed and implemented between the hospitals, practitioners, and local public health authorities during the NCR incident. Other than daily conference calls (moderated by this project’s PI) between hospitals, medical practitioners, and public health authorities, no detailed data was collected, analyzed, and returned to practitioners to define the size and scope of the patient encounters or the profiles of the exposed patient population and infected victims. Standardization of the evaluation and treatment protocols occurred only late in the incident. The response to the anthrax dissemination event in the National Capital Region was further complicated by inadequate information coordination between the four jurisdictions (DC, MD, VA, and the U.S. Capitol). At one point, the improbable situation existed in which the four public health departments were prepared to issue conflicting public recommendations for completing medical prophylaxis. Detailed communication between public health and the medical care disciplines was less than optimal: daily updates that changed the profile of at-risk patients were, for the most part, obtained by practitioners through media events conducted by public health authorities, rather than directly from public health in regular, formal communication.

It is not enough to research problems to merely understand them and describe a theoretical systems approach to solutions. Staff and resources must be dedicated by local emergency management, public health and public safety agencies in a nonpartisan fashion to ensure development of capabilities and coordination across the health and medical spectrum of the community and the region. Important considerations include regular interface between system components (informal discussions, interagency planning meetings) and exercises (frequent inter-hospital communications tests also involving public agencies, regular mass casualty drills using the established systems, etc.).

Unless an above-described systems approach is accomplished, the mass casualty preparedness process will continue along a fragmented, technology-influenced course that is wasteful and ineffective.

This conceptual approach is not meant to suggest that a lengthy process is required before significant management and response improvement occurs. The strategy of defining system requirements and responsibilities is important for rapidly optimizing existing capabilities as well as for determining resource requirements, including technology, to be developed along an extended timeline (Figure 1-10).

The goal of this project is to define one comprehensive system model that incorporates the requirements and functional responsibilities for adequate mass casualty medical incident management. Mitigation (including prevention and decreasing vulnerability), preparedness, and response efforts must be sustainable, must always be effectively ready, and must be cost-effective.
**Process Goal**

This project was designed to use a peer review process, and base the model upon medical, public health, and emergency management science.

**Process Objectives**

- Complete the project in a rapid time frame (total 7 months) due to urgency of national planning and preparedness for mass terrorism consequence management.

- Describe the concepts in language understood by the user community, particularly the emergency management, public health, and medical communities.

- Incorporate peer review input from medical and health professionals who represent the spectrum of incident management and medical response.

- Describe an exceptionally complex subject as simply as possible, to both comprehend and to use, without creating inaccuracies from oversimplification.

**Background to the Development Process**

This project was designed to use a structured approach for analyzing and describing systems requirements for regional mass casualty care: it employs Systems Engineering methods while maintaining a base of sound medical scientific and operational principles. Using Systems Engineering theory...
and practice (Eisner), and the extensive medical and health experience of the investigators and the project reviewer consultants (Appendix C), the project is a comprehensive analysis of actual and theoretical components of mass casualty incident management and response needs. All types of potential hazards, including terrorism, were considered.

**Systems Engineering**

Dr. Howard Eisner, Distinguished Research Professor and Professor of Engineering Management and Systems Engineering at The George Washington University, defines the discipline of Systems Engineering as an “iterative process of top down synthesis, development and operation of a real world system that satisfies, in a near optimal manner, the full range of requirements for the system.” Figure 3-1 provides a description of Systems Engineering as implemented by the U.S. Department of Defense (MilStandard 499B). The inputs to such a process are external and include such things as the overall mission needs, requirements, measures of effectiveness, and context (environment, constraints, available technology).

This project focused on the requirements loop of the Systems Engineering process described in blocks 1 and 2 in Figure 3-1. The requirements analysis (top block), provides the initial functional descriptions. The functional analysis provides a decomposition of functions to lower-level functions and processes and defines/refines interfaces. Note that this iterative requirements loop is a prerequisite to the design loop in which organizational and physical system outputs are defined.

Using this methodology, a function is defined as a group of activities that together support one aspect of furthering the mission of the enterprise. Functions can be grouped into functional areas that refer to major areas of activity. A functional decomposition is the breakdown of the activities of an enterprise into progressively increasing detail. Functions decompose into sub-functions, and then into processes, which are low-level activities that have a definable beginning, end, and output (Martin, 1990).

Stepwise functional decomposition of an enterprise can be viewed as a “top-down” approach to problem solving (Defense Systems Management College, 1990). This systematic, disciplined approach can be particularly appropriate for the current analysis of consequence management in order to avoid the potential of organizational “turf battles” over who should have responsibility, how missions should be executed, and which hardware and equipment should be acquired. As stated by Eisner (p. 197), “by maintaining a

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**Regional Planning for Mass Casualty Care**

Systems engineering decomposition process (summarized)

- "Old" logic based on organizations
- Functional decomposition
- "New" logic based on function
- Commonly attempted approach
- New organizational description

**GOAL**

**IMS & Systems Engineering**

<table>
<thead>
<tr>
<th>IMS</th>
<th>Systems Engineering</th>
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<tbody>
<tr>
<td>Management = Management</td>
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<tr>
<td>Management Staff = Management Staff</td>
<td></td>
</tr>
<tr>
<td>General Staff = Functional Area Leadership Staff</td>
<td></td>
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<tr>
<td>Section = Functional Area</td>
<td></td>
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<tr>
<td>Branches (geographic or functional) = Functions</td>
<td></td>
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<tr>
<td>Divisions (geographic) or Groups (functional) = Sub-functions</td>
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<tr>
<td>Units = &quot;</td>
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<tr>
<td>Teams, TFs, &amp; single resources = &quot;</td>
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**Focus** on function, rather than the manner in which the function is to be executed in hardware, software, and human components, we allow the system engineer to consider a host of alternative ways of implementing a given function. We explicitly separate the ‘what’ is to be done from the ‘how’ it should be done. We consciously want to avoid leaping to a premature conclusion regarding a specific way to implement a given function.”

This approach contrasts with the common approach for developing mass casualty and terrorism response capabilities, which is done by identifying the organizations that are traditionally in charge of various functions, and having them define an organizational system. The contrasting rationales (“traditional” versus “systems engineering”) are summarized in Figure 3-2.
For the purpose of analysis, mass casualty incident management and response were successively decomposed into functional areas, functions, sub-functions, and processes. Requirements were then delineated for these components. Subsequently, these components were reassembled into a functionally defined incident management system with defined processes for management, coordination, and information sharing.

Description of tasks and procedures (which are the specific methods used to execute processes and fulfill functions) is specifically avoided, since it is imperative that they be defined by the jurisdiction or entity according to their organizational structure, traditional methodologies, budgetary priorities, and other community specific factors.

**Incident Management Systems**

Most emergencies and disasters in the United States are now managed using the Incident Command (ICS) or Incident Management System (IMS). For instance, federal health and medical assistance in disasters, as described by the Federal Response Plan, are applied through an incident management framework. Because of this widespread acceptance of IMS concepts and practice, and the demonstrated effectiveness of IMS across a wide spectrum of incidents, IMS became the logical model for the functional description of a comprehensive mass casualty response system.

The components of the functional analysis described above were reconstructed into a comprehensive mass casualty care framework using the IMS template. The authors of this study have purposely chosen the terminology “Incident Management,” not the more commonly used “Incident Command,” in recognition of the reality that medical and health assets in the United States are generally disparate entities that are not connected through any inherently defined “command” structure.

The project describes a framework of coordination based upon authority generated by responsibility rather than exclusively upon statutory or regulatory power. Many past planning efforts have begun with the question “who’s in charge?” and the efforts have commonly stalled on this question or reached compromise that provided an ineffective basis for further planning.

By using the concepts of IMS, who is actually “in charge” depends very much upon the circumstances of the incident. It becomes apparent that for successful incident management, it may in fact be more important to define each critical operational function and who is responsible for it than to know who exactly will be in charge. In other words, ambiguity of authority is less troublesome than ambiguity of responsibility. Responsibility for each critical function through the four phases of emergency management (mitigation, preparedness, response, and recovery), though, must be determined during any system implementation (i.e., who is accountable for developing, implementing, and maintaining each critical function).

Many versions of ICS and IMS have been promulgated over the past two decades. The authors chose the Standardized Emergency Management System (SEMS) version of IMS as the specific model for this planning framework. In addition to having demonstrated effectiveness in major emergencies, SEMS establishes terminology consistent with the “management” orientation of this project. The Veterans Administration’s Strategic Healthcare Group has also successfully utilized SEMS as a template for their recommended Hospital Emergency Management Programs for Veterans Administration Medical Centers. This project uses the SEMS Incident Management System as a template in considering functional positions and organizational relationships.

**Integration of Systems Engineering and Incident Management Systems**

Because the theoretical bases for Systems Engineering and IMS are so similar, it becomes easy to move from the Systems Engineering decomposition findings to a functionally defined Incident Management System structure. Figure 3-3 provides a comparison between classic ICS terms and those used in this system’s engineering functional decomposition.

Functional areas are organized on the concepts underlying SEMS and listed below with explanations of how they are used in this project:

**Regional Unified Management Coordination**

(SEMS addresses regions as adjoining geographic areas within the state of California). The term regional is used in this project to describe adjoining geographic areas within a state or the far more complex phenomenon of adjoining interstate jurisdictions.

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*The Incident Command System is a very widely accepted management system for emergency response, used by the fire service and by FEMA, and state and local emergency management agencies. Unfortunately, it is not well understood or used by public health, creating clear management deficits as noted in the recent anthrax mail dissemination. Additional information on Incident Command may be found at [http://www.fema.gov](http://www.fema.gov)."
Project Methodology:
Objectives, Assumptions and Description of the Process

Management
Used in this project to mean the functions related to directing and coordinating resources while establishing overall response objectives. Typically, objectives are defined in a manner so that they are measurable and achievable within a defined period of time.

Operations
Used in a traditional manner in this project to denote the functions that develop and implement tactics (i.e., methods) to achieve the objectives established by Management.

Logistics
Used in this project to denote the functions necessary to support overall incident response with personnel, equipment and supplies, or specialized services for Operations.

Planning
SEMS uses the term “Planning/Intelligence” for this functional area. “Planning” is used in this project to denote the functions necessary to support Management and Operations in Action Planning and Information Management, including collection and analysis of data, transforming it into relevant information, and formatting and disseminating the information appropriately.

Administration/Finance
Used in this project to denote the functions that support Management and Operations in addressing financial and administrative (including regulatory) issues encountered during response.

This reconstruction of functional systems incorporates other principles of effective IMS such as: formal Action Planning; maintaining reasonable “span of control” in each functional area; basing authority upon responsibility.

Terminology
Because this project is a “hybridization” of the scientific disciplines of emergency operations, acute care medicine, and public health, terminology had to be adapted to be consistent across the system. As much as possible, “usual” terms were retained. In places where varying terms or meanings of terms were conflicted between the disciplines, selection was determined according to the following strategy:

• Incident Management terms were retained if the concepts being described are emergency operations. Terms were, however, adapted to emphasize “management,” and not “command” (for reasons noted above) and to reflect the regional coordination concepts defined in this project.

• Medical terms were used when addressing primarily medical concepts.

• Public health terms were selected when addressing primarily public health issues.

• When conflict arose between terminologies, decisions on the appropriate selection were made based upon the tenet that this project’s primary emphasis is on a medical and health model.

Project Process Funding and Management
Funding for this project was provided by the Alfred P. Sloan Foundation to the Institute for Crisis, Disaster, and Risk Management (ICDRM) at The George Washington University. Joseph A. Barbera, M.D., was the Principal Investigator, and Anthony G. Macintyre, served as a co-author. An extensive research effort formed the basis for this project model (Appendix A). ICDRM personnel coordinated this work with expert colleagues within The George Washington University and with a multidisciplinary group from the National Capital Region and elsewhere (Appendix C). The document development process therefore drew upon the operational and management knowledge of personnel experienced in the emergency operations of public health, medicine, and emergency response. Daylong meetings devoted specifically to formal review and comment on the work products were a critical part of the process. See Appendix B for the Project Work Plan and Task Completion Schedule.
The goal of this project was to develop a peer-reviewed, requirements-based operational model for mass casualty response, based upon medical, public health, and emergency management science. The Medical and Health Incident Management model was intended to be a single, comprehensive system description of the functional components critical to effective response for any mass casualty incident. This includes delineating the critical relationships between functions, both within the system and with important nonmedical emergency response functions, such as law enforcement and fire services, and the system processes that coordinate these many component functions to work toward a common goal: the limitation of morbidity (injury or illness) and mortality (deaths) in a population exposed to a major hazard. The initial intent was to develop a primarily regional model. During the research and analysis phase of the project, it became apparent that regional management coordination is critically dependent upon a well-defined and implemented medical incident management system in each jurisdiction within the region. The model therefore focuses at that level, while providing the framework and concept of operations for regional management cooperation.

Model Objectives

The model is intended to provide:

- A conceptual systems framework that allows a specific community to develop organizational roles and responsibilities, and to define the relationships between organizational elements.
- An approach to maximize available capabilities through the integration and coordination of current health, medical, and emergency response assets, thereby providing immediate benefit within the existing resource base.
- A description of the critical information needs of each organizational and functional element, the system linkages that provide this information, and the overall information management system requirements.
- A tool of reference, which allows a jurisdiction to evaluate proposed initiatives that would require any significant resource commitments or major changes in policy.
- A dynamic model that can evolve after evaluation of future responses to mass casualty events or exercises, such that new knowledge can be efficiently incorporated and organizational learning is therefore promoted.
- A basis for defining measures of operational effectiveness for the overall system as well as system components.

MaHIM is not intended to be an all-encompassing, “bankbuster” guide that promotes individual, stand-alone capacity for mass casualties. In contrast, principles of cost-effectiveness, sustainability, flexibility, and adherence to multiuse and “daily routine” capability were used as guides in developing the conceptual requirements for responding to a mass casualty event.

Model Assumptions

In order to fully understand the rationale behind the MaHIM model, the assumptions upon which the model is based are delineated. An extensive research effort and experience-based knowledge were used in developing these assumptions.

Incident and Response Assumptions

Review of recent mass casualty incidents in the United States and other medically developed countries reveals important recurring phenomena:

- Any incident resulting in mass casualties has the potential to produce a broad range of medical issues (as well as additional nonmedical emergency issues that are not addressed here). The delivery of adequate incident medical care (while maintaining normal routine medical capacity), reducing risk for potential victims (through population action, prophylaxis, and other health
interventions), providing a mass fatality response, and addressing psychological needs all must be considered for effective response systems.

• Mass casualty incidents may have a sudden onset with extraordinary medical needs or may begin insidiously, requiring adequate surveillance systems for timely determination of size and scope.

• The event itself has the potential to directly impact medical and health capabilities themselves, including management and response facilities, personnel, equipment, infrastructure support, and communications. This could compromise the delivery of even routine medical and health services and severely affect medical surge capacity. For example, acute-care patients (including critical care cases) and long-term-care patients in the hospital before the onset of the incident may need immediate relocation from those facilities due to the hazard impact.

• Prolonged incident response (days to weeks) in and of itself has the potential to impact the responders as well as the victims. Issues related to responder fatigue, victim relocation, mass sheltering, vector control, food distribution, provision of potable water, and waste water/solid waste management all become critical.

• Hazard impacts that create mass casualties, particularly biological and other forms of mass terrorism, have the potential to create a large population of concerned, potentially exposed persons. Significant medical and health resources must be devoted to evaluating these patients. Mass casualties may require specialized medical and health capabilities ranging from proactive, mental health interventions to unusual treatment capacities for such entities as chemical burns, respiratory failure, eye injury, radiation syndromes, or mass medication needs.

• Scene control in a mass casualty incident may be nonexistent or bypassed during the early post-impact phase, when patients are moving in large numbers toward healthcare facilities. Even with excellent emergency medical services (EMS) systems and timely response, 75%-80% of mass casualty victims consistently reach hospitals (and other healthcare providers, even private physicians’ offices) through avenues other than organized EMS: Tokyo sarin attack, Oklahoma City bombing, World Trade Center (WTC) 9-11 attack. Victims may therefore arrive at hospitals rapidly, with little or no prior notification to the receiving facilities, and without being matched with the most appropriate hospital capability (trauma center, burn center, pediatric center, etc.).

• Based on prior experience, the majority of victims may not require hospitalization after initial care. Historically, approximately 10%-15% of mass casualty incident victims evaluated at healthcare facilities actually require hospitalization for their injuries/illnesses (Nairobi embassy bombing, Oklahoma City bombing, WTC, and Pentagon 9-11 attack). While this could drastically change in a very unusual CBRNE incident, it has been a relatively consistent finding across a wide range of mass casualty incidents and must be incorporated as a planning assumption for this project.

• In U.S. mass casualty incidents, the problem is rarely overwhelming for an entire community’s or region’s medical care capabilities but rather a temporary (and dangerous) mismatch between the specific locations of unmet patient need and the available medical resources. Coordination of medical resources to move toward the site of need must be considered, rather than depending solely on an expensive increase in individual stand-alone resource capacities to address this phenomenon.

• Medical economics and public health funding strategies over the past decade have created the reality of minimal medical and public health surge capacity at the level of individual institutions and agencies. A major mass casualty event will overwhelm this capacity. At a regional level, however, a significant but widely dispersed medical and health surge capacity continues to exist in the aggregate. Well-established coordination is required to effectively address patient needs during a major mass casualty incident, especially if the victim population extends across jurisdictional boundaries. In many situations, it may be more effective to move health and medical personnel and supplies to the proximity of patient need, rather than moving patients to relatively distant medical facilities.

• Many disparate and very loosely connected medical entities are required to function in a coordinated fashion in order to rapidly and effectively address mass casualty needs. These medical and health entities cannot be directed through a traditional “command” structure but rather must be managed through the incentives of information management, adequate financial compensation, and other measures to enhance preparedness and response.

• Standardization of response parameters (vocabulary, equipment, communications), political support, and regular interagency interactions promotes improved preparedness.

• Hospitals have demonstrated a willingness to
collaborate among themselves during mass casualty incidents (Oklahoma City bombing, Washington, D.C., anthrax incident, WTC and Pentagon 9-11 attacks, and others). In some instances, hospitals have also demonstrated willingness and a capability to successfully implement formal mutual aid arrangements and common radio systems, shared protocols, and joint equipment purchases (D.C. Hospital Association and Northern Virginia Emergency Response Coalition experience).

• Volunteerism and donations will be encountered during mass casualty incidents. These phenomena must be addressed during the preparedness phase in order for them to be a positive impact on the incident outcome (as opposed to a response distraction).

• Profiteering by medical and health assets is not expected but has occurred in the past after certain tragedies. Pre-existent, exercised response systems must be prepared to respond to this potential phenomenon.

• Systems that perform the best during a crisis are ones that are used or practiced every day. This has been a stated reason for the use of IMS during day-to-day operations in the fire service, regardless of the scope of the event, and serves as a good model for mass casualty medical incident management.

• Response capabilities will evolve over the course of an extended event and may become exceptionally difficult to manage without effective systems.

Emergency Management Assumptions

• Mass casualty incidents are commonly large and complex and often geographically spread out. Effective management requires a formal management structure with defined functional components.

• As medical preparedness for mass casualties becomes increasingly recognized as both a public safety function and responsibility, the need for a fully integrated emergency management system that includes medical managers is becoming more recognized at the local government level.

• Mass casualty care response is rarely isolated to the medical and health sector — it takes place in the context of a broader regional emergency response. Planning should therefore address management in this larger context. A community’s emergency management and public safety incident management must be intertwined with the medical and health planning. Medical and health support needs (security, transportation, etc.) should be identified and assured through existing local and regional emergency constructs (Logistics Function of an emergency management agency, security/ protection by local law enforcement, etc.) rather than through health systems trying to develop independent, stand-alone capabilities for each support function. This is the conceptual basis for current Federal Response Plan (FRP) and state level emergency response planning, and a similar approach should be incorporated in community medical mass casualty planning.

• Emergency management has developed to address all types of emergencies and disasters (as opposed to civil defense, which was focused primarily on protection of civilian populations against attack). The past two decades have therefore witnessed the evolution into an “all-hazards approach,” which also encompasses incidents with mass casualties. The all-hazards approach of emergency management primarily denotes the use of a single set of management and response systems for all hazards (the same systems for communication, notification, management methods, etc.). This project employs the philosophy of all-hazards preparedness by defining systems for managing and responding to mass casualties from natural hazards (seismic, wind, infectious, incendiary, etc.), technological hazards (chemical, utility loss, etc.), and civil disturbance (terrorism, criminal, riots, war, and others). Approaches differ for only a few hazard-unique requirements.

• A fully integrated emergency management system for mass casualty care includes both IMS and the effective use of the emergency operations center (EOC) support operations. The two entities (IMS and EOC) should be maintained as discrete functions, even if the EOC provides some direct IMS services during a response (such as using its information management personnel and equipment to assist the IMS Planning functional element and its information systems).

• Tactical mutual aid is commonly used to develop surge and specialized capacity in EMS and other traditional public safety disciplines. It is much less common in medical, public health and health-related services. This must be addressed, since mutual aid is the single most available and cost-effective way to obtain surge capacity after maximizing the output of individual assets. Because mass casualty injury profiles commonly include a significant number of patients with medical conditions where time-to-adequate-medical-treatment is of the essence, mutual aid strategy should first emphasize a local sharing of assets. Subsequently, regionally based capabilities are emphasized, and then finally a national
mutual aid capacity for management of the truly catastrophic event. The concept is based upon “mutual self-interest,” assuring that the sum of the local and regional assets creates a stronger capability for each individual jurisdiction. Tactical sharing between jurisdictions should be guided by strategic mutual aid arrangement between interjurisdictional functions that are consonant with the strategic regional action planning.

- The Emergency Management Assistance Compact (EMAC)* provides a basis for constructing interstate mutual aid arrangements.

Incident Management Assumptions

- Response functions can only be effective when management responsibility is constructed to maintain effective “span of control” over response processes and tasks.
- Common terminology is essential to prevent confusion and potential harm when coordinating the efforts of different organizational entities.
- Clear-cut, well-delineated organizational roles and responsibilities that follow the functional responsibilities must be developed and exercised to promote efficient response.
- Incident Management System provides common terminology, span of control, and a well-defined management framework. IMS structure and concepts of operation have evolved beyond theory: through extensive emergency operations experience, effectiveness has been conclusively demonstrated when IMS is properly applied.
- The authors recognize the lack of comprehensive understanding of IMS in the traditional medical and public health response communities. The lack of an effectively functioning, commonly defined, well-understood management system across the spectrum of disparate med/health resources has been a major impediment in past large-scale events. Even the Hospital Emergency Incident Command System (HEICS)** model, now being adopted by hospitals across the country, contains primarily an organizational description. There is less emphasis on critical processes such as Information Management and Action Planning.
- In a sudden onset, unanticipated incident, the initial phase of response and management is best described as reactive, with management and response assets responding to identified needs primarily at a task level based upon experience, standard operations, and tactical incident management. As soon as is possible, formal Incident Management planning processes should be implemented and the Incident Management transitions to a proactive phase, managing the incident by establishing specific objectives and strategy. These are defined in the incident Action Plan (AP) for each operational period.

- Strategies and tactics for incident response must be based upon accurate Incident Management objectives. All must be adequately disseminated to be effective.
- In a well-constructed management system, all functions within the regional mass casualty system will be involved in all incidents, even if only in the notification phase and the Information Management component. (The report of “no change in medical activity” for certain healthcare facilities, for instance, is important data in determining and confirming the size and scope of an incident.) All functions are included in at least the notification phase, since even “noninformation” (i.e., “nothing’s happening,” “everything is per usual,” or “your function is not needed”) is very important for the overall Planning and Information Function, and for contingency planning. Emphasis on specific functions (and therefore the organizations that effect these functions) will vary according to the nature and characteristics of the hazard and its human impact.
- Promulgation of useful response information is essential, both to the public and to the response community. In the absence of good information, rumors, speculation, and dissent emerge.
- Unified management (UM) is a structure in IMS that brings together the incident managers of the major organizations involved in the incident to establish a common set of incident objectives and strategies. Unified management is commonly described as not usurping organizational authority or responsibility but it is unclear how authority conflicts are resolved. UM characteristics include:
  - A single integrated incident organization.
  - Shared or co-located facilities.
  - A single planning process and incident Action Plan (a single set of strategic goals and objectives).
  - Shared planning, logistical, and administration/finance operations.
  - A coordinated process for resource ordering.

Regional Management Coordination Assumptions

- In interstate regional “jurisdictions” may be mandated
through legislated authorities such as occurs in California and Florida, or they may be handled at the county/municipal jurisdictional level with regional coordination. The relationship between intrastate regions should be determined through a statewide emergency management system and established through state regulations and legislation. Interstate regional coordination, however, must recognize and respect the individual legal and political responsibilities of each individual state (Washington, D.C., is treated as a state jurisdiction).

- Each political jurisdiction has primary legal and political responsibility to its own citizenry such that it cannot abrogate or subrogate that responsibility to other jurisdictions, to a “region,” or to a federal response agency. Because “unified management” between jurisdictions of an interstate region cannot override the jurisdictional command responsibility, regional management is limited to strategic issues that traverse jurisdictional boundaries. The underlying key concept for regional response, therefore, is management coordination: identifying the interjurisdictional issues and addressing the management coordination (objectives and strategies) required for these issues.

- The basis for regional coordination and cooperation must be mutual self-interest, assuring that the sum of the regional assets creates a stronger overall capability as well as within each individual jurisdiction. Regional management coordination may therefore be legally and conceptually based upon the mutual aid system. In fact, one may conceptualize a regional emergency management “system” as a fully integrated master mutual aid plan that includes information management.

- The framework for this strategic mutual aid (and therefore coordination of response) is determined at the highest management levels between jurisdictions (Figure 4-1). It requires operational cross-jurisdictional mutual aid arrangements between response and logistical functions, and an information management system that shares critical information across all jurisdictions in the region. Equally available, openly shared trusted information will enhance the ability to make regionally coordinated management decisions. The “first among equals” in the management decision process may best be determined as the one with the bulk of the jurisdictional responsibility (i.e., the jurisdiction most affected if it is a multiple jurisdictional issue) or by the bulk of the specific need (potentially more law enforcement in one jurisdiction, more medical needs in another).

- Lower level (tactical) interjurisdictional coordination and resource sharing may then be accomplished through function or organization-specific mutual aid agreements, but these should follow the strategic direction of the regional management coordination, delineated by a master mutual aid plan.

- Regional management also can’t abrogate or subrogate the responsibility for local emergency management to coordinate with the federal government. Federal assistance must be managed through local and state emergency management systems, generally through the EOCs, and the Disaster Field Office, per the FRP and its concepts of operations.

- A similar “primary responsibility” concept applies to medical and health resources that are independent of the
normal public safety response system. Hospitals, medical practices, healthcare supply corporations, and others have primary responsibilities to current clients, to shareholders, and to others that cannot be subrogated to public concerns and management without prior arrangements that protect the primary stakeholders. Mass casualty systems that incorporate private, voluntary health and medical resources must address this issue and may need to assure information and resource support to those organizations that become part of the response system.

- Emergency management of disasters has traditionally been at the local level (county or municipality) with state assistance. Public health, however, has often been constructed with state authority overriding local jurisdictions. These digressing lines of authority and reporting between public health and emergency management/public safety must be specifically addressed and resolved within each state’s jurisdiction.

- Having jurisdictional response systems that are “redundant” within a region and developing them with similarities between their capacities, systems, equipment, and procedures will promote regional coordination and more-effective mutual aid, as well as more cost-effective resource acquisition, training, and exercises.

- Nonmedical strategies such as transportation, mass evacuation or shelter in place, public information systems, and others will also require regional coordination for the regional mass casualty response to work.

**Operations Assumptions**

- Specialized and general surge capacity for medical needs during a major mass casualty incident can be promoted through careful planning.

- Medical care surge capacity for hospitals and healthcare organizations should begin with protecting, augmenting, and facilitating individual healthcare facility response capabilities, which is far more effective than creating a separate, isolated hospital capability for a low-probability mass casualty incident. Planning must begin with a priority placed on maintaining functional integrity of the in-place facilities and services.

- Existing community capabilities that manage, on a regular basis, medical care for especially at-risk victim populations such as the medically frail can be strengthened and augmented to be capable of addressing the needs of their normal constituents in a disaster. This requires identifying (during the preparedness phase), protecting, and augmenting these already existing and functioning advocacy and key service groups to allow them to perform needed services for their constituencies, or to coordinate vital services with jurisdictional incident management during times of need. Offices on aging and meals-on-wheels are two examples of service organizations servicing the frail elderly, disabled, and needy after a disaster.

- The next level of striving for adequate surge capacity is assuring that individual facilities have maximally effective individual emergency operation plans (EOPs) for their facilities. The EOPs should address local assistance for maximizing their facilities’ capabilities. This could include having procedures to obtain services from professional societies and associations for health professionals. Other possible allies to improve each function’s capacity include:

  ✓ Leaders of faith communities (as partners in managing the mental health issues in their community population.)
  ✓ Crime victim services and victim service providers.
  ✓ Animal care and agricultural/animal and insect surveillance/monitoring services.
  ✓ Medical examiners and funeral directors organizations.
  ✓ Pharmacist organizations, pharmacy chains, and pharmaceutical wholesalers and manufacturers.

- The psychological stress, loss, and pain caused as a result of the public emergency may result in a region’s mental health system becoming overwhelmed, producing urgent need for mental health crisis counseling for emergency victims, response personnel and their families, and the general public. They may also require assistance addressing long-term psychological needs based upon identified mental health illnesses.

- Delivery of multilingual messages, and personnel with multilingual skills, may be necessary due to diversity of the population throughout the region.

**Logistics Support Assumptions**

- Prolonged incidents will require personnel relief, medication and equipment re-supply, and other unusual logistical challenges (child care for responders, pet care, etc.).

- Dedicated entities are needed that understand support concepts and have the logistical capability and legal
authority for resource acquisition, for rapid transport of personnel and equipment, for temporary and long-term storage of supplies, for ongoing maintenance of equipment as indicated, etc.

• Well-wishers can overwhelm responders at the scene of response or at areas where care is being delivered. A well-defined capability dedicated specifically to screening, cataloging, accrediting, and deploying these individuals is necessary.

Planning Assumptions

• Information management. Information management is vital to the development and operation of an effective mass casualty system. The collection, authentication, and analysis of data, and the synthesis and dissemination of information concerning local and regional health and medical issues are vital components of an adequate Information Management System. The types of information, analyses, and reports vary by hazard type and other circumstances, but the processes are commonly the same.

It is important to distinguish the difference between Information Management and Communication. The former relates to the processes of the collection, analysis, formatting, and the transfer of information with an intense focus on the parties receiving or sending the message. The term “Communications” is a more-focused process (sub-function) and refers only to a method of conveying the information (i.e., a vital but narrow component of Information Management). Unfortunately, most projects currently funded and under development focus on communications in response to mass casualty events rather than the more comprehensive Information Management needs.

• Communications. The ability to connect parties for the purpose of multidirectional exchange of data and information is a relatively narrow component of comprehensive Information Management and must be viewed as such. The architecture of a communications system must be constructed based upon the architecture of the information system, which is designed to meet the Information Management needs for all hazard incidents, with specialization to meet the projected issues of individual hazards

• Planning Cycle. Action Planning can be a time-intensive process, and specific support is required to facilitate an adequate process. Universally accepted briefing methodologies that limit time spent exchanging information while providing discipline to the process are required.

Administration/Finance Assumptions

• Administrative and financial considerations must address all hazards response issues (such as cross-jurisdictional licensing, credentialing, and liability coverage for health professionals). This should preferably be done using preexisting structures such as a hospital’s credentialing process rather than maintaining a stand-alone credentialing system.

• Health, medical, and mental health services will be financially impacted. Continuity of Operations Plans (COOP) must address large expenditures, some unreimbursed and others delayed, and financial strain due to loss of normal elective procedures and other remunerative business.

• The majority of medical and health resources in the United States are nongovernmental businesses, many with very thin operating margins. Management/coordination of these nongovernmental medical and health assets during a response requires that systems be in place to provide financial guarantees and/or direct payment to the businesses if management requests engender significant expenditures (supplies, equipment, personnel time, and so on). This concept has evolved well for nonhealth businesses in major responses and must be applied to healthcare businesses as well. IMS Finance Function must have the financial capability and legal authority for contracting, for financial accountability, and for defining methods for capturing the financial impact from loss of normal business revenues for vital response entities such as hospitals.

Technical Experts

• Personnel with specialized expertise (such as infectious disease and public health experts for contagious epidemics, radiation experts — medical and technical — for radiological releases, and so on) may be used as technical specialists (i.e., consultants) or as part of unified management. The concept that a technical expert should run an operation is outmoded and should be avoided. Operations experts should manage emergency operations, with input by the technical specialist provided the input is indicated or requested.

Boundaries of the Project

As noted earlier, mass casualty response takes place within a larger context of emergency preparedness and response. Issues and functions that significantly affect mass casualty medical response but are not primarily within the domain of health and medical management are designated as Boundary Functions and Boundary Issues.
The project recognizes that mass casualty care systems function within the larger context of overall Incident Management, and a successful system is fully integrated into this larger system, even if an event requires primarily a medical response. Defining that larger system is beyond the scope of this project, but key integration points, support needs, and so on are defined in this project’s requirements framework.

The “boundaries” for this project include many of the emergency response areas that are nonmedical in nature and yet impact upon mass casualty care.

This is not a model for all four phases of emergency management. It does not include mitigation or recovery and doesn’t address in detail many essential preparedness functions such as System Implementation, Training, and Exercise (though it is recognized that these would be critical development functions for an adequate response system).

The financial aspects of mass casualty response are vital issues for healthcare resources. Important issues must be assured, including hospital COOPs. This model, however, is not a comprehensive financial guide for this subject area.
MaHIM provides a comprehensive system description of all functional components critical to effective mass casualty incident response of any type. Chapters 5-8 describe the functional system layout, delineating the specific requirements for each individual function and for the critical processes that coordinate the functions. Functions and processes are described conceptually, to be applicable in developing any community-wide response system for mass casualties. The system description may also be used in a checklist format for evaluating an existing management and response structure, although this is not the primary intent. The broader concepts of operations for MaHIM are covered in Chapter 9, including the critical relationships across functions and incident phases (i.e., how the system works across a time line). It also provides a more-detailed description of interjurisdictional relationships within a region. The unifying theme of Chapters 5 - 9 is the description of how the various functions can work in a coordinated fashion to achieve the common goal of limiting morbidity (injury or illness) and mortality (deaths) in a population exposed to a major hazard.

Overview of the Functional Model

Each major component is described as a functional area. Primary elements within each functional area are denoted as functions. Sub-functions describe the distinct but related capabilities within each function. The functional areas are organized according to the architecture of traditional incident management (Figure 5-1) but are more simply conceptualized as three primary components (Figure 5-2)

1. Jurisdiction Medical and Health Incident Management
2. Medical and Health Operations
3. Support to Medical and Health Management and Operations:
   - Medical and Health Logistics
   - Medical and Health Planning
   - Medical and Health Administration/Finance

Figure 5-1

Traditional Medical and Health Incident Management System

MaHIM: Functional System Description Overview

General System Criteria

Within MaHIM are general criteria applicable to all functions and processes. These are as follows:

- Well-defined and comprehensive standard operating procedures for each function, sub-function, and major process. This includes a delineated management structure and specified points of contact for each function and sub-function to interact with the overall MaHIM System. Coordination of each discrete resource (at all levels) with the overall system requires an organized internal management system within each entity and a defined way for the resource to interface with its specified functions and sub-functions.

- Appropriately qualified and trained staff for all system positions, with the capacity to systematically train personnel.

- Limited span of control such that each individual system element is responsible for a manageable number of sub-functional elements. The number limit for span of control (or perhaps more accurately called “management/coordination”) can vary depending on geography, mobility, or complexity of tasks performed by the sub-elements (i.e., routine tasks and simple management allow an increased number; more complex tasks or management/coordination requirements dictate a smaller number).
• Adequate internal information processing within each functional area. The Planning Functional Area establishes the overall information processing architecture, but each function has the individual responsibility to internally collect and disseminate appropriate information in a timely fashion.

• Adequate communication infrastructure to support the internal and external information processing architecture.

• Effective interface between related functions (i.e., functions support other functions, are supported by other functions, or coordinate directly with other functions to achieve a functional objective).

• Capability for 24/7/365 operation of all MaHIM System functions.

An effective response system is heavily dependent on adequate Information Management. This should be distinguished from “Communication,” which only addresses the methodology of passing data or information between parties. “Information management” addresses the critical requirements involved in data and information acquisition, analysis, formatting, and distribution. These must be defined before communication methods are developed, so that “communication capability” will adequately meet the data and information transmittal requirements of the information system architecture.

One of the innovative concepts introduced in MaHIM is that of the Medical Local Information Function (MH-LIF), which functionally resides within Planning. The MH-LIF provides the information processing support to Management, Operations, and the other support functions. It establishes overall coordination of information by specifying the data to report and establishing reporting requirements such as formatting, timing, and methodologies. Information Management across the response system will only work if each functional area can gather data and disseminate information within its own function and, simultaneously, collect and transmit necessary data to the MH-LIF in a timely manner.

Information Management activities must be defined and implemented through all phases of the incident: event recognition/initial notification, mobilization, operations, demobilization, and recovery/organizational learning (see Chapter 6).

Medical and Health Incident Management Functional Area

The Medical and Health Incident Management Functional Area is responsible for the entire incident response, and therefore for all “strategic” incident issues. It sets the strategic goals and objectives for the incident (Figure 5-2) and defines the major management parameters (length and timing of the incident operational cycle, priority of objectives, etc.).

Figure 5-2

Medical and Health Operations Functional Area

“Operations” encompasses all functions that are directly responsible for accomplishing the strategic goals and objectives set by Management. The Operations Functional Area oversees and directly coordinates the Operations Functions. To do this, tactics (methods) are established to achieve the incident objectives. The development and execution of specific tactics are the responsibility of operations leaders.

Medical and Health Support Functional Areas

Support functions provide assets and services, internal to the Incident Management System, that maintain the capabilities of Management and Operations throughout the incident. The Medical Support Functional Area is comprised of three support functions: Medical Logistics Support, Medical Planning Support, and Medical Administration/Finance Support.

• Medical and Health Support Logistics Functional Area

This functional area encompasses all functions that support Management and Operations in the areas of personnel, equipment and supplies, and assisting with the maintenance of facilities used by Operations.

• Medical and Health Support Planning Functional Area

This functional area encompasses all activities that support Management and Operations in the processing of incident information and in the development of plans for the overall incident. The key information-processing sub-function, the
MH-LIF resides within the Medical and Health Support Planning Functional Area. The MH-LIF is responsible for information collection and dissemination to and from the various response system elements, and is supported in turn by the Communications Function under Logistics. The second critical function of Planning is the Plans Development and Assessment Function, which supports all activities through the development and maintenance of a systemwide MaHIM planning process. This includes a planning cycle: a continuous, deliberate method of defining incident objectives, evaluating their effectiveness, reacting with revised and new objectives, and forecasting future needs or contingency plans.

- Medical and Health Support Administration/Finance Functional Area

This functional area encompasses all activities that support Management and Operations in incident administrative issues and in the tracking and processing of incident expenses. Examples of issues that this sub-function is responsible for include:

✓ Licensure requirements.
✓ Regulatory agency requirement compliance.
✓ Financial accounting during the incident.
✓ Contracting services below the level of the community’s emergency operations center (EOC), which is operated by the local emergency management agency.

Regional Management Coordination Function

Unified management may potentially provide a basis for regional management of an incident, and effective intrastate regional unified management has been established through state-level statutes and regulations (California and others). Unified regional management is difficult to establish, however, when the region transgresses state borders. State authorities have steep legal and political obstacles to ceding final authority for its citizenry to a body that doesn’t have the state’s citizens exclusively as its ultimate focus. Regional management coordination may therefore become the achievable target, rather than a formal unified regional management structure. A Regional Management Coordination Function (Figure 5-3) is delineated in the MaHIM model to accomplish this goal.

Regional Management Coordination Function

The Regional Management Coordination Function provides a coordination conduit between all jurisdictions that have become significantly affected by an incident (intra- or interstate). This function oversees a process that coordinates jurisdictional incident goals and objectives and establishes a regional strategy. The outcome is a regional Action Plan, a brief document that is distributed with each jurisdictional Action Plan and only addresses strategic issues, including parameters for guiding interjurisdictional mutual aid at the tactical level.
An important service provided by this function that enhances interjurisdiction coordination and cooperation is the management of interjurisdictional information, perhaps best done through a defined mechanism, a Medical and Health-Regional Information Function (MH-RIF). This is not a physical entity, but rather a function that provides the capability to integrate, analyze, and report in real time the information being generated and shared by the jurisdictional MH-LIFs (Figure 5-4). Establishing this function requires the commitment of personnel and equipment but may best be developed by vesting each of the MH-LIFs with the capability. The Regional Integration Function then has redundancies in case one center is incapacitated or overwhelmed. In fact, a regional Concept of Operations could include a caveat that the least impacted jurisdiction within a region primarily manage the regional information integration and specific high-effort functions such as Regional Patient Tracking (see below) during an incident.

Requirements:

- Coordination of individual jurisdictions’ incident response objectives, to develop consistency across the region.
- Review and coordination of incident strategy and tactics between jurisdictions.
- Coordinate the public message to be consistent between jurisdictions. Differences are addressed with a public explanation/clarification (example: West Nile mosquito spraying in some counties and not other counties in the same region).
- Hazards and other important information identified in one jurisdiction are shared with others, along with methods that address the hazards.
- Strategic mutual aid agreements between the jurisdictions of a region define how tactical mutual aid will be implemented, including defined mutual aid request methods, mutual aid tracking mechanisms, and other critical issues (finance, licensure, tactical management of mutual aid assets, etc.).
In incidents where the primary impact is mass casualties, or the potential for mass casualties, (such as the 2001 anthrax mail dissemination), the overall incident may be run by a medical and health incident manager or by Unified Management (Figure 6-1). For incidents that are not primarily medical or natural (e.g., bombing with a collapse structure response), overall Incident Management will not be primarily medical, but Medical and Health Emergency Management must be recognized as a critical function and should be a respected component of a unified Incident Management entity (Figure 6-2). Acute care medicine and public health should be strongly represented in any management arrangement in incidents in which there are human victims, or the potential for human injury or illness among victims or responders. Ideally, the management of both types of incidents (primarily medical and primarily nonmedical) would be accomplished through UM that includes emergency management, fire/EMS, law enforcement (if indications of an intentional attack, either criminal or terrorist in nature), and possibly other key response disciplines.

For the incident with a primary medical impact, the medical incident manager and/or UM is responsible for establishing the incident medical and health objectives and for overseeing the development of incident strategy and operational tactics (defined by the Medical and Health Operations leaders) that accomplish the objectives. Incident Management also performs high-level problem solving, settling issues such as resource shortages that cannot be adequately addressed within the Incident Management structure. In both primarily medical events and primarily nonmedical events, Medical and Health Management provides strategic coordination with a community’s nonmedical response functions. Management interfaces with state and federal response functions through the community’s EOC. Incident Management is therefore closely coordinated with the EOC, but should be kept separate and distinct from the EOC function.

Health and medical mass casualty response commonly includes private medical assets, public health, and public medical assets that are not within the command authority of the public safety system (fire, law enforcement, Emergency Medical Service, public works). Operational management of these resources is accomplished through a coordinating mechanism based upon recognized competency of management, information sharing, and systems that provide both payment for services and financial/security protection for participating assets in the Response System.
All of this community-wide Medical and Health Incident Management is accomplished by a well-defined series of activities and meetings that comprise a formal, disciplined Action Planning process. Effective Incident Planning must be based upon timely, accurate information, so data from each function and sub-function must be rapidly collected, analyzed, and formatted into usable information. Using this knowledge, the goals, objectives, strategy, and tactical procedures and tasks are then delineated in an Action Plan to address the defined needs of the incident. An Action Plan is developed and disseminated for each operational period.

The recommended management goal in this model is best described as “management by objectives,” with the incident-specific objectives developed during the Planning Process (Figure 9-8). The general objectives in a medical model of incident response are listed in Figure 6-3. The MaHIM management process is defined in detail later.

Requirements for Community Medical and Health Incident Management include:

- Legal authority to represent the jurisdiction on public health and medical issues.
- Legal authority to issue public advisories and directives addressing public health and medical issues for the community.
- Comprehensive understanding of the Incident Management System and its operational principles.
- Comprehensive understanding of the discipline of Emergency Management, including how it functions and how responses are organized.
- Operational knowledge of the jurisdiction’s general emergency response plans (emergency public health, mass casualty, fire and rescue, law enforcement, etc.).
- Operational knowledge of public health and epidemiological principles.
- Operational knowledge of the jurisdiction’s emergency public health law and regulations.
- Operational knowledge of operational (“field”) medicine.
- Operational knowledge of acute care medicine, including:
  - Emergency and trauma care medicine
  - Critical care
  - Toxicology
  - Chemical agents of warfare
  - Biologic agents of warfare
  - Radiation injuries
  - Blast injuries
  - Psychology and psychiatry related to mental health and stress.
- Operational knowledge of incident stress and related management strategies.
- Demonstrated leadership qualities and leadership experience in crises and large operations.
- Demonstrated public-speaking skills, plus training and experience in dealing with the media.
- Operational understanding of principles of crisis communications and principles of mass population behavioral response.
- Operational understanding of the Federal Response Plan, particularly:
  - Emergency Support Function #6: Mass Care.
  - Emergency Support Function #8: Health and Medical.
- Understanding of principles of fatality management: body processing and identification requirements, forensics needs, and jurisdictional authorities (i.e., understand the role of the medical examiner and coroner).
- Knowledge of principles of infectious disease in animals.

Medical and Health Incident Management Functions (Figure 6-1) assist the IM/UM in performing its duties.

**Incident Management System Monitoring Function**

This function provides management oversight of the overall
MaHIM System for the jurisdiction. It monitors the adequacy and effectiveness of the system itself (i.e., it assures that the MaHIM System is functioning as designed) and has the authority to address deficiencies in the system. The Incident Management System Monitoring Function reports directly to the medical and health incident manager on the assessments of the system’s critical operations and any major problems not solved through system processes. The effectiveness of Information Management in particular must be monitored by this function, elevating the importance of Information Management to the highest level in the system and utilizing the full authority of the medical incident manager.

**Requirements:**

- Authority to correct inadequacies in or misapplications of the response system.
- Extensive management experience and operational knowledge of systems designed for the emergency management of large events (e.g., Incident Management Systems).
- Unrestricted access to all geographic and functional locations of the MaHIM System.
- Unrestricted access to all documentation and information generated by MaHIM.

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**Management Liaison Function**

Liaisons are important for coordinating with major organizations outside the jurisdictional Medical Response System, such as federal law enforcement and the Joint Operations Center (JOC), Department of Defense, and others. Medical Management may also assign a liaison to political leaders, though the medical and health incident manager may elect to directly provide the briefings to political leadership. A primary role of liaison is to establish and operate appropriate information exchange (and therefore coordination) with outside support assets. The liaisons convey information to the appropriate destination functions within the Incident Response System and to the Planning Functional Area for processing and incorporation into the Action Planning Process.

Liaison personnel could be located in many possible areas, including the local EOC, the state EOC, the JOC, and others. The physical locations may vary depending on the incident type and the entities involved. Large complex incidents may require a number of staff assigned to this function.

**Requirements:**

- Operational understanding of the community’s MaHIM System, with the ability to provide a knowledgeable briefing that is relevant to the outside resource.
- Operational understanding of the outside entity to which they have been assigned for liaison purposes, including its capabilities, management structure, and direct point/s of contact.
- Operational understanding of the contact methods to be used for interfacing with the outside resources and the ability to maintain round-the-clock availability if indicated.
- Capable of identifying relevant information to be passed to assisting/cooperating agencies. This requires extensive coordination with the Planning Functional Area, and the Public Information Function of Management.
- Ability to forward requests and relevant information from assisting/cooperating agencies rapidly to the appropriate MaHIM Functional Area/s.
- Ability to assess whether supporting/cooperating agencies and other assets are operating in a method that achieves or supports incident objectives established by the Medical and Health Incident Management, and identifies potentially conflicting objectives.

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**Management Safety Function**

The Safety Function provides oversight for all issues related to responder safety during response to the incident. This function should be viewed as an active process rather than a passive one, requiring administrative capabilities and strategy development as well as qualifications to directly or indirectly accomplish individual field monitoring for safety concerns. If hazards are identified by functional elements other than Safety within the response system, they will be forwarded through the information processing system to the Safety Function. Safety performs an analysis, mandates immediate intervention if safety is seriously threatened, and makes recommendations through the incident management process for less-immediate health and safety concerns.

Safety is responsible for developing the Health and Safety Plan (HSP), a key component of the MaHIM management process (see Chapter 9).

**Requirements:**

- Emergency authority to prevent or stop unsafe practices when immediate action is required (Safety personnel must therefore be recognizable to all components of the response system).
- Unrestricted ability to correct unsafe practices through coordination with the incident managers.
- Authority to review all incident objectives, strategies, and tactics for health and safety implications.
Requirements of Public Information spokespersons:

- Ideally should be easily identifiable by the public (i.e., not an obscure scientist or relatively unknown public official).
- Frequent appearances to engender media and public familiarity with the public information personnel early in an incident.
- Access to expert information so that he/she never portrays being “caught off guard” or unable to answer questions posed by the press.
- Capability to provide nontechnical answers to technical questions.
- Honest and confident in presentation of material to the public.
- Warmness and sincerity portrayed through communication skills. For example, capable of showing emotion without portraying loss of control.

Media Message Sub-function

This sub-function produces timely, carefully structured media messages, to be approved by management and released through the Public Information Function leadership, for briefing the media and the public. This media message has several purposes. It can be used to provide general incident information, guide public actions, reassure the public, and prevent speculation and subsequent rumors.

Message requirements:

- Message must be coherent, concise, and attract/focus attention.
- Message should avoid policy debates. That is to say, conflicting issues should be solved before going public. If this is not possible, response strategies are presented as the best recommendations based upon the currently available background information, and an explanation is provided as to why completely clear and noncontroversial recommendations are not yet possible. Recommendations commonly should err on the side of caution and can be effectively presented as being based upon an “excess of caution” (Mayor Rudolph Giuliani in his first anthrax press conference during the 2001 anthrax dissemination event in NYC). This same strategy is important in addressing policy debates between jurisdictions and between different response agencies.
- Message must be consistent. Avoid changing the message from prior recommendations without specific criteria and a careful explanation as to why the change occurred.
- Message development must consider the views of the public and shape accordingly.

Management Public Information (Media/Public Affairs) Function

The Public Information Function deals directly with the media, developing the media message and providing it after the incident managers have approved release to the public.

Information should be distributed to the medical, public health, and other response personnel prior to release to the general public. This is important so that: the responders can prepare for the public reaction to the news release; so that the health and medical communities can understand the information and affirm the credibility of the information; and so that standardized responses can be developed across the health and medical response spectrum. If situations occur in which time-sensitive, life-threatening information is discovered, this would be simultaneously released to the media and the medical response community, in an appropriate format to prevent death or serious disability.
✓ Realization that “public” is not a monolithic group.
✓ Different age groups may respond differently to media information.
✓ Different cultural groups may respond differently to media information.
✓ Different groups may need “targeted” information. Examples:
  - Socioeconomically underprivileged: traditional lack of access to medical assets.
  - Tourists: out of their usual environment.

- Provide examples of “triumphs” in face of adversity.
- Do not hide bad news. Instead, provide a realistic portrayal of events, place them in context, and describe the corrective measures being implemented.
- Define the issues and set the agenda for the media and public message:
  - Provide a very early media message. Keep the description of the event factual; place the report in context: “This is what we know right now… this is what we are doing to address the issue and find out more information… this is when we will provide an update… please remember that ______ has occurred and it will take some time to obtain accurate information for you” (paraphrased from the initial press conference by U.S. Capitol Police spokesperson Dan Nichols after the U.S. Capitol shootings, July 24, 1998).
  - Schedule frequent news briefings and have experts and appropriate incident personnel available to answer questions when possible.
  - Shape the message to promote appropriate population behavior. Fact sheet for release through web sites, treatment advice hotlines, primary care call lines, and as handouts in emergency departments, and physician’s offices.
  - Provide specific information considered important by the public, such as:
    ✓ Precautions to take against predictable developments.
    ✓ Where to seek shelter.
    ✓ Where to seek aid.
    ✓ Where to look for lost loved ones.
- Personalize recommendations by providing personal accounts of individuals who have heeded the advice of public information message. Include information that delineates the consequences of not taking recommended actions.
- Promote expert commentary where appropriate. Identify and provide knowledgeable experts to comment publicly, and to expand in a consistent manner on the deliberate cautious approach being taken in controversial areas.
- In some instances, the media message may be best accomplished by providing information in story format (Ball-Rokeach, 2000):
  ✓ Provide examples of “triumphs” in face of adversity
  ✓ Do not avoid “bad news.” Instead, provide a realistic portrayal of events, place them in context, and describe the corrective measures being implemented.

Public Information Tracking Sub-function

This sub-function’s purpose is to identify misperceptions, rumors, and unintended consequences of the response system actions or messages. Special attention is required to monitor messages delivered by political or community leaders. It is also expected to anticipate public and political reaction to written and unwritten messages from the incident response. Concerns and recommendations are rapidly and clearly defined and conveyed to the appropriate MaHIM Functions for proactive shaping of the public message. These are active, time-intensive processes.

This management sub-function provides a structured capability for monitoring and evaluating:
- Public message from the media.
- Public response to media message.
- Public interpretation on non-verbal communication within the Response System.
- Public information from outside sources, including “experts.”
- Public statements from political and other community leaders.
- Web-based information regarding response and hazards.
- The public perception of the response system and its activities.

Public Information Tracking also focuses upon “rumor” management. Rumors are caused by lack of information and subsequent speculation. This is primarily addressed by regular periodic information dissemination but also by identifying rumors, defining the issues underlying them, and clarifying
the public information. The actual goal is long-term maintenance of the public’s confidence, promoting beneficial population behavior, and minimizing the psychological impact of the incident.

**Requirements:**

- The media message should be monitored by trained media personnel with the objective of detecting significant misinformation, sensationalizing of details, unfounded rumors, and other phenomena that can be effectively addressed by the appropriate component of the response system. Rapid response to public concerns should be incorporated into the overall response strategy.

- Personnel act as the incident’s “information safety officer,” monitoring the incident management actions and media/public communications for unintended perceptions and messages. Positive feedback to responders and managers should also be provided if their actions are receiving positive response by the target population.

- When rumors are detected, the perceived importance of a rumor story and the ambiguity of the story should be reduced (Garcia).

- Outlets distributing disinformation must be challenged by authoritative information.

- Recognized, credible experts should be provided for regular media briefings on specific technical information. Technical jargon must be reduced to common terminology.
The Medical and Health Operations Functional Area has the mission of accomplishing the strategic incident objectives set by the medical incident managers (the remaining functional areas are primarily involved with activities/objectives that support the Operational and Management Functions). The mission of the Medical and Health Operations Functional Area is to implement and coordinate the operational functions, sub-functions, and processes, at the tactical level, that comprise the primary response interventions in a mass casualty event. The Medical and Health Operations Functional Area leaders are responsible for assuring the operability and integration of all Operations Functions (Figure 7-1).

Medical and Health Operations Functions and Sub-functions

Medical and Health Operations Staging Function

This function is critical to overall operations, as it organizes arriving operational resources and then deploys them to their designated function at the direction of the operations leadership. The Operations Staging area is supported by the Logistics Support Function in multiple essential activities.

Requirements:

• Location for staging operational resources must be a designated “safe area” that can effectively deploy resources as they are requested.

• Provide adequate and visible space for personnel processing. These activities are supported by Logistics’ Personnel Processing Support Function. A check-in process must be established for assets and personnel so that accountability is maintained. Appropriate badging of personnel by Logistics would also occur here. For responders from outside the Incident Management System (volunteers and outside assets), verification of credentials is done through Logistics processing.

• Personnel feeding and billeting, along with other personnel support, may be required. Logistics Personnel Support Function supports this activity.

• Transport of assets and personnel from staging to operational assignments will often require support by the Transportation Support Function of Logistics.

Incident Epidemiological Profiling Function

This function encompasses all activities to identify, define, and track an incident from a medical and epidemiological perspective. It involves activities such as disease containment, patient surveillance, and diagnostic support.

Figure 7-1
Medical and Health Operations Functions and Sub-functions

Figure 7-2
Incident Epidemiological Profiling Function
perspective (Figure 7-2). The information is vital to Incident Management, since it encompasses most of the information needed to define incident objectives, strategy, measures of effectiveness, and anticipation of medical needs for an incident. Accurate and timely epidemiological profiling:

- Allows determination, as early as possible, that an unusual event (an “anomaly”) is occurring.
- Provides a rapid investigation of an anomaly.
- Confirms that an incident that requires a response is occurring.
- Rapidly provides an assessment of the size and scope of the hazard’s medical impact and/or threat. Scope includes developing and refining the case definition, determining the potentially at-risk population, and other epidemiological parameters.
- Provides other vital incident parameters.

In the case of a surreptitious event (e.g., unannounced biologic agent or slow onset chemical toxin release), event recognition may occur in multiple ways. It may occur through systematic surveillance of community parameters and patient population profiling (including animal and environmental surveillance — other sub-functions under the Incident Epidemiological Profiling Function) or by receiving alerts (the report of a “case of concern”) from astute medical and public safety practitioners. The latter is considered the most sensitive and therefore most likely method of discovery. In this scenario, the other macro-surveillance mechanisms remain important as tools for assessing the size and scope of the incident.

If an anomaly in surveillance findings occurs (defined by the jurisdiction’s epidemiologists) or is determined by the report of a “case of concern,” a rapid epidemiological investigation, confirmation, and notification must occur.

Requirements:

- Capable of analyzing and formatting epidemiological and diagnostic data from all of its sub-functions into cohesive analysis and reporting mechanisms. This information-processing activity is supported by the MH-LIF Information Sub-functions. The epidemiological profiling information is also used by MH-LIF in supporting the planning processes of management.
- Appropriate legal authority for surveillance systems.
- Surveillance information must be tracked regionally (through similar surveillance systems in each jurisdiction) to be most effective and sensitive.

Possible Indicators of a Covert Biological, Chemical, or Radiation Attack

- Unusual clusters of disease in a population.
- A higher morbidity and mortality than expected with a common disease or syndrome.
- Failure of a common disease to respond to usual therapy.
- Multiple unusual or unexplained disease entities coexisting in the same patient without other explanation.
- Disease with unusual geographic or seasonal distribution.
- Multiple atypical presentations of disease agents.
- Similar genetic type among agents isolated from temporally or spatially distinct sources.
- Unusual, atypical, genetically engineered, or antiquated strain of agent.
- Endemic disease with unexplained increase in incidence.
- Similar illness in noncontiguous areas.
- Unusual deaths among animals that precede or accompany illness or death in humans.
- Illness in people exposed to common ventilation systems.

Figure 7-3

- Dynamic analysis of data must occur that may in aggregate or as a single case identify an anomaly or “unusual occurrence” — indicating a possible public health threat. Indicators that may signal a covert biological, chemical, or radiation attack are listed in Figure 7-3.

Community Health Surveillance Sub-function

This sub-function tracks community health indicators as a component of a jurisdiction’s ongoing health surveillance capability. This capability must track, analyze, and report general health and medical parameters across a jurisdictional area (distinguished from the individual patient or “case” data addressed by the Patient Surveillance and Tracking Sub-function). The Community Health Surveillance Sub-function follows health parameters throughout a rapid epidemiological investigation and continuously through the entire incident to provide information important for epidemiological profiling (establishing and tracking the size and scope of the incident). Information from this sub-function could also serve as measures of effectiveness as the response moves forward. The MH-LIF (under the Planning Functional Area) is responsible for supporting this function’s information processing (data collection and analysis, information formatting, and disseminating reports).

Community health indicators that may be tracked are noted in Figure 7-4.
Possible Community Health Indicators

- Representative pharmaceutical sales (antibiotics, anti-diarrheals, anti-pyretics/pain medications, etc.).
- Aggregate hospital, emergency department, and critical care unit census/occupancy.
- Aggregate hospital in-patient pharmaceutical use (selected medications).
- Unexplained deaths (through the medical examiner and/or coroner’s office).
- 911 and poison control center call volumes and syndromic indicators.
- EMS total dispatch and transports, with breakdown by key categories.
- Absenteeism from schools and high-risk targets (postal workers, government workers, healthcare personnel, etc.).
- Aggregate activity data from funeral homes.
- Aggregate data from animal care providers:
  - General vets
  - Specialty vets
  - Zoo personnel

Figure 7-4

General incident surveillance requirements:

- Capability for a rapid response to an event, where general surveillance may be quickly scaled up to intensive surveillance during an event.

- Provide rapid information on the initial, evolving, and final/total size and scope (by pharmaceutical sales data, hospital admission rates, absenteeism rates, etc.) of the incident.

- Provide rapid information for use as measures of effectiveness of the response to the incident.

- Development, implementation, and maintenance costs financed from sources outside the regular health/medical system (no cost to nonpublic health entities).

- System is capable of running regular tests/exercises for purposes of:
  - Education
  - Training
  - System evaluation
  - Data collection for background epidemiological profiles.

- Integrated with Incident Epidemiological Profiling Function leadership so that its data can be combined with that from the other Epidemiological Profiling Sub-functions to form a comprehensive profile.

- Integrated with Rapid Epi Investigation and Incident Profiling to provide pertinent data for the initial investigation.

- Nodal hierarchy to achieve manageable span of control.

Patient Surveillance and Tracking (PSAT) Sub-function

The Patient Surveillance and Tracking (PSAT) sub-function establishes a capability to collect, track, analyze, and report patient (case) information across a jurisdictional area. This includes surveillance on a continuous basis and increased or focused surveillance during an incident or epidemiological investigation. The same system and processes can be used for patient tracking (via case definitions) during and after the impact phase of a mass casualty or unusual medical incident. The MH-LIF supports the tracking, analysis, formatting, and information reporting of this data.

Patient (case) Surveillance describes the ongoing organized review of patient with designated signs and symptoms and diagnosed medical conditions via data input modes. The most accurate and sensitive indicator of an incident may actually be the prompt reporting of a single unusual case or case circumstances by an informed medical practitioner: a clinical or lab professional, or diagnostics specialists such as pathologists and radiologists. During an identified incident of major proportions (large-scale bombing, widespread infectious disease, etc.), the most reliable indicator of the size and scope of the incident may be from healthcare facilities reporting patients meeting the case definition, with their data collected through this Patient Surveillance Sub-function. This function may also be very useful for tracking other non-disaster injury or illness patterns. Examples include “all fireworks-related injuries for the two weeks surrounding July 4th”, or “all heat-related illnesses during a summer heat wave.”

Individuals to be reported and tracked are defined through a “case definition” that will usually become more specific as the incident progresses. Individual patient information that should be tracked/reported includes:

- Cases meet case definition.
- Suspicious for case definition.
- Demographics:
  - Primary (during general surveillance): name, date of birth, gender, race.
  - Secondary (upon request for intensive surveillance or for Tracking Function): name, address, and phone number; next of kin with phone number and address.
  - Hospital reporting the data (both types of surveillance).
• Medical information/clinical condition
  ✓ Primary: syndrome category (by patient self-reporting form or diagnostic codes), hospitalized level of care (regular, intermediate, or critical care), disposition: hospitalized, treated and released, morgue/funeral home.
  ✓ Secondary: chief complaint, primary symptoms/findings by designated categories, condition: major, moderate, minor, deceased.
• Epidemiology: location (where injury, illness, exposure occurred); event and patient specific details.

General patient surveillance and tracking requirements:

• Rapid response to an event such that general case surveillance may be quickly scaled up to intensive surveillance and individual patient tracking during an event.
• Provide rapid information on the initial, evolving, and final/total size and scope (by patient numbers, locations, and general medical condition) of the incident.
• Provide rapid information for use as measures of effectiveness of the response to the incident.
• The information architecture necessary for this function should have costs (development, implementation, and maintenance) financed from sources outside the regular health/medical system (i.e., no cost to medical and other nonpublic health entities), since this is primarily a public safety function.
• System is capable of running regular tests/exercises for purposes of:
  ✓ Education
  ✓ Training
  ✓ System evaluation.
• Data collection for background epidemiological profiles of planned events (concerts, political gatherings, etc.) and recurring hazards (heat waves, etc.).
• Real-time sharing of information with the corresponding PSAT capability in each jurisdiction in the region.
• System ability to screen out reporting redundancy (i.e., the same patient reported from multiple sources: Emergency Medical Services, initial hospital, follow-on hospital).
• Confidentiality for patients and institutions.
• Capability for receiving reports promptly, per a defined and simple protocol, from:
  ✓ Any alert acute care physician.

✓ Emergency medicine (nurse or physician).
✓ Infectious disease.
✓ Infection control specialists (hospitals or outpatient facilities).
✓ Internal medicine/“hospitalist.”
✓ Critical care specialists (nurse or physician).
✓ Microbiology and hematology laboratories (hospital, outpatient, reference labs).
✓ Pathologists/medical examiners/coroners/funeral home.

• Integrated with all other sub-functions of Incident Epidemiological Profiling so that its data can be combined with that from the other Epidemiological Profiling Sub-functions to form a comprehensive profile.

• Integrated with victims’ family support services and decedents’ family support services to provide rapid reunification of patients with families, providing an effective avenue for search by families trying to locate family members.
• Supports the Management Liaison Function with responses to queries from law enforcement: used for investigating the possibility of criminal action as the etiology for any mass casualty incident.

Rapid Epidemiological Investigation Sub-function

When Incident Epidemiological Profiling identifies an anomaly, this sub-function performs a rapid investigation through further information gathering and analysis (an epidemiological investigation) to determine if the anomaly is a true indication of a health emergency. During a confirmed incident response, this sub-function also reacts to significant changes in surveillance data to determine why the major change has occurred and how this may impact the entire response system. Traditional public health epidemiological investigations occur through individual interviews and a “shoe leather” approach, with public health personnel personally gathering the data. In contrast, this sub-function is designed to employ information systems tied to health practitioners and other health/medical data sources to rapidly (minutes to hours) accumulate the data and information necessary for public health epidemiologists to make an informed determination. This sub-function uses a similar process to investigate sudden changes in an ongoing incident’s parameters.

Requirements:

• Appropriately trained individuals to accomplish above.
• Appropriate staff to conduct investigations.
• Tools, statistical or otherwise, to detect changes in disease patterns.

• Rapid access to a clinical diagnostician who is expert in the medical area relevant to the suspect case. Ideally, this expertise should be an integral component of the Rapid Epidemiological Investigation team: an infectious disease specialist for cases of biological concern, a radiation specialist (radiation oncologist or other) for suspected radiation illness, etc.

**Anomaly Confirmation Process**

Confirmation of public health threats must be rapidly accomplished. Suspected threats (chem, bio, radiological, etc.) must be investigated by appropriate individuals and agencies using adequate confirmatory techniques. A well-defined process must be developed for this purpose.

**Incident Diagnostics Sub-function**

Incident Diagnostics provides the testing capabilities for defining the etiologic agent/s for an incident, for helping to establish the scope of an incident, and for tracking purposes. This may include determining the biological agent causing illness and defining any sensitivities or resistance to patient therapeutics and to cleanup interventions. It includes the capabilities for defining chemical agents in accidental or intentional HAZMAT incidents (including any significant contaminants that could cause problems in addition to the primary agent).

**Requirements:**

• Location and contact method for diagnostic and confirmatory testing must be well-known within the system.

• Established guidelines for clinical specimen collection, packaging, labeling.

• Established requirements for clinical specimen transportation (transportation cannot be the responsibility of the clinical care areas as they will be too busy during response, and they do not possess any inherent capability).

• 24/7/365 capability to receive specimens in the lab facilities.

• Capable of projecting the realistic time periods until confirmatory testing will be completed. The expected testing procedure completion time for critical tests is clearly delineated and disseminated to the Response System so that planning can account for this time factor.

• Established guidelines for reporting of demographic data relevant to each individual specimen.

• Ideal confirmatory testing procedure must have absolute sensitivity and specificity. Since this is usually not the case, reporting of procedure results must always be accompanied by sensitivity, specificity, and other limitations (Figure 7-5) of the individual testing methodology.

• Ability to obtain and provide detailed information on confirmatory testing procedures to the response community (Figure 7-5). **Coordinated** through MH-LIF.

• Ability to provide pertinent information on confirmatory testing procedures to the public. This is **coordinated** with MH-LIF, which **supports** the Management Public Information Function for this task.

• Inherent analytical capability to establish whether an indeterminate outcome of the rapid epidemiological investigation is significant or not. Requires **coordination** with the Incident Epidemiological Profiling leadership.

• Inherent analytical capability and past data to demonstrate that new epidemiological curve is different from baseline data.

• Ensure that proper security is provided for handling of specimens, storage of specimens, and change of custody issues.

• Adequate surge capacity for major incidents is critical. This may be complex and involve several different testing sites or procedures working in close coordination under this sub-function. It includes the ability to utilize established networks such as established hospital labs, commercial reference labs, public health labs, and specialized federal labs to strengthen diagnostic capabilities. Example: Laboratory Response Network access arranged by the state public health laboratory directors, cooperative effort of the FBI, the Association of Public Health Labs, and CDC including guidance for specific sampling procedures established (including collection, processing, and transportation).
Clinical Laboratory Diagnostics Process

This capability accomplishes the diagnostic testing that occurs on *clinical* samples for the purpose of establishing size and scope of an incident and for tracking. Its focus and methodologies must be distinguished from the Patient Diagnostics under the Medical Care Sub-function, which provides information directly relevant to individual patient treatment. Though the two sub-functions may produce overlapping data sets, they possess different objectives. Because of this, any testing used in Incident Profiling must be clearly explained within that context or it may be confused as a Patient Diagnostic tool, which is not always the case (e.g., anthrax nasal swabs in the October 2001 anthrax mail dissemination incident were done for epidemiological purposes, but patients began to perceive them as standard of care for an individual patient evaluation).

Laboratory testing methodologies are a rapidly evolving technology in many areas and very technically specific. Individual testing requirements for specific biological or chemical agents are beyond the scope of this project, and general requirements are listed above.

Adequate general and specialty surge capacity capability is an important consideration. This is complex and may involve coordinating multiple testing sites or procedures. Examples include:

- **Biological incident:**
  - ✓ Level A testing, which can rule *out* potential agents within 48 hours of specimen collection.
  - ✓ Level B testing, which can rule *in* potential agents within 24 hours for culture isolates and 72 hours for specimens.
  - ✓ Level C testing, which can rule *in* and *speciate* potential agents.

- **Chemical events:**
  - ✓ Many tests involve testing the breakdown products of specific chemicals. “Breakdown” can be influenced by multiple environmental factors (e.g., arsenic and lewisite) or take an extraordinarily long time to detect (e.g., urine thiodiglycol and mustard). Reliance on these tests for diagnosing a large number of patients should be limited if possible.

- For radiological events:
  - ✓ Capability to detect heavy metal in blood samples
  - ✓ Capability to evaluate nasal swabs for determination of inhalation of radiological material.

Environmental Lab and “Field ” Diagnostics (& Detection) Process

This includes field tests for detecting or ruling out the presence of dangerous substances. Field procedures and laboratory evaluation of environmental specimens are also part of this vital process. This covers a broad range of capabilities, including chemical agent/s detection and identification, defining or ruling out the presence of radioactive substances, determining biological agents and their environmental characteristics (alterations from naturally occurring organisms, such as the ability of anthrax to become resuspended in air in the Hart Senate Office Building, 2001). It also includes evaluation of planned event venues and prolonged rescue sites (collapsed structure, mass transportation scenes, etc.) for intentional or incidental contaminants that could be harmful to victims or responders.

Environmental testing for presence of dangerous substances must occur in a rapid, coordinated, and controlled fashion, often in the semi-chaotic environment of an immediately post-impact scene (explosive, chemical spill, and others). The current state of environmental evaluation for many chemical and biological agents is imperfect, with many field tests in particular lacking sensitivity, specificity, or both. Environmental lab and “field detector” findings must be considered *preliminary* only. They are rarely definitive, and public reporting of these findings commonly causes major problems. They should not be deployed without clear decision support systems that clearly define findings as preliminary, should provide directions for reporting the findings so that they may be scientifically evaluated and further delineated.

**Requirements:**

- An inherent analytical capability to cross-reference results with the findings of other sub-functions of Incident Epidemiological Profiling. This may present one method for assessing the validity of test results.
- Coordinating the multiple independent entities performing the environmental testing to assure a comprehensive environmental evaluation (e.g., air and surface sampling, evaluation of all at-risk areas, etc.). Both testing and results reporting must be *coordinated* through a single entity (e.g., environmental testing done at Salt Lake City Olympics was coordinated through the state department of health to prevent false positive information from being promulgated). This serves to assist the Incident Profiling Function’s leadership in determining the significance of results and recommendations to management of release to the general public.

Criminal Investigation Diagnostics Process

This addresses forensic evidence and studies that could be
valuable in defining patient needs and the most effective medical interventions. While this information would be obtained essentially through a Liaison Function, it is designated separately to emphasize the importance of having a truly “trusted agent” from the health system that sees all of the criminal investigation data and is able to recognize information that may be useful for Incident Epidemiological Profiling, for medical care of victims, and for the protection of responders. If a liaison relies on receiving just carefully screened information that is presented only because law enforcement thinks it is important, critical data may be overlooked. Conversely, health and medical personnel may interpret and provide medical information to law enforcement that could be critical to the criminal investigation.

**Animal Surveillance Sub-function**

Various hazards may affect animals in addition to human populations, and so surveillance of animal health and health anomalies may aid in event detection, incident profiling, and as measures of effectiveness for response interventions.

**Requirements:**

- Adequate understanding of pertinent hazards and their identifiable effect on animal populations.
- Survey of specialized veterinary services as well as traditional ones (e.g., zoos, animal farms, etc.). It should also include wild-game managers such as fish and game wardens and animal rescue resources.
- The capability to investigate insect reservoirs as needed.
- Surveillance costs, including lab tests, covered by public health or public safety funding, rather than by the owners of the animals or the animal care facilities. This is especially important for specific diseases such as anthrax and plague.
- All data is reported through a centralized collection mechanism.

**Environmental Surveillance Sub-function**

This function oversees testing and monitoring of key environmental indicators for evidence of a hazard to humans. This could include water quality evaluation, radiation monitors, chemical detectors, and other environmental monitoring. While much of this is actually performed by nonmedical and nonhealth entities, direction by health experts may be required to maximize effectiveness of ongoing surveillance, and for developing focused monitoring during an incident.

**Pre-Hospital Care Function**

The Pre-Hospital Care Function establishes an organized patient care scene that allows EMS and operational medical care to provide optimal medical services to the affected population in the pre-hospital setting (Figure 7-6). It encompasses the initial victim interaction with first responders through patient arrival at a definitive care site. EMS and operational medicine assets (medical assets attached to rescue operations such as Special Weapons And Tactics (SWAT), urban search & rescue (US&R) teams, HAZMAT teams) must coordinate closely on scene, and processes to promote this are defined.

**Requirements:**

- An established pre-hospital command system for coordinating pre-hospital medical response.
- Adequate communications to report to health care providers, through a single “disseminator,” that an incident is evolving, and the nature and location of the event. Updated reports are communicated at regular intervals.
- Communication from pre-hospital providers directly to receiving facility for patients being transported to them (coordinated directly with Acute Medical Care Function and supported by Communications and MH-LIF if necessary).
- Standard protocols for pre-hospital triage and treatment, with recognition and explanation provided for jurisdiction-based variances in practice within a region.
- Well-established internal EMS safety component to delineate field hazards and implement personnel protective
policies (coordinated with Medical and Health Management Safety Sub-function). Includes comprehensive and disciplined approach to issues such as responder accountability, personal protective equipment, adequate communications to support emergent evacuation, and other safety contingencies.

• Planning consistent with established experience that many patients (>50% of the total) in a large-scale mass casualty incident (mass casualty incident) are transported to hospitals independent of EMS (i.e., will not interact with Pre-hospital Sub-function before arrival to definitive care). This does not obviate the need for Pre-hospital Function to manage large numbers of critically ill, since the most injured or ill are less likely to self-transport.

Emergency Medical Services Sub-function

This sub-function’s objective is the rapid organization of the on-scene victim population through casualty collection, triage, initial treatment, and organized transport to appropriate medical treatment facilities. It includes the following key processes:

Victim Extraction/Casualty Collection Process

This encompasses the removal of patients from the direct hazard impact areas (if they can’t self-extricate or be guided through commands to evacuate the hazard area) and “collection” into the formal EMS system for triage and distribution to definitive care. Collection may mean a defined area or areas, or may be a “collection” into a rapid triage and distribution to hospitals without moving to a defined holding area. This is in contrast to the traditional Casualty Collection Point (CCP), which is designed to also provide definitive care for more minor injuries and illnesses. CCPs require a large amount of infrastructure and medical support and are rarely indicated in sudden onset incidents. CCPs may have more relevance during planned events, i.e., mass gatherings and slower moving disasters such as prolonged floods. Definitive medical care at CCPs (by disaster medical assistance teams and others) is considered part of the Acute Medical Care Function.

Requirements:

• Appropriate interface with scene managers for efficient integration into the scene response and assessment of risk for medical responders.

• Appropriate understanding of hazard (“hot zone”) areas.

• Appropriate training and level of personal protective equipment (PPE) for responders to enter a “hot zone” if needed.

• Accountability system for responders entering the hazard environment.

• Clearly designated evacuation signals, with preestablished regrouping and accountability points if evacuation occurs.

• Clearly marked areas for victim collection: preferably in an area with access to ambulance/air transport.

  ✓ Protected from elements.
  ✓ Area is “safe” from hazards, including the risk of secondary events.
  ✓ Protected from onlookers and media.

Victim Triage Process

This process rapidly evaluates victims and assigns relative priority for their care and transport. Standardized guidelines and implementation of disaster triage criteria will be implemented, to best match patient needs with available and appropriate medical resources. Factors to consider include the volume of patients, patient conditions and probable medical needs, their probability of survival, and the limitation of care available in the mass-casualty situation.

Requirements of triage system used:

• Simple, easily remembered, understood by all responders, and, ideally, require little physical contact with patients if they are contaminated (i.e., able to be performed visually by responders in PPE).

• Easily repeated, since triage is a single-point evaluation of a dynamic situation and requires re-triage as time elapses until the patient reaches definitive care.

• Accompanied by a documentation system to indicate triage category and to record evaluation findings and interventions performed on the patient. This information/triage tag should remain inseparable from the victim until it is appended to the patient chart in the definitive healthcare facility.

Victim Treatment Process

This consists of basic medical care provided in the pre-hospital phase that is primarily directed toward stabilization of progressive or life-threatening medical conditions.

Requirements:

• Clear and concise treatment protocols for mass casualty events that are easily remembered.

• Limited to basic life-saving interventions.

• Airway management.

• Bleeding management.

MaHIM: Medical and Health Operations Functional Area
• IV hydration.
• Oxygen administration.
• Medication administration, for life-saving interventions.

Response Resource On-Scene Staging Process

This addresses the organization, at the impact scene, of incoming personnel, vehicles, and supplies for use at the scene of a response, and so is differentiated from the Medical and Health Operations Staging Function. This process is an operational imperative in organizing the scene so that arriving resources may be effectively utilized by scene managers, and in assuring that an over-willingness to assist does not complicate operations or compromise safety. As assets arrive on scene, they are registered and held in staging until deployed at the direction of the on-scene manager. On-scene staging maintains accountability of resources at the scene, including personnel moving into any hazard area.

Requirements:
• Operational knowledge of incident response and standard methods for managing on-scene staging.
• An established location that is visible and accessible to incoming resources, and convenient to medical sites within the scene.
• Reliable communication with forward response elements.

Patient Distribution Process

Patient distribution denotes the processes that best match patient medical needs to available medical facilities, and the transportation modalities that accomplish the movement of patients to those healthcare facilities. Similarly, transportation assets should also be matched to patients’ needs, using adequately equipped and trained personnel for seriously injured/ill victims and lower capability transports, including buses, for minor cases.

Requirements:
• Rapid understanding of the casualty profile (even if it is only an initial on-scene assessment) and rapid reporting by hospital receiving capacities across the region, so that the transportation officers can make the most accurate decisions in assigning patients to healthcare facilities.
• Accurate triage category assigned to each patient.
• Ongoing status reporting by hospitals to a central location to provide aggregate up-to-date hospital status for the EMS transport officer throughout the incident. Because of the likelihood of self-referral by many victims who leave the scene without interacting with EMS, hospital casualty loads will be affected independent of EMS transports.
• Casualties with specialty care requirements (from chemicals, radiation, etc.) should be distributed to adequately prepared and protected medical facilities.

Operational Medicine Sub-function

“Operational Medicine” is medical care capability that exists as an integral component of a primarily nonmedical emergency response resource. It includes the medical capabilities integral to SWAT teams, US&R teams, HAZMAT teams, and others. These operational medicine units generally operate directly under the management of their individual response team with a primary mission to care for response team members. They work within the response team’s assigned role and position in the incident management structure, but it is imperative that they closely coordinate with emergency medical services and other operational medicine units under the Pre-Hospital Care Function. They should also coordinate (through the Pre-Hospital Care leadership) with the local hospitals/medical care. Process requirements to achieve this include the following:

• Brief the on-scene EMS manager as to the Operational Medicine team’s capabilities, limitations, and methods of operations (having concise preprinted medical team “fact sheets” for distribution can be very helpful for this purpose). They should receive a similar briefing from EMS, defining the EMS scene management structure, contact methods, patient handoff procedures, and safety issues.
• Establish regular briefing/planning sessions with EMS management and other operational medicine units to coordinate scene medical care and preventive medicine.

Medical Care Function

This function encompasses all facility based, organized medical interventions to meet the medical needs of the affected population (Figure 7-7). “Facilities” could include alternate treatment sites, including definitive care capabilities set up at the site to screen and medically release victims. All victims, however, should be entered into a follow-up registry and receive information on the incident, stress effects, and available resources for physical or psychological concerns. The medical care functional leadership provides coordination of assets and information between medical care resources, and oversees the development and implementation of standardized evaluation and treatment protocols as indicated by the type of injury or illness in the incident.

Acute Medical Care Sub-function

This sub-function encompasses the traditional medical
evaluation and treatment capabilities for injury and illness. For this function to meet the medical needs of the incident, it must have an adequate capability for both surge capacity (further explained in Chapter 9) and specialized medical care. This requires effective internal coordination of its sub-functions and processes, and integration into the support functions delineated in this mass casualty incident response model. The Acute Medical Care sub-function contains two major components: non hospital-based care and emergency and hospitalized care.

**Non Hospital-Based Care**

Delivery of healthcare comprised of outpatient services, physicians’ offices, and practitioners or services not encompassed within a “hospital” setting.

**Emergency Department & Hospitalized Care**

The role of this function is the delivery of patient care in the emergency department and further treatment in the hospital as required. This type of care will usually be delivered in the healthcare facility setting and, as such, the hospital emergency operations plans are intended to promote optimal surge capacity: the ability to provide medical care to many more patients than usual, or to provide very specialized care for patients urgently requiring it. This function also encompasses any medical care capability established during the incident in nontraditional “alternate treatment facility.”

The following list outlines general requirements for healthcare facilities responding to mass casualty events. The list is not a complete compilation of mass casualty requirements for healthcare facility emergency operations plans (EOP)s. Some requirements (e.g., patient decontamination) are listed under other functions though these capabilities may be established in the healthcare facility setting. Additionally, the stated requirements focus upon those necessary for hospitals to integrate into and be supported by the emergency response community.

**Requirements for healthcare facilities:**

- A clearly defined hospital emergency operations plan, with a defined management structure including roles and lines of authority.
  - Familiar to all participants, through all levels of hospital personnel (i.e., adequate “penetration” of the emergency operations training).
  - Structured management system that promotes easy integration with community response.
  - Provides for relief of key personnel during extended incidents.
  - Provides for graduated levels of response (advisory, alert, activation) that are coordinated with the information systems established by Planning Function, so hospital emergency operations can begin to mobilize without incurring all the expense and disruption of a full-scale activation.
  - Incorporates “plain speak” as much as possible. Otherwise, confusion may result within the hospital or between the hospital and the community.
  - Designates an established, equipped area for a hospital management (“command”) post, with a back-up/alternative site.

- Effective hospital mutual aid plans, which are formal arrangements between healthcare facilities to support one another during times of crises. One template that established the District of Columbia Hospital Association Memorandum of Understanding, is now recommended as a national template by the American Hospital Association. Agreements should specify the following:
  - Communication method between healthcare facilities.
  - How formal requests for assistance are made.
  - Types of assistance that can be provided:
    - Hospital capacity (for transfer of patients).
    - Supplies, pharmaceuticals, and equipment to deploy to another hospital.
    - Credentialled personnel sent from one hospital to another (and how credentialing will occur in the receiving facility).
✓ How transportation of supplies, personnel, or patients will occur.
✓ Financial reimbursement for supplies, personnel, or services. In case of patients transferred to another facility, third-party payors in agreement to continue reimbursement.
✓ Liability for loaned personnel and for donated supplies and equipment.

• Effective communications plan internal to the healthcare facility
  ✓ Alert, advisory, activation notifications coordinated and consistent with Information Management System established by the MaHIM System.
  ✓ Internal notification reaches intended parties within the facility (e.g., in case of a public address system, the speakers reach all areas of hospital, including the operating rooms and other hard-to-reach areas), with confirmation provided from critical areas to the management post.
  ✓ Ability to communicate with off-duty staff and other staff not in the healthcare facility to provide situation reports, assess availability, and provide work assignments for recall and other tasks. Confirmatory methods for receipt of notification and that the notified staff member is taking the requested action.
  ✓ Backup communication systems to use in case the phone system is overloaded — e.g., hard-line disaster “shadow” phone system with direct call functions.
  ✓ Regular staff updates during each operational period and whenever major changes occur (operational briefing and change in event notification). Requires the support of Planning Functional Area to provide updated information that can be passed to hospital management and staff.

• Effective Communications external to the healthcare facility:
  ✓ A designated spokesperson to interface with the media. Closely coordinates with MaHIM Public Information Function to prevent promulgation of conflicting messages. Media is managed in areas well away from clinical treatment areas.
  ✓ All healthcare facilities in a jurisdiction should be reporting information and requests through an Acute Medical Care information node that feeds a composite data set to the Operations Functional Area and to the MH-LIF. In many instances, it is desirable that MH-LIF does not coordinate all individual data from each individual healthcare facility. The D.C. Hospital Association Mutual Aid Radio System (HMARS) provides an example of an information node that consolidates information from participating hospitals, including available patient capacity, composite patient counts, and other parameters.

• Security plan: each facility has this responsibility within its individual EOP. Additional capacity is coordinated with the Hazard/Threat/Disease containment Sub-function and Border Functions such as scene security/perimeter control, traffic control, and law enforcement. Requirements include:
  ✓ Controlled access points to facility.
  ✓ Identification (“badging”) for entry into facility.
  ✓ Securing for personal belongings of victims.

• Traffic control/parking for:
  ✓ Ambulances and other patient transport vehicles (coordinated with pre-hospital function).
  ✓ Other response vehicles.
  ✓ Responding staff members’ vehicles.
  ✓ Victim’s vehicles (may require hospital personnel to move the vehicles).
  ✓ Officials and VIPs.

• Crowd control: methods of directing large numbers of people to holding areas for treatment or delivery of services (e.g., family support services).
  ✓ Lock down of facility and effective perimeter control.
  ✓ Threats: ability to evaluate and manage threats directed at facility, including bomb threats.

• Adequate decontamination of patients prior to entry to facility (supported by Victim Decontamination Process).

• Staff management.
  ✓ Recall of off-duty personnel in an organized manner, including staging personnel for work assignments on follow-on shifts.
  ✓ Accountability: clear accountability system that tracks all personnel (clinical and nonclinical) and their duties performed during the response, to aid in determining exposure issues and financial reimbursement.
  ✓ Reporting procedures clearly defined for arriving personnel: where they should report (to normal work station versus personnel pool), what they should bring for identification, any transportation issues for their commute to work (traffic jams, crossing security lines).
Supervisory procedures and task sheets (operational checklists) for staff who may be working in nonroutine capacities during the incident.

Defined methods for utilizing solicited and unsolicited volunteers, coordinated with Medical Staging and Logistics.

Credentialing: facility bylaws and procedures that allow rapid credentialing of requested health professionals. Mutual aid systems should stipulate that only credentialed personnel are sent to fill requests of another healthcare facility, so that the receiving facility is accepting the credentialing of another accredited hospital facility. Variances should be cleared by the receiving hospital and coordinated with the Regulatory Compliance Sub-function of the Administration and Finance Functional Area.

Personnel Support (clinical and nonclinical):

General logistics.

Prophylaxis and immunization: established plan of distribution of prophylaxis, immunization, medications for staff and potentially for family members.

Family Assistance: established capability to support needs of family members of personnel requested to work during response (e.g., day care, transportation, etc.).

Incident stress intervention: an established capability to identify and respond to personnel stress during prolonged or particularly difficult responses. Supported by Logistics Preventive Medicine Sub-function.

Physical wellbeing: system to address physical injuries or illnesses encumbered during response. In some cases, this may involve registering for physical exam and entry into a long-term surveillance study after response — e.g., HAZMAT and contagious biological incidents.

Supplies management:

Accountability and tracking of needs versus availability: supported by the Event Epidemiology Projection and the MH-LIF.

Maintenance of an adequate reserve of equipment and supplies for ongoing and contingency operations, specifically assuring that multiple hospitals are not counting the same reserve held by a common supplier.

Coordination with Resource Tracking Sub-function.

Vendors: preestablished contingency contracts and emergency inventory acquisition. This includes arrangement for extra linens, food services, potable water, generators and batteries, and other basic goods and services. Coordinated across a region by Logistics and through regional management coordination.

Pharmacy:

- Linkage to the National Pharmaceutical Stockpile.
- Ability to receive and manage outside resources.

Blood bank — surge capacity for processing requests, accomplishing cross-match, and delivering blood to designated centers.

Patient care:

Patient care areas/capacities: processes to maximize the use of regular patient care capacity (such as emptying the emergency department of admitted patients), and establishment of alternative areas of adequate care (such as transitioning critical patients to post-anesthesia care units, and clinical procedures areas that can support critical care services). Accurate triage of arriving patients to appropriate areas of care is a vital process in accomplishing this objective. Engineered (managed) degradation of services should be incorporated into the patient care capacity planning. Delineating managed degradation strategies (see Chapter 9) that maintain the highest available level of care when capacity is exceeded is important: the use of hallways for patient care, the use of nontraditional personnel for patient care services (for example, paramedics to provide patient monitoring in the hospitals), the use of medical students to provide prolonged bag ventilation are all options to prevent catastrophic failure of patient care services when planned capacity is exceeded.

Patient tracking: adequate method of tracking patients through the system — internally within the healthcare facility and reporting externally to a medical care information node that conveys composite information to PSAT and forwarding to MH-LIF.

Patient privacy: capability to retain patient privacy as much as possible.

Lab and radiology (see patient diagnostics).

Ability to provide acute psychological interventions once diagnosed with mental illness — preferably separate from clinical treatment areas if patient has been cleared of physical illness or injury.

Morgue services: surge capacity should be integrated with the medical examiner’s emergency operations plan, the Mass Fatality Function, and law enforcement investigators.

Discharge services: ability to rapidly identify inpatients who are stable for discharge, and expedite...
discharge procedures while maintaining patient safety and understanding. This should be coordinated with the Post-acute Medical Care Sub-function.

• Plant operations:
  ✓ Air intake: ability to close intake to buildings or selected areas of the buildings to provide shelter in place.
  ✓ Isolation of parts of building (e.g., smoke compartments).
  ✓ Structural evaluation: supported by Logistics, Structural Integrity Evaluation Processes.
  ✓ Waste disposal: capability to adequately dispose of increased waste load from the increased patient load. Supported by Hazard/Threat containment and Logistics.
  ✓ Utilities: adequate backup systems.

• Infection control:
  ✓ Isolation capabilities
  ✓ Control of airflow
  ✓ Waste disposal.

• Facility evacuation:
  ✓ “Horizontal” evacuation for emergent threats and for temporary situations to adjoining areas on same floors.
  ✓ “Vertical” movement of patients and staff to lower floors and/or out of the building evacuation of facility.
  ✓ Accountability of staff and patients includes:
    ❑ Clinical staff: RNs and other clinical staff, medical students, interns and residents, private physicians, other attending physicians, and non-clinical staff.
  ✓ Patient record retrieval and accompanying patient to the next medical destination.
  ✓ Routes evaluated for continued safety during the evacuation.
  ✓ Assembly points outside facility – for accountability and further instruction.
  ✓ Relocation to new facilities, supported by mutual aid, Acute Medical Care Function, and Logistics Transportation Function.

• Finance/administration (supported by the Finance/Administration Functional Area):
  ✓ Financial impact tracking, both in expenditures and in loss of business revenue.
  ✓ Cost recovery.

✓ Continuity of Operations Plans for the healthcare facility.
✓ Adherence to regulations, or variances obtained. A sampling of applicable regulatory entities includes OSHA, HIPAA, EMTALA, HAZWOPER and EPA, HCFA, JCAHO (acronyms defined in Appendix D).

• Personnel family support (supported by the Logistics Personnel Family Support Sub-function).

Post-acute Medical Care Sub-function

This encompasses the continued medical care services for patients past the acute care/hospitalization phase. This includes chronic care and/or post-hospitalization follow-up medical evaluation and treatment.

Requirements:

• Adequate facilities and resources for appropriate follow-on care.
  ✓ Chronic care facilities for those who require it.
  ✓ Home nursing and supportive services.

• Home support:
  ✓ Home IV therapy support
  ✓ Home respiratory therapy services
  ✓ Rehabilitation services
  ✓ Physical therapy
  ✓ Occupational therapy
  ✓ Speech therapy.

• All victims should be entered into a patient registry:
  ✓ Capability for tracking the long-term health effects of the hazard impact, including epidemiological analyses of patient reports.
  ✓ Capability to notify patients concerning a change in periodic evaluation and/or in treatment.
  ✓ A patient-reporting mechanism for new health concerns, possible side effects from treatment, or other problems.
  ✓ A medium to provide further information on incident details, stress effects, and available resources for physical and psychological concerns.

• Outreach to the medically frail:
  ✓ Identification and assessment to assure continued health support for the medically frail populations (the elderly, impaired, disabled, homebound, and others).
This includes ongoing home health services, meal delivery, and assistance with activities of daily living.

✓ Assuring community access to chronic medical services, such as chronic dialysis patients, chemotherapy and radiation services for oncology patients.

**Patient Diagnostics Sub-function**

This encompasses diagnostic services necessary to establish (or rule out) a diagnosis and monitor response to therapy for individual incident patients and their medical conditions. It also includes a capability to develop a standardized patient diagnostic strategy. This differs from the diagnostics that are focused upon establishing the incident etiology and defining the epidemiological characteristics. Patient diagnostics are provided by hospital and reference laboratories, radiological services, and other diagnostic modalities. A critical component of this sub-function’s activity could be defining simple and/or rapid diagnostic criteria, and patient response parameters, that could reduce or eliminate the need for expensive, time-consuming, or reference-lab-only diagnostics. This may be a critical component of adequate diagnostic surge capacity: defining the strategy used to determine what diagnostic tests are necessary for the patient cohort. Many unusual microbes and chemical hazards are currently diagnosed only through expensive, time-consuming, and poorly available lab tests. If a large number of patients need to be diagnosed or ruled out, this could become very problematic. A more effective strategy may be to determine a constellation of readily available, rapid lab tests to substitute for the single slow procedure. Another strategy that may be employed is finding a simple test to reliably rule out a disease, rather than primarily to diagnose it. This could then be used as a screening tool to evaluate the large numbers of concerned (“worried”) but low-risk patients. Patients who do not pass this screening could be subjected to the more extensive diagnostic procedure. The goal may optimally be to develop a reliable patient evaluation protocol that considers risk based upon the patient’s history, physical findings, diagnostic testing (including radiology), and symptom course to develop (or rule out) a diagnosis.

**Requirements:**

- Diagnostic oversight to manage and prioritize diagnostic/interventional requests in the face of excessive requests.
- Provision for surge capacity in diagnostic testing: processing of requests and specimens, conduction of the tests, recording and transmitting of results, maintenance of quality control.
- Defines what constitutes positive versus suspicious test finding (e.g., widened mediastinum on an X-ray is “suspicious” for inhalational anthrax).
- Provision of clear instructions to clinical areas for specimen collection, handling, labeling, storage, and transport.
- Provision of understanding to clinical areas of limitations of tests being used, including turnaround times for testing.
- Reporting mechanism is coordinated with PSAT so that significant test result can be linked to patient’s location and reported there.
- System for transporting specimens and out-processing of more definitive testing and obtaining additional surge capacity.
- Transport containers and handling protocols for delivery of specimens to specialized state or federal labs.
- Evidence preservation: use of appropriate techniques for preserving possible evidence at a medical facility.

**Medical Evacuation/Inter-Facility Transport Sub-function**

This sub-function provides the capability to safely and expeditiously transfer patients from one treatment location to another. Movement of patients may be required as a result of the patient load exceeding a facility’s capacity and/or lack of specialty care, or because of the hazard impact on the facility itself (including staff). It also includes the movement of stable non-incident patients out of the impacted area for the purposes of either maintaining their level of care (if the medical infrastructure was compromised) or freeing capacity for medical care of the victims. In the latter case, the hospital must obtain voluntary consent from patients before arrangement for transfers is made.

**Requirements:**

- Identification of adequate receiving facilities.
- Notification and acceptance of patient by the receiving facility.
- Patient numbers, types, and demographic information conveyed.
- Adequate infection control procedures in the event of infectious biologic agent.
- Adequate prevention of cross-contamination procedures in the event the patient is not able to be fully decontaminated (i.e., organophosphate ingestion).
- Safe, reliable transportation vehicle/s with adequate medical support systems.
- Reporting mechanism for events during transport.
**Mental Health Function**

This function provides mental health counseling for injured and ill victims, the “concerned, possibly exposed” population, the remaining at-risk population, and the general public (Figure 7-8). In addition to providing individual counseling services, it coordinates closely with public information and with public warning/alerts/education to provide strategic mental health preventive measures through targeted messages to the at-risk sub-populations. It also coordinates closely with the Responder Medical Care Sub-function (Logistics), which provides mental health assistance to all incident personnel. Patients requiring acute and chronic psychiatric interventions are addressed through Operations Medical Care Function. The leadership of the Mental Health Function assures that all of these activities are coordinated and that consistent messages are being provided.

**Population Mental Health Interventions Sub-function**

This sub-function oversees activities designed to ameliorate stress reactions from the general population in the affected area and beyond. Much of this activity occurs through coordination with the Management Public Information Function, since population-based interventions depend upon providing mental health information targeted to the general or specific sub-populations.

**Requirements:**

- Clear explanation of responder efforts and objectives with the intent of developing and maintaining public “trust” in the local/state/federal government response efforts.
- Address the phenomenon of “terror” caused by terrorism through effective fear management:
  - Since a direct relationship exists between the lack of knowledge about potential threat and increased fear from that threat or hazard, efforts must be designed to provide extensive knowledge in a non-technical format to both define the threat and provide reasonable personal interventions.
  - Provide an understanding of what the authorities know and, just as importantly, what is not known and how that is being addressed. This should be publicized early and updated often.
  - The reasoning behind response actions may need an explanation to prevent alarming the public — if major mobilization occurs primarily because of caution rather than an identified threat, this should be explained clearly.
  - Displaying a unified and consistent response capability, demonstrated by consistent messages and information, can decrease much of any fear.
  - Provide direction for the public to reliable sources for more in-depth knowledge (sources that have been examined for validity and for consistency with the incident response message, such as specific web sites, texts, etc.)
  - Educate the public about stress and its manifestations.
  - Provide a clear description to the public that distress will be experienced by a significant percent of the population, that it is expected, and that it can have associated somatic symptoms that may warrant evaluation but may not require treatment as an exposure to agent would.
  - Provide recommendations for constructive avenues for the population to pursue if they wish to help. If productive volunteer task assignments can be made, provide recommendations after coordinating with unsolicited volunteer processing in Logistics.
  - The mental health problems experienced by disaster survivors are often stress-induced symptoms precipitated by countless actual personal challenges. Thus, finding ways to meet the needs that stem from the immediate and practical problems of the hazard impact is helpful (Myers 1994):
    - **✓** Publicize information assisting public to “set priorities.”
    - **✓** Information regarding financial services.
    - **✓** Information regarding transportation.
    - **✓** Information regarding employment.
Information regarding infrastructure status.

- An important issue for mental health of populations is that the actual and perceived level of care is being devoted appropriately (i.e., equally) to all segments of the affected population.
- Develop messages for Public Information Function that target significant mental health issues for particular segments of the community.
  - Ethnic groups.
  - Various age groups and/or their parents (the very young, elementary versus middle versus high school populations, etc.)
  - Trade groups
  - Religious leaders
- If reasonable and possible given the situation, messages should convey to the public the importance of maintaining daily activities.

**Victim Mental Health Intervention Sub-function**

For the purpose of this sub-function, a victim is defined as any person with obvious injury or illness as a direct result of the event OR any person with perceived injury or illness as a result of the event. This group therefore includes persons who are concerned and potentially exposed in cases of potential contamination with a chemical, biological, or radiological agent.

**Requirements:**

- Clear, nontechnical explanation of why patient is receiving a particular treatment (e.g., why decontamination is being performed, why a particular prophylaxis is being administered, etc.).
- Preprinted materials explaining
  - Normal feelings after a potential exposure or tragedy
  - Psychosomatic feelings
  - Exact explanation of the agent/event
  - Where to obtain follow up assistance/psychological assistance
- Capability to identify when psychological/psychiatric intervention is required
- Recognition that some may not desire mental health intervention immediately post-event (should always be voluntary).
- Effective application of social services support and other available mental health assistance.

**Victims’ Family Assistance Services Sub-function**

This sub-function assists in identifying the status and location of victims for their families, and provides other specific information and support.

- Assistance with locating loved ones, accomplished through coordination with PSAT.
- Ability to assure confidentiality for the victims as well as those seeking news of loved ones.
- Ability to verify that queries are coming from valid family member.
- Surge capacity to handle incoming calls/emails/visits from large numbers of families.
- Ability to publicize the services so families are aware of the services and not visiting multiple treatment areas in search of loved ones. Requires coordination with the Public Information Function.
- Capable of documenting information from families so that family can be rapidly located if the missing are located or other information suddenly develops.
- Capability (with additional staff) to handle upset families or unusual requests. May require support from mental health or psychiatric (acute care medicine) services.
- Targeted families may require the services of Decedents’ Family Assistance Services (explained later in this chapter). Close coordination between these sub-functions is important.

**Hazard/Threat/Disease Containment Function**

This function intervenes to control, arrest, or minimize the threat of chemical, biological, radiation, and other hazards (Figure 7-9). It is the most important function in directly addressing two of the three general medical and health objectives in mass casualty response:

1. Reduce hazard exposure: avoid or minimize the hazard exposure to patients and the population.
2. Increase hazard resistance: maximize patient and population resistance to the hazard impact.

Though some activities listed here (e.g., environmental decontamination and cleanup of hazards) may not be a direct function of the Medical and Health Response System, critical input into these activities from the health and medical communities may be required. The requirements for this input are listed here.

**Public Health Population Based Interventions Sub-function**

Interventions directed toward human populations rather than individual patients, with the goal of minimizing the hazard exposure and impact.
Mass (or Targeted) Prophylaxis/Immunization

Mass prophylaxis and/or mass immunization/vaccination as indicated. It is supported by Logistics’ Supplies and Equipment Support Function, which acquires and maintains adequate supplies of pharmaceutical and medical equipment, including shipments from the National Pharmaceutical Stockpile (NPS). This sub-function implements distribution of prophylactic medications and immunizations.

Requirements:

- Adequate distribution sites.
- Located near hospitals, so that ill patients may be transported easily if they come first to the medication centers, and so hospitals may safely and easily divert patients without symptoms who are only seeking medications (if their resource capacity is challenged). The facility locations should be selected with significant input from the hospital experts.
- Choice of location should not pose physical or psychological barriers for potential users of the space in the future (i.e., classroom space and student areas of schools should be avoided, since large numbers of potentially infected persons arriving for prophylaxis or immunization may affect future use of the space and delay the community return to normalcy).

- Ease of access: parking, proximity to mass transit, accessible to pedestrian traffic (wheelchair ramps, etc.).
- Adequate space for rapid patient processing. Proper routing of persons (entrance separate from exit) to promote patient flow. Adequate layout to allow privacy if private issues are indicated by individuals.
- Environmental control.
- Support systems: adequate phones, lights, heat and/or air conditioning, etc.
- Medical supplies immediately available for treating allergic reaction, or for stabilizing sick patient who arrives at delivery center for treatment.
- Storage space (and conditions) for items to be distributed. Capable of 24-hour operations.
- Support facilities for personnel working on site (kitchen, rest area, etc.).
- Information provided to those waiting for service (handouts about the process and about the incident).
- Adequate staff:
  ✓ Properly licensed and certified personnel.
  ✓ Protection of staff – whether by immunization, prophylaxis, PPE, and/or facility adaptations (air flow changes and other interventions).
- Adequate supplies, including linkage with the NPS.
- Surge supplies obtained from local stocks, then state and federal through the NPS. Supported by Logistics.
- Adequate process for dispensing:
  ✓ Medications packaged in individual patient course dosing (packet provides enough medication for one patient to take the recommended course of medication).
  ✓ Instructions in patients primary language given with medication or immunization:
    ❑ Exactly what they protect against
    ❑ Dosing
    ❑ Potential side effects
    ❑ Contraindications
    ❑ Resources if concerns about treatment arise.
- Adequate security: through internal resources, coordination with law enforcement, and supported by
Logistics, which is also supporting the other general facility requirements of the medication distribution centers.

• Adequate public information: times of operations, population expected at that facility. Requires coordination with Public Information.

• Adequate procedures for disposal of bio-waste. Supported by Logistics.

• Adequate record keeping to allow tracking of persons who have received medication/vaccination (and to prevent individuals from obtaining excessive medication). Coordinate with PSAT for long-term surveillance of those given prophylaxis for efficacy and for adverse reaction monitoring.

Isolation Processes

This capability defines and oversees implementation of isolation strategy to prevent spread of disease or contamination, not primarily to prevent the movement of people. It includes strategies to separate persons capable of transmitting the agent from the rest of the population until agent is removed from victim or patient is no longer capable of transmitting the agent. Full isolation is rarely indicated. Respiratory, body secretions, contact, and reverse isolation are options that are less burdensome, realistic interventions that can be effectively implemented across a community through education of the public and healthcare providers.

Requirements:

• First and foremost, the actual threat of transmission of an agent must be identified as posing a realistic risk (for example, these requirements are not indicated for a person with inhalational anthrax).

• Least restrictive methods used: may be recommending and/or providing protective equipment to close contacts: respiratory isolation (masks), contact isolation (gowns, gloves, face shields), etc.

• Isolation of an individual:
  ✓ Must have identified symptom complex or identified agent on/in him or her.
  ✓ Explanation provided to the individual as to why actions are being taken and the expected duration of isolation.
  ✓ Adequate isolation facilities provided:
    ○ Security
    ○ Adequate infrastructure
  ✓ Environmental control.
  ✓ Food, water, sanitation facilities.
  ✓ Communication capabilities to outside isolation location:

  ✓ Access to legal representation (if appropriate).
  ✓ Adequate medical care.
  ✓ Prevention of groups of individuals from transmitting an agent (either infected or potentially infected).
  ✓ Concept of least restrictive methods employed first.

✓ Voluntary actions proposed to groups through education and self-interest (especially large groups):
  ○ Avoid close contacts and large groups.
  ○ Stay at home.
  ○ Other recommendations.

✓ Involuntary actions:
  ○ Restriction of places of communal gathering.
  ○ Must be applied equally across community, applying to all facilities in all affected areas (i.e., all areas of mass gatherings must be treated equally based upon risk).
  ○ Restriction of mass transportation.

✓ Must provide for adequate infrastructure support of affected area:
  ○ Food, water, sanitation, hygiene, energy, housing.
  ○ Adequate medical care.
  ○ Access to legal representation if indicated.
  ○ Must address issues of special populations such as transient populations (homeless, tourists, etc.).

• Public education campaign to prevent scapegoating of affected population after isolation is instituted.

Evacuation Strategies Sub-function

This sub-function develops recommended health and medicine based strategies for limiting population exposure to the hazard through geographic interventions — sheltering in place or directed mass evacuation. The actual implementation of any evacuation is generally through nonmedical functions. Recommendations are processed through the Management Function (which then coordinates with jurisdictional and regional authorities) for approval; implemented by the general Emergency Response Function responsible for evacuation and/or sheltering in place. This function may also be tasked with developing strategy recommendations for directing an ill population to evacuate from the affected area and where to seek medical evaluation and care outside the affected geographic area.
Requirements for evacuation or shelter-in-place strategies:

- Decision to evacuate or shelter in place is complex but must be based upon the medical threat posed by the agents and other event characteristics. This may require rapid access to outside expert advice, with support by the MH-LIFs Hazard-Related Expert Information. Examples:
  - Simple: impending hurricane
  - Complex: disseminated chemical hazard. Short-term exposure while sheltering-in-place may be less problematic than the exposure from a lengthy evacuation through a contaminated area.
- Adequate warning and explanation. Supported by Public Warning, Alerts, & Public Education.
- Instructions provided as to how to evacuate (routes, transportation, etc.) or shelter (tape windows, shut off air intake, stay in house, etc.).
- Prediction of how long shelter in place may be required.
- Instructions for how long “all safe” will be made.
- Instructions on what to do when “all safe” is announced.
- Health and medical considerations during evacuation:
  - Medical support for special needs populations (nursing home geriatrics, etc.).
  - Environmental conditions along evacuation routes
  - Destinations for evacuees
    - Adequate infrastructure
    - Adequate access to medical care
  - Timing of the evacuation
    - Adequate warning
  - Communication – medical message added
    - Bring prescription medications
    - Bring medical aids, dialysate, prosthetics, etc.
- Hazard containment (chemical, biological, radiological) during evacuation.
- Capable of screening for potential hazards among evacuees if indicated.
- Capable of dealing with contaminated evacuee.

Public Warnings, Alerts, & Public Education Sub-function

The containment of hazards and threats is contingent upon clear instructions provided to the public as to how to protect themselves. Mass education may explain disease parameters (incubation period, mode of transmission, initial signs/symptoms), where to be evaluated for possible prodromal symptoms, how to prevent spread (barrier protection, fomites cleansing, insect repellent, treatment regimens, etc.). This sub-function develops the medical portion of the public message that shapes population behavior. It requires close coordination with the Public Information Function.

Requirements:

- Information to be released to public should be released to health and medical community first.
- Warnings-alerts.
  - Not fatalistic.
  - Threat clearly defined.
  - Signs and symptoms defined.
- Actions defined that prevent spread of hazard and positive benefits for individuals.
- When to expect the next update, and how to become informed about unexpected changes (radio stations, public health department web sites, and others).
- Multi-lingual and special needs population issues addressed.
- Public education:
  - Expected health and medical consequences of certain actions.
  - Expected medical benefit of certain actions.

Victim Decontamination Process

Adequate decontamine of patients assures that biological, chemical, and radiological agents are minimized to the victims themselves, and that contamination is not spread to other people or to “clean” areas. Decontamination can occur immediately in the “field” (ideally) or at areas of definitive care (e.g., healthcare facilities). “Hasty decon” removes as much contaminant as possible in a rapid fashion but without assuring complete decontamination (due to inadequate time, available water, or other limitations). “Definitive decon” refers to the removal of all contaminant that could continue to pose a threat to the victim or to others. Patients should undergo definitive decon before being admitted into a healthcare facility.

Requirements for definitive decontamination capability include:

- Adequate decision support tool to rapidly decide whether decontamination needs to occur. Must be prepared to make decision without access to real-time test results confirming or ruling out the presence of an agent, and may be based
primarily on patient symptomatology, event characteristics, or credible threat. A conservative approach is necessary: if unable to realistically rule out the presence of threat, proceed with decontamination.

- Placement of victims in area not capable of cross contaminating until definitive decon occurs.
- Protection of responders.
- PPE – appropriate level of personal protection.
  ✓ Appropriate training provided pre-event for use of PPE (Macintyre 2000).
  ✓ Equipment fit testing if required.
- Decon Safety Sub-function: sole responsibility is to monitor health and safety of responders during decontamination operations.
- Post-event monitoring: responders with any exposure to contaminated victims should receive a post-event physical examination and entry into a long-term surveillance registry.
- Security: adequate security provided to secure decontamination site, to prevent unauthorized entry, to assist with movement/placement of victims, and to secure personal belongings of victims. Requires security personnel trained in and equipped with PPE.
- Decontamination facility:
  ✓ Protection from elements.
  ✓ Separate from receiving facility.
  ✓ Fixed or semi-fixed preferred: allows for quicker response time in the event of the arrival of unannounced patients.
  ✓ Visual control of victims at all times by decon staff, but rigorous protection from onlookers (including media and hospital staff).
  ✓ Provision to keep parents and young children together.
  ✓ Provision for special needs population
  ✓ Segregation of the sexes.
  ✓ Nonslip surfaces.
  ✓ Adequate drainage to prevent walking through runoff.
  ✓ Lighting for nighttime operations. All electrical appliances on ground fault circuits.
  ✓ Runoff: controlled but usually can be disposed in drains running to sewage treatment plants (preferable to storm drain going directly into waterways). Should provide notification to local water authorities at time of event (Macintyre 2000).
- Explanation provided to victims: adequate instructions provided to patients describing the decontamination process and why it is being performed.
- Patient tracking: initiated at first contact with patient. Simple methods work best and include log with name and assigned number. Patient number attached to plastic necklace and same number placed on belonging bags.
- Monitoring and detection: as noted above, detection device may not be available, especially in the hospital setting (except for radiation detection). Current technology is such that most detection devices are not reliable enough to exclude presence of agent or technically too complex to maintain and train on or too expensive.
- Patient triage: initial triage of patients must be conducted without physical contact with patient (the responders are wearing PPE and so are unable to obtain exact vital sign measurements). In the event of large numbers of patients, it may be beneficial as well to conduct rapid visual triage to determine priority of decontamination and access to treatment.
- Disrobing: requires adequate space and privacy from onlookers, not from same sex victims.
- Patient belongings: demonstrable, adequate protection provided for patient belongings. Should also be able to maintain chain of custody as potential perpetrator may present for care. Personal belongings secured in area preventing cross contamination until final disposition can be made. Potentially returned to victims if determined to have minimal or no contamination. If seriously contaminated, priority placed on retaining patient valuables (separated from clothing at time of decontamination and bagged separately) for later decontamination, and disposal of clothing. Patients given clear instructions as to the hazard threat and why this is occurring. Attention given to weapons collection.
- Acute medical care available throughout: a limited cache of medical equipment must be available for adequately trained personnel in PPE to stabilize acutely injured or ill patient. Interventions should be quick and limited (difficult to perform in PPE). The priority is to accomplish decontamination before providing definitive treatment.
- Definitive medical care: after completion of decontamination, definitive care is provided. May occur initially without definitive identification of agent, based on symptomatology. Coordinated with MH-LIF to obtain information as rapidly as possible from the Incident Epidemiological Profiling Function (including Incident Diagnostics).
Special treatment needs (e.g., antidotes, medical devices such as endotracheal tubes) supported by Logistics.

Environmental Based Interventions Sub-function

Environment based interventions involve actions taken to limit environmental spread, dispose of the agent, and effect site cleanup. Although much of cleanup is nonmedical, this sub-function’s responsibility is to promote optimal safety and efficacy of the environment based interventions: minimizing health hazards during the cleanup operations (dust, smoke, etc.), assuring cleanup has eliminated remaining health hazards, and other activities.

Environmental Decontamination & Cleanup of Hazard

This process encompasses cleanup of hazards present in the environment so that the area is rendered safe for human re-occupation.

Related medical requirements:

• Medical implications of the decontaminating agent/s must be considered and analyzed prior to use.

• Protection of the population near the hazard site during cleanup.

• Protection of workers in area to be decontaminated and physical monitoring of personnel coordinated with Logistics’ Preventive Medicine Sub-function.

• Verification activities to determine that no significant contaminant remains — coordinate with Incident Diagnostics. Once completed, requires clear message to the public as to how certification of cleanliness had been made and a demonstrable evidence of cleanliness. Coordinate message with Public Information Function.

• Program in place to monitor illness/injury/complaints of persons reentering environment after cleanup. Reinvestigation required to determine if contaminant still present or if decontaminant residue posing a risk.

• Prophylaxis/immunization of workers may be required. This would be coordinated through Logistics’ Preventive Medicine Sub-function.

Food, Water & Sanitary Inspection

These processes oversee the evaluation of site contamination effects until it is determined that they are resolved.

Animal & Vector Control

This activity addresses human health considerations in the processes developed for animal and/or insect/vector suppression for disease containment. Efficacy and the hazards from suppression itself (insecticides, controlled hunts, etc.) may be issues.

Waste Disposal

This activity addresses human health considerations in the processes used for hazardous waste disposal:

• Treatment, storage, disposal cause no further impact on the population.

• Monitoring is in place to assure this and to reassure the public if indicated: coordinated with Public Information Function.

Hazard Site Security

Though not primarily the responsibility of the Medical Response System, medical interface and input (distance of perimeters, length of toxin exposures, and other medical considerations) may become important in establishing adequate site security for containing the health effects on victims, uninvited “rescuers,” and responders. Coordinate with general emergency response functions such as Scene Security/Perimeter Control to provide these services.

Mass Fatality Care Function

The objective of this function is to address the complex requirements of processing fatalities, (deceased victims) following a mass casualty incident, or smaller numbers of unusually contaminated bodies (Figure 7-10). Attention must be paid to such critical issues of preventing cross contamination from contaminated bodies, cataloguing and protection of personal items, chain of custody issues, as well as respect for the cultural traditions of certain groups. While search, extrication, and resuscitation of the living take precedence over the recovery of and processing of remains, this is a very important function to accomplish correctly, in order to assure adequate forensic information and to promote family and community healing. The statutory duty of the medical

Figure 7-10
examiner or coroner does not change when victims are multiple, but the overall process commonly must adapt (Mass Fatality Incidents 2002).

**Body Recovery/Handling (pre-morgue) Sub-function**

This sub-function delineates the requirements necessary for recovery, field storage, and transport of remains.

**Requirements:**

- Must coordinate closely with the General Emergency Response leadership on scene, including law enforcement, fire services, search and rescue, and other functions.
- Assure security prevents any unnecessary tampering with remains: disruptions not necessary for search and rescue, victim extrication, removal of contaminants from live victims, etc.: coordinated with Scene Security Sub-function.
  - Controlled access/egress points.
  - Visible and secure identification system (badging).
  - Establish chain of custody.
- Must identify hazards present that could pose risk to body recovery personnel:
  - Assure that hazard identification and PPE recommendations are received from Safety.
  - Determine who has overall legal authority for the human remains, which almost always resides with the local medical examiner or coroner.
    - In certain cases, FBI, DoD, state, and local jurisdictions can all have authority over the processing of the human remains. Must establish the authority structure early in incident, as each of these agencies may have a role in recovery and then processing of remains.
- Need for outside resources: must establish early on the type of outside resources to meet objectives. Coordinate through Management and Liaison. Examples of outside assets include:
  - DMORTs
  - FBI, CIRG/ERT/HMRU
  - DoD assets
  - State resources
  - Canine units
  - FEMA, US&R
  - NTSB.
- A consecutive numbering system for all recovered bodies and body fragments: simple, but provides method to document initial location and movement through the fatality processing activities. Must assure that all agencies are using the same system. Coordinate through the Liaison Function.
  - Documentation and processing requirements defined for search and rescue and other body extraction personnel (defining defining procedures for a “recoverable fragment,” recording location of bodies, belongings, and other evidence, handoff process, etc.). Supported by a Liaison Function with search and rescue and other emergency response functions.
  - Establish adequate on-scene fatality collection site (secure, not visible to the public or media, access to transportation and a loading dock, refrigeration, etc.).
  - Adequate scene imaging/photography and assuring completeness of search: e.g., shoulder-to-shoulder sweep of area. Coordinated with liaison to law enforcement.

**Mortuary Services Sub-function**

The overall objective for Mortuary Services is to provide for victim identification, determining manner and cause of death, collecting forensic evidence, and providing the information for death certificates. Identification capabilities use standard methods: physical characteristics, tattoos and other body markings, types of injury, presence of personal belongings, fingerprints, toxicology (residue or other trace materials). Victim identification may initially be presumptive from direct visualization or photo identification, from personal effects, or from location where remains were discovered. The process then accomplishes confirmatory identification using fingerprints (automated fingerprint identification system), odontology, radiology, and DNA analysis. Final approval of positive identification is made by the legally responsible medical examiner or coroner.

**Requirements:**

- Maintenance of chain of custody.
- Sophisticated inventory system for tracking and maintaining the large volumes of information involved.
- Photography.
- Obtaining ante mortem identification information through the Decent Family Assistance Services.
- DNA sample processing, including DNA acquired from victims’ belongings and the families of the deceased.

**Post-Morgue Services Sub-function**

This encompasses procedures and activities that occur after morgue functions and involve funeral and burial practices.

**Requirements:**

- Providing technical information, including any special personal protection issues, for funeral directors.
- Processing and eventually disposing any unclaimed remains.
• Consolidation of missing persons lists.
• Addressing any religious or cultural issues.
• Locating and confirming next of kin. Coordinated with Decedent Families’ Assistance Services.
• Transfer of remains to funeral directors’ control.

**Decedent Families’ Assistance Services Sub-function**

To obtain and provide information to the families and legal representatives of deceased victims and to provide access to grief services for victims relatives.

**Requirements:**

• Protect families from intrusions of media and curiosity seekers.
• Provide timely and private information for the families.
• Provide counseling services for deceaseds’ families. Supported by Mental Health Function.

• Provide a liaison with families for:
  ✓ Investigators and medical examiners to access families to obtain necessary body identification and other forensic information.
  ✓ DNA sampling collection acquired from victim’s personal belongings (at home) or from the families of the deceased. Supports Mortuary Services (obtain consent, provide confidentiality agreement, confirm donor’s credentials, establish biological relatedness of donor, contact information, chain of custody of donor sources). Obtaining, processing, and tracking samples (usually blood and buccal swabs from parents and/or siblings) and preventing cross contamination of sample.

**General Emergency Response Function**

Emergency response to a mass casualty incident includes many functions that are essentially nonmedical but are critically important to successful response (Figure 7-11). It is unlikely that Medical and Health Operations will have any defined authority over these functions, and so they are depicted as boundary functions that must have response objectives closely coordinated, ideally through unified management, with Medical and Health Operations. While the Medical Operations leadership does not directly manage these functions, close coordination of response actions on incident may be accomplished through effective training and familiarity established during pre-incident preparedness. Some medical response functions require direct involvement and/or interdependence with specific General Emergency Response Functions (example’s: mass evacuation, traffic control for hospital transport, victim extraction by search and rescue).

**Fire Suppression Sub-function**

This sub-function encompasses the capability that extinguishes or controls fire and potentially flammable/explosive environments. Fire suppression requirements are standard and widely understood.

**Scene Security/Perimeter Control Sub-function**

This sub-function controls access to the disaster site and/or tactical areas to ensure a safe and secure work environment. It limits interference by curiosity seekers, the media, and untrained “rescuers” who may pose a risk to themselves or responders. General security process requirements (for all response sites and resources) are delineated in Chapter 9 Concept of Operations. This capability requires:

• Adequate personnel to control entry points.
• ID system for access of necessary personnel to sites.
• System for temporary access for VIPs and technical specialists.
• Armed security for incidents resulting from terrorist and/or intentional acts by others.
• Search capability (with detection devices) to rule out secondary devices and other security threats.

**Search and Rescue Sub-function**

Bystanders and local responders accomplish initial search
and rescue following most mass casualty incidents. Organized response may also involve specialized trained search and rescue teams: urban search and rescue, wilderness search and rescue, swift water rescue, HAZMAT extraction, and others. Many of these teams now contain an operational medicine component.

**Traffic Control Sub-function**

Traffic control is essential for an incident scene and throughout a jurisdiction affected by a major mass casualty incident. Disaster sites, casualty collection areas, hospitals and healthcare facilities, and transportation routes must be available and accessible for emergency response vehicles. Mass evacuation can only occur effectively if traffic is managed.

**Hazardous Materials Response Sub-function**

This sub-function encompasses the specialized response to hazardous environments to provide detection, victim extraction, hazard containment, scene decontamination, and direction. Hazardous materials incidents may be chemical, biological, or nuclear/radiological in nature.

**Law Enforcement Sub-function**

This sub-function encompasses multiple critical capabilities for effective mass casualty response. It includes evidence collection, apprehension of suspects, assistance to or direct responsibility for site security, traffic control, and property protection.

**Mass Evacuation Sub-function**

Population behavior can be critical to minimizing or completely avoiding the hazard impact. Options include mass or focused evacuation, sheltering in place (with definition of what that means for the individuals), closure of mass transportation, public gatherings or other large group activities, and other actions. The Mass Evacuation Function includes all the assets that accomplish these population actions. **Coordinated** with Evacuation Strategies Sub-function.

**Public Works and Engineering Sub-function**

This sub-function is responsible for water supply and sewer restoration, road clearing, debris removal, and many other issues that directly affect the health of the population and responders. Close coordination with the sub-functions of Hazard/Threat/Disease Containment is important after a major hazard impact, to obtain maximal benefit from the Public Works and Engineering assets.

**Mass Care Sub-function**

This sub-function is responsible for the temporary care and sheltering of displaced persons impacted by incidents. **Coordinated** with the Mass Evacuation sub-function, the Mental Health functional area, and Public Health population-based intervention is required. Overall the Mass Care function is primarily assumed by the American Red Cross.
Logistics Functional Area

This functional area manages activities that provide logistical support to the operational functions through equipment and supplies, transportation, personnel maintenance, and technical activities that maintain function of operational facilities (Figure 8-1). This functional area’s assets are used when individual assets and functions are unable to meet their logistical needs through their own internal resources. Reliance on effective and accurate information from the Planning and Operations Functions is crucial to the effectiveness of this equipment/supplies/personnel support.

Technical Support Function

This function provides the technical expertise to response entities to assist in restoring their function after the hazard impact, and it provides the technical expertise to directly assist organizations in accomplishing their individual incident mission (Figure 8-2).

Communications Sub-function

Communications is the “vehicle” for data and information transmission, a central core sub-function supporting and coordinating functional areas in achieving their mission objectives.

Communications technology supports the MH-LIF Function in its acquisition and dissemination of information and can be conceptualized as the transportation means for data and information needed for response. Communications hardware and connectivity must match the information flow requirements for each functional area.

Requirements include:

• Immediate availability of communications capability with interagency interoperability/compatibility.
• Redundant and reliable capacity for communications; Options include:
  ✓ Hard-wired phone systems, wireless and radio communications.
  ✓ Broadband communications for relaying digital, voice, video, and multimedia messages.
  ✓ Fax capability.
  ✓ Computer/internet access for sources of “expert information.” Examples include chemical databases, geographic information system (GIS), weather forecasting, and incident management programs.
• Potential for secure transmission if indicated.
• A communication link with the emergency alert system.
• Response personnel must be familiar with the devices/system operations or have personnel available to directly support the users.
Specialized Equipment Maintenance & Repair Sub-function

This sub-function provides for the upkeep and repair of specialized equipment necessary to maintain the operation. It generally refers to incident specific equipment not normally in use by the Operations Functions (i.e., equipment for which they do not have a regular maintenance and repair capability). Individual response agencies maintain ultimate responsibility for equipment maintenance schedules as required by manufacturers or regulatory agencies or as required to maintain the safety of operators and to keep the equipment in good working order. This sub-function supports the individual agencies in this effort, generally upon receiving a valid request. Support for these services is provided by the Finance Support Function (vendor contracting and others), obtaining assistance from equipment manufacturers and their designated service agents.

Technical Evaluations of Hazard Impact on Response Capabilities Sub-function

This sub-function is incident specific and addresses the issue of obtaining appropriate technical expertise in evaluating key response facilities and equipment either to assure that the facilities and equipment are intact post-impact, or to define the impact issues that must be addressed so those facilities can maximally support operations. This sub-function is closely related to the Administration Function (Operational Recovery Certification sub-function and others) after the Logistics Functions have addressed problems such as structural damage or facility contamination.

Potential areas of need for this type of support include:

- Environmental surety: Air and water sampling for contamination, or ruling out air or surface contamination of response facilities during a chemical, radiological, or biological attack (or accidental HAZMAT incident). Other environmental analyses may be indicated as well.
- Structural integrity evaluations: After a seismic, wind, or explosive event, rapid assessment of response facilities’ structural integrity is vital to maximizing response capability and for the safety of responders and victims.
- Computer systems: After cyber attack, or unintentional crash affecting electronic systems in public health agencies, healthcare facilities, laboratories, and other response resources, the rapid return to full function, or the augmentation of normal function, may be critical for support to Operations in meeting its response objectives.
- Other infrastructure areas: Include electrical systems, medical gases, and other utilities.
practice) and arranges delivery to the requesting operations resource. Supplies and equipment involved may vary markedly depending upon the hazard and the operational objectives. Necessary acquisitions may include:

- Pharmaceuticals/vaccines
- “Sterile” supplies
- Medical equipment
- Blood products
- General supplies.

Requirements of the process:

Acquisition methods for supplies are best established during the pre-incident preparedness phase. Important components of this preparedness include:

- Accurate and shared inventories between adjacent jurisdictions, which may allow for redistribution through mutual aid arrangements to sites of need.
- A reliable system to track needs that have been requested by Management or Operations, and to track assets and supplies from request through receipt and use.
- Inventory control of infrequently used supplies and pharmaceuticals to address shelf life and stock rotation concerns.
- Automatic notification systems when inventory reaches reorder thresholds.
- A 24-hour internal hospital supply of pharmaceutical products should be maintained, based upon the estimated time for activation and receipt of the federal assets within the National Pharmaceutical Stockpile (NPS). The NPS is not a first response tool. Local and state preparedness must have plans for immediate supply and resupply of pharmaceuticals and equipment to meet critical needs until NPS arrival. The NPS would then augment response capacity.

Other NPS issues include:

- Operational understanding of the process for requesting and receiving NPS assets.
- Prepared local plan to manage NPS push packages, including receipt, distribution, and security.
- Vendor Managed Inventory supplies will follow if requested. They can be tailored to the specific needs of the incident, requiring information from Incident Epidemiological Profiling, Resource Status Tracking, and other components of MaHIM (processed through MH-LIF). Transportation and storage of pharmaceuticals/vaccines and blood supplies require adherence to specific regulations re: sites, inventory controls, temperature regulation, etc.
- The management of unsolicited, donated goods is also a responsibility of this sub-function. Capabilities to evaluate, sort, inventory, maintain, and/or properly dispose of unsolicited donations is imperative. Processes for re-donation of supplies not usable for the incident should be established during the preparedness phase.

Equipment Decontamination, Rehabilitation and Return Sub-function

This sub-function provides the specialized or surge expertise for equipment demobilization requirements.

Personnel Processing Support Function

This sub-function addresses the need to incorporate all responders into a common system for accountability and for controlling access to the site/s (Figure 8-5). It encompasses all activities that fulfill this purpose and provides processing of all personnel deployed for an incident.

Solicited Volunteer Processing Sub-function

This sub-function processes individuals or responder groups that have been directly requested through the Operations and Management Functions of the medical response. Solicited volunteers have been prescreened for qualifications and adequate operational and protective equipment.

Registration and Badging Includes:

- Responders who have been prescreened for qualifications and adequate operational and protective equipment.
- Registration into the response system requires personal information acquisition for accountability and collection of data for administrative tasks.
A basic orientation is provided to all incoming responders. Badging of individuals allows consistent identification and regulated entry into various operational areas. Photographic ID badging is essential for security.

**Credentialing**

Credentialing of healthcare/medical practitioners and other professionals provides legal assurance that the personnel meet minimal criteria for clinical practice, which is required by regulatory agencies. Credentialing for organized teams must be accomplished during the preparedness phase. Individual responders not affiliated with or responding with a pre-credentialed group should know to bring acceptable credentials that can be easily verified. One example is incorporated into the DCHA Hospital Mutual Aid System: hospitals sending personnel to another facility are to send only credentialed personnel and supply a log of those responding. The receiving hospital then is accepting the credentialing of another accredited healthcare institution, rather than relying only on the individual responder credentials.

**Unsolicited Volunteer Processing Sub-function**

Spontaneous and other unsolicited volunteers are a constant phenomenon in a mass casualty incident. While bystander volunteers often perform heroically in the immediate aftermath of a sudden onset incident, as the response organizes, the volunteers untrained in incident response can become problematic to the response and cause safety risk for themselves and other responders. It is imperative that a volunteer management capability be established early in incident response, along with perimeter control.

**Registration and ID/Skills Verification**

Receives and registers all unsolicited volunteers (including all turned away from the perimeter gates for lack of an appropriate badge). The role of this sub-function is to evaluate volunteers for credibility and capability; enter their names, methods to be contacted, verified skills/credentials in a database; provide them with information on the response and the incident’s management of personnel, and that unauthorized entry into the perimeter could compromise operations and safety and will have consequences. Further detail on managing unsolicited volunteers is provided in Chapter 6.

**Assignment**

This sub-function process assigns volunteers to fill requests for additional personnel by operations. Solicited volunteers generally already have an assigned task or are directed to report to Medical Operations Staging (where they were processed). Unsolicited volunteers would be kept out of the response area until their credentials are verified and they have an assignment. This sub-function coordinates with Operations by receiving the assignment order, communicating it to unsolicited personnel, assuring that the assigned personnel are qualified for the assignment and have completed the registration process. They are then incorporated into the response, transported to their area of duty, and report to a supervisor at their destination.

**Personnel Support Function**

The success of a response is greatly impacted by the performance level of the responders. Necessary supports must be in place to provide for basic responder needs, as well as for needs created by the stress of the environment in which responders operate. Prolonged incidents may increase the resources support that maintains responder productivity and safety. This function oversees all of those activities (Figure 8-6).

**Personnel Feeding and Billeting Sub-function**

- Provisions for billeting and feeding must be addressed as soon as it is recognized that an incident will extend beyond a usual work cycle for responders.
- Billeting areas should be located a safe distance from the impacted site but should not cause excessive transport time between work sites and housing area.
- Security provisions must be addressed with staff available to provide security and privacy.
- Locations should provide comfort measures, if possible. This is especially important for rest and sleep areas: comfortable bedding, environmental control (temperature, noise, light for night shift workers’ sleep cycle), and outlets for exercise and recreation.
• Use of hotel/private entities can potentially be identified during the preparedness phase.

• Consideration must be given to the billeting requirements for teams that include animals (i.e., search canines).

• Procedures such as changing clothes, boot wash, showering should be considered to prevent contamination of feeding and billeting areas by responders.

• Certain response groups may have specific requirements for billeting (e.g., US&R, DMATs). Coordination with these groups is required to determine these needs.

• Supplied foods should meet dietary recommendations.

• Certified food handlers should monitor food sources for safe handling and storage.

• Food and hydration should be available at billeting location as well as at work site if possible (at work sites, outside any potentially contaminated areas). Hand washing stations must be provided at all food sites.

• Food donations from private entities (individuals, small groups, unwrapped baked goods, unregulated sources) should be discouraged or if allowed, rigorously monitored.

**Personnel Support Function**

Figure 8-6

- Personnel Medical Care
  - Acute Care (Medical and Psychological)
  - Post-Acute Care (Medical and Psychological)
- Preventive Medicine
  - Physical Health & Hygiene
  - Mental Health
  - Responder Rehabilitation
  - Personnel Health Surveillance (Incident & Post-incident)
- Personnel Support
  - Personal Feeding & Billeting
- Personnel Family Assistance

This includes medical/psychological care for incident personnel requiring such assistance during the response (coordinates with Administration/Finance’s Personnel Claims Processing and Tracking Sub-function).

- Certain established response groups may have an internal operational medicine component for care of their own team members. Provisions to provide extended care beyond the capability of the internal medical team should be coordinated through this sub-function.

- For responders without an internal team medical response component, provisions for sick call/first aid and EMS response capability should be arranged.

- Healthcare of responders is a high priority response component.

**Post-Acute Care (Medical and Psychological)**

Includes assuring follow-up medical/psychological care for any incident personnel requiring medical care during the response (coordinates with the Administration/Finance Personnel Claims Processing and Tracking Sub-function).

**Preventive Medicine Sub-function**

This sub-function serves to prevent worker illness or injury (physical and psychological). In addition to providing general preventive medicine capability, it coordinates with Hazard/Threat/Disease Containment Function, Safety, and Epidemiological Profiling Function to identify threats to responders. Preventive Medicine coordinates with Operations and with Logistics to address health maintenance issues as they are identified.

**Physical Health and Hygiene**

**Activities may include:**

- Monitoring of work cycles, avoidance of excessive fatigue in responders, and other concerns.

- Monitoring of food sources, distribution, preparation, handling, and storage.

  **When applicable:**
  - Monitoring of potable water supplies.
  - Assuring adequate hand washing stations, shower facilities and the monitoring there of.
  - Assuring adequate toileting facilities, with associated hand washing stations.
  - Assuring adequate laundry services for responder clothing and bedding.

**Mental Health**

Monitors and provides for the mental health of responders to
ensure their continued ability to operate in the mass casualty environment.

**Responder Rehabilitation**

Assures adequate location and amenities for responder breaks and rehab. Coordinates with Logistics to have this support for responders at work sites and healthcare facilities. May involve provision of supplies (food, water, etc.) or recommendations (i.e., work cycles, rehydration directions, cooling measures, etc.).

**Personnel Health Surveillance**
* (Incident and Post-incident)

Coordinates overall surveillance of health status of personnel in the response system. May be required to assist with specific tasks (unique lab testing for personnel exposure to a hazard). Monitors sick-call rosters to identify preventable illness (food-related enteritis and others). This process has a major responsibility that persists beyond demobilization: assuring that long-term surveillance of responders is carried out.

**Personnel Family Assistance Sub-function**

This sub-function provides support to the families of incident personnel. A major responsibility is assuring that families are kept informed about the incident, the positive effects from the incident personnel’s actions, and other specific information. The arrangement should promote a support structure between families that could facilitate assistance with day care, house maintenance advice, and other stress-inducing problems while family members are occupied as incident personnel.

**Medical and Health Planning Functional Area**

These functions establish a comprehensive information-processing capability that promotes timely information exchange between elements of the response community and with the public, while not unduly encumbering the Individual Response Function with information collection and reporting requirements. Reports are generated as indicated (or assigned by management) to support the Management and Operations Functions. This functional area also provides a critical support role in the development of action plans (Figure 8-7).

**Objectives**

- To provide management with support in the development and evaluation of Action Plans
- To provide the public with credible information (through the Public Information Function) regarding the event and the population actions most likely to achieve preservation of health.
- To provide a system in which individual jurisdictions share pertinent information and promote a coordinated management.
- To provide a system in which individual patients can be located easily by family members.
- To establish a system that, during regular operations, can be used to monitor the public health of a community.
- To suppress the spread of misinformation through Public Information Tracking.
The Information Processing Function includes managing interconnectivity, data collection, collation, and analysis; formatting of operational reports; and appropriate dissemination of information (Figure 8-8). Information Management is a process that takes place at all levels and sites in the jurisdictional and regional organization. The information architecture follows the management structure of the response system, with information “nodes” (for analyzing data/generating information up and capturing, formatting and disseminating information down the architecture) that maintain data and information “span of control.”

The concept of a Medical and Health Local Information Function (MH-LIF) for a community response to mass casualty incidents (or even smaller multiple casualty events) is entirely consistent with the Planning Function defined in Information Management Systems (IMS). An adequately developed MH-LIF would have primary responsibility for information processing systems for medical information arising from a mass casualty event. This responsibility includes developing and maintaining a capacity to acquire, collate, analyze, and report a defined amount/type of information in a prescribed time frame.

**Responsibilities necessary to fulfill this purpose include:**

- Establishing reporting requirements/format and timeframes.
- Establishing and maintaining specific cross-functional information systems, to support Operations Functions such as a Patient Tracking (using much of the already established system for ongoing patient/case surveillance).
- Providing the information infrastructure to track public information and help identify misinformation and its sources. Supports Public Information Tracking (rumor control).
- Establishing the capability for access to hazard-related expert information for personnel across the MaHIM System.

Each major jurisdiction should establish a MH-LIF to promote information processing that supports the legal and political responsibility for the health and safety of the citizens residing within that jurisdiction. This translates into at least one MH-LIF per state jurisdiction, with division into intrastate regions at the state’s discretion. Furthermore, the state’s responsibility requires that all Information Functions within the state be linked together to provide a comprehensive state information system.

The MH-LIF should be designated as providing the **official system** for collection and verification of medical and public health data for that jurisdiction. It should be cohesively integrated with jurisdictional medical incident management, which is responsible for making strategic decisions and providing information to the public and political leaders. A MH-LIF is therefore the sole source for “official” and “confirmed” medical/public health information from its jurisdiction.

**MH-LIF Requirements:**

- This function must maintain 24 hour a day, 7 days a week capability.
- Defined Standard Operating Procedures, with adequate staff training on these procedures.
- A structure and function consistent with the Planning Section of the Incident Management System.
- Adequate redundancies and back-up systems.
- Easy transition from everyday operations to consequence management. The MH-LIF operates continuously in

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1 The terms Incident Command System and Incident Management System are relatively interchangeable. The FEMA Incident Command System description may be found at [http://www.fema.gov/emi/is195lst.htm](http://www.fema.gov/emi/is195lst.htm)
Surveillance Function support. It also performs other non-disaster functions that assist the community with the management of traditional, everyday public health challenges (TB management, HIV infection rates, food-borne disease outbreak, pedestrian fatalities, etc.).

- Limited span of control established by the use of information nodes. The complicated information processes can only be successful if the information architecture incorporates information control as described in IMS management concepts. To reduce the complexity and prevent error, each entity in the response matrix can only be responsible for a limited number of entities. Information Management should be similarly organized so that the MH-LIF is responsible for direct integration of a limited data input and information dissemination. This is accomplished using information nodes, and their position and hierarchies are functionally determined and driven by their specific information end products. For instance, “down-flowing” information relevant to hospitals would come from the MH-LIF to/through the Operations Function, which would be responsible for disseminating the message, through the Acute Medical Care Sub-function, to healthcare facilities.

**Example of possible nodal organization of information:**

- Hospitals develop systems using an existing 24-hour hospital communications center (e.g., DCHA HMARS), an emergency medical service (EMS) command hospital, or an EMS communications center (less desirable because in a major incident, EMS coordination will be their primary focus) to collect data and develop a composite hospital capacity breakdown for the EMS.

The MH-LIF must be prepared to collect, format, and communicate many types of information. The reporting mechanism for these types of information should be established by the MH-LIF during preparedness and delineated as part of the Information Management System description. It must address:

- Public health data: findings from epidemiological investigations, public health and other laboratories, reportable illnesses that may be related to the suspected or confirmed agent, all side effects from the prophylaxis and treatment of victims, and so on.

- Medical data: all information from hospital/medical sources concerning patients with suspected illness, patients with confirmed illness, suspected and confirmed case fatalities, patients presenting with concerns about exposure, the numbers and profiles of “concerned, potentially exposed patients” presenting for evaluation, demographic information, and so on.

- Patient tracking data: receives patient identifying data from healthcare facilities through the PSAT Sub-function and organizes it to provide a single source for families to determine the location of loved ones during a major, sudden onset incident.

- HAZMAT data: collects and formats data on sites that hazardous materials teams and similar resources have responded to, together with their assessments of the sites, all laboratory evaluations, and related findings. Supported by Liaison function.

- Law enforcement investigation: data pertinent to public health and medical assessment (location of release and areas where agent may be present, population risk profile drawn from information about the perpetrators, their motives, prior methods of operation, known associates and travels, and other information. Supported by Liaison function.

- Environmental sampling: data from all sites evaluated, including the test used, specific tested location within the sites, and all test results (including denominator) and interpretation if available. Supports Event Epidemiological Profiling Sub-functions.

- All vector evaluations and their results. Supported by Hazard/Threat containment.

- All animal/plant surveillance activities and findings. Supported by Hazard/Threat containment

A MH-LIF could be required to manage many types of communications. Each communication method must be selected for its appropriateness to the particular Information Exchange Function. (In some situations, combinations of communication types may be required for adequate information exchange.)

**Information Collection, Analysis, Formatting and Reporting Sub-function**

This sub-function is the “endpoint” for all information required for the Planning Function. It also develops all reports for information that will be disseminated outside the Incident Management System. The information processing includes the use of deliberate mechanisms to evaluate and verify any new information prior to its use or dissemination. The evaluation of all new information must occur through a deliberate verification process.

- Verification should occur that the message came from the indicated source.

- Verification should occur that the message was transmitted properly (i.e., message not changed by transmission process).

- Analysis performed as to the expertise and reliability of the reporting source.
• Analysis of the transmitted information for validity, accuracy, and consistency with previously verified information. This may also require checking with identified experts within the response system.

• Evaluation of importance of message; it is important if the information:
  ✓ Indicates a need to change response methodology.
  ✓ Identifies a new hazard for responders and/or the public.
  ✓ Identifies major resource deficiency, or one that is about to occur.

• Important/urgent messages require immediate action by MH-LIF, bringing the information to the attention of management and the other appropriate MaHIM Functions.

Community Health Surveillance Data Processing

This process provides the data processing support to the Operations Function’s Community Health Epidemiological Profiling (both ongoing surveillance and during incident profiling).

Collection requirements:

• Appropriate nodes for data processing before reaching MH-LIF (e.g., professional vet organization forming a communications network, with data summarized and then transmitted to MH-LIF).

• Data collected so that it may be easily collated for aggregate reports.

• Addresses/screens out reporting redundancy (same animal illness reported from multiple sources).

• Confidentiality maintained for patients and institutions.

Analysis requirements:

• Information technology programming that collects and organizes data and develops aggregate reports.

• Data aggregation may be revised according to need during/after data collection.

• Ability to categorize by hospital, jurisdiction, or other geographic segment.

• Ability to aggregate by complaint, level of care, level of implied need, or other categorization established in the data collection methods.

• Automatically analyzes data by multiple parameters, looking for unusual patterns.

• Automatic alerting system for unusual individual cases or for unusual patterns.

Formatting requirements:

• Capable of providing concise reports that present GIS and epidemiological data visually.

• Capable of producing continual updates.

Patient Surveillance and Tracking Data Processing

This process provides the data processing support to the Operations Function’s Patient Surveillance and Tracking Function (both ongoing case surveillance and during incident profiling). The requirements are similar to those supporting Community Health Surveillance.

Boundary Function Information Processing

This activity is supported by the Liaison Function and maintains the relevant information from the assets of the General Emergency Response Function.

Resource Status Tracking

Resource status tracking maintains a constant accounting system for condition and status of all resources available for response. It tracks the status of health, medical, and mental health resources, personnel, equipment, supplies and facilities impacted by the incident/threat of incident. This master list includes personnel, equipment, supplies, pharmaceuticals, and vehicles. This includes assets originally from within the jurisdiction and assets arriving from outside the jurisdiction (mutual aid, state, and federal assistance). The location of specific assets is also included in the database. This information is collected and formatted during each operational period so that at each operational briefing, the information is available to other functional areas. The information would be an attachment to the Action Plan (AP) as well. The resource status has direct input into the AP development process and provides an information base so that Logistics may operate in an anticipatory manner.

Requirements:

• This process requires close linkage/communications with the Logistics Functional Area.

• The Resource Status Tracking Process should establish the system used to maintain accountability of response assets.

• The required information should be transmitted to Resource Status Tracking at least once during each operational period and more frequently upon request for specific elements.

• Formatting of resource status must provide easy to read documents that are clearly identified for its specific operational period.
Functional Area Report Tracking

Frequent, regular situation updates from Response Functions are critical to an adequate management system. Updates contain summarized information from the functional areas and are processed by the MH-LIF to produce relevant information for Action Planning (the written updates may also be attached as annexes to the AP). Each functional area should develop and transmit a situation update for each operational period. This should be delivered to the MH-LIF in time to be processed for the Management Meeting (to assess progress in meeting objectives and to identify problems) and the Planning Meeting (a meeting used to develop that operational period’s AP; see below). A situation update is essentially a report on the status of the functional area’s objectives (objectives attained or in progress; tactics established or revised; problems; etc.). Information conveyed also includes general patient information (numbers, types), new assets, new hazard information, new protection policies, changes in response tactics, and other relevant response information.

Report may include:

• Designation of the operational period the report is referring to.
• Title of functional area producing report.
• Reference to whether functional area objectives have been achieved; if not, time line when expected completion is to occur.
• Newly identified hazards.
• Other relevant response information.
• Signatures of persons preparing update with date and time of submission.

• Operations Functional Area:
  ✓ Total numbers of EMS patients.
  ✓ Total numbers of hospital case definitions.
  ✓ Total number of outpatient definitions.
  ✓ Total number of dead.
  ✓ Results of environmental testing with tests used, numbers conducted, numbers positive, exact locations of test sampling.

• Logistics Functional Area:
  ✓ Identification of critical shortages
  ✓ Status of mutual aid

Hazard-Related Expert Information

The goal of Hazard-Related Expert Information is to provide, as soon as possible, comprehensive expert information related to the hazard and recommended response actions. It may also provide credible sources for further expert information. Critical information must be communicated to all appropriate functional areas. The sources of information must be pre-screened, ideally prior to the event, to assure technical credibility. Expert information from disparate services should be consistent.

Requirements:

• Critical information and/or the experts themselves should be made directly available to the appropriate Management and Response Functions.
• Contact information for sources should be provided by the MH-LIF early in the incident.
• New or updated contact information provided as it is received by MH-LIF.
• Sources of information listed according to types of technical information they can provide.

• Comprehensive list to include:
  ✓ Information on hazard agents.
  ✓ Information on treatment, prophylaxis, immunization.
  ✓ Information on protection.
  ✓ If information being provided has not been scientifically established, it should be indicated as such.

  ✓ Examples of expert sources of hazard information:
    ❑ Poison Control Centers.
    ❑ USAMRIID experts.
    ❑ ChemTrec.
    ❑ CDC.

Document Control and Archiving

This process maintains current and earlier incident documents in easily researched formats and maintains their availability for reference during the planning process, for appropriate inquiries from components of the response system, and for after-action evaluation.

Information products:

✓ Action Plans (See chapter 9 for more information.)
✓ Maps
✓ Communications plan
✓ Traffic plan
✓ Weather – current and forecasted
✓ Health and Safety Plan (for responders) and Safety message — including preventive medicine recommendations.

Types of Information Dissemination from MH-LIF

Announcement/Bulletins

• Well suited for rapid dissemination of straightforward concept(s), for treatment guidelines, for incident statistics that are important to a wide audience, and for other well-defined information.
• Typically unidirectional information flow (no discussion).
• Limited information is conveyed.
• Must adhere to message notification requirements discussed above (verification of transmittal and receipt, etc.).
• Can be emergent but must have an alert component as stipulated.
• Can be non-emergent information.

Briefings

• Well suited for complex information and for decisions requiring input or needing questions to be immediately answered.
• Typically individual/s provide verbal presentation of multiple concepts (situation update, etc.) with some “space” for audience interaction.
• Helpful in associating individual face/voice with event.
• More than facts can be conveyed (e.g., reassurance).
• Depending on target audience, must have adequate warning that briefing will occur and how to access (TV channel, etc.).
• Must have structure to prevent prolonged discussion; must meet predetermined time schedule:
  ✓ Outline of topics to be discussed is provided prior to or at the beginning of the briefing.
  ✓ Personnel in attendance are allowed limited questions during briefing — prolonged discussion tabled to end of the meeting, with decisions from those discussions reported at the next briefing.
  ✓ Strict time limits if any reporting of information by attendees.
  ✓ No general discussion of positions.
  ✓ Pagers and cell phones off.

Group Discussions

• Good for sharing of ideas but must be tightly moderated according to a predetermined format.

• Could include teleconferences and conference calls.
• Least desirable method due to potential inefficiency, especially if not tightly moderated.
• Well-defined rules for participation: speak only when addressed, identify self when speaking, requests for input controlled by moderator.
• Specific time frame defined and adhered to.
• Limit participants by numbers and types (i.e., no press).
• Sign on must occur at appropriate time with rapid roll call.
• Security in place to prevent unauthorized eavesdropping.

Situation updates

• Well suited for progress reports for entities outside the Incident Management System, including outside organizations, public officials, the public, and others.
• Provides the status of the entity, and objectives achieved.
• Allows issues to be shared with the target party.

Types of Information Collection by (MH-LIF)

Functional area updates

• Well suited for progress reports for within the incident management system, including:
  ✓ Status of entity
  ✓ Resource status
  ✓ Personnel status
  ✓ Objectives and goals achieved
  ✓ May include requests for additional resources.

Raw data

• Formatted according to specifications of recipient. For a node, raw data comes in a form that can be processed into information. For MH-LIF, may require that some analysis and formatting has occurred at an earlier node.
  ✓ Must be transmitted rapidly.
  ✓ For urgent information, must assure that information has been received and acknowledged by recipient.

Information Systems Administration Sub-function

This sub-function addresses the processes for collecting, collating, formatting, and distributing critical information related to the incident. It assures that processes are adequate and coordinates with the Communications Function of Logistics as appropriate to complete the information circuits.
It directly supports the Incident Management System Monitoring Function, providing information systems design, revisions, and new applications as indicated to support Management and Operations.

**Information Systems Design and Application**

Information system development, implementation, and adaptation are organized according to the products needed to carry out the Incident Management objectives. It is conceivable that unusual mass casualty incidents will create information-processing requirements not addressed by the processing systems established during the preparedness phase. The Information Systems Design and Application Process is responsible for adapting or redesigning systems during the incident to assure that necessary information is available. This process oversees system design and then coordinates with Logistics Communications to assure that the system is implemented and functioning.

**Information Systems Support**

Information Systems Support addresses the systems integration of information and communication. The Logistics Communication Sub-function would coordinate with this entity and support the ongoing hardware and software operation of the Communication and Information Processing System.

**Plans Development and Assessment Function (Action Planning)**

This function (Figure 8-9) oversees and coordinates the many support activities for Action Planning (AP). The MaHIM management process (Figure 9-8), which incorporates Action Planning, is extensively discussed in Chapter 9.

**Event Epidemiological Projections Sub-function**

This sub-function focuses on short- and long-term predictions of future event parameters based upon analysis of all available data. This information is critical to incident strategy development and evolution. Based on the nature of the incident, data may allow rapid prediction of the numbers and types of patients, status and condition of response assets, as well as other incident characteristics (weather, etc.). Much of this information would be provided by the Incident Epidemiological Profiling Function and other Planning Sub-functions. The projections developed by this process are provided to management for consideration in the Management Meetings and Planning Meetings that define incident objectives, strategy, and tactics. This information is also provided to the Logistics function to assist in anticipating future logistics support requirements.

**Requirements:**

- Close communication and linkage with the Incident Epidemiological Profiling Function.
- Must receive input during each operational period.
- Must be able to verify that projections are based on realistic expectations and valid data.

**Measuring Effectiveness Sub-function**

This sub-function focuses upon the incident objectives and the use of incident information to evaluate whether the incident strategy and tactics are achieving the incident objectives. Defining both sensitive and accurate measures of progress is a key activity of this function, as well as monitoring and reporting on the findings of the defined measures of effectiveness. This allows a cyclical evaluation, repeated in each operational period, of response objectives and strategy by the management team.

**Alternative and Long-Range Strategy Planning Sub-function**

This sub-function develops optional strategies for management to consider as alternatives for achieving incident objectives. This includes considering alternatives to the current “trajectory” of the initial and follow-on Action Plans, and planning beyond the next one or two operational periods. Alternative options should be realistic, practical, and based upon available resources. Though particular options may never be exercised, they should be documented for consideration during the incident planning cycles and for post-incident organizational learning.

**Contingency Planning Sub-function**

Contingency planning develops emergent response actions in the event of sudden calamitous change in event parameters.
that negatively impacts victims or responders. Contingency plans should focus on sudden life-saving measures that could be required in responding to the precipitous change.

**Demobilization Planning Sub-function**

The Demobilization Planning Process develops comprehensive plans for disengagement of all response entities. Demobilization planning includes establishing procedures and guidelines for disengagement (including transfer of ongoing activities and responsibilities to designated entities). It begins early in the incident and is reformulated throughout, with the demobilization plans being considered through the Planning Cycle and other planning activities at the appropriate times. The Demobilization Plan itself may be utilized in part or in complete form at the “beginning of the end” of the incident, per direction of Incident Management. Preestablished demobilization plans prevent misunderstandings and provide for orderly, rapid disengagement of various entities from the incident.

**Requirements:**

- Logistics requirements
- Transportation requirements
- Rehabilitation of equipment and personnel
- Personnel follow-up
- Provide information developed by Ops for critical incident stress follow-up
- Provide status reports during demob process.

**Briefing Support Sub-function**

This sub-function provides the framework, administrative and secretarial support for the briefings that establish Action Plans, determine operational tactics (“The Ops Plan”), and that develop the many other supporting documents for the Action Plan. The primary meetings/briefings to be supported are the Management Meeting (which develops the incident objectives), the Planning Meeting (which develops the incident strategy and tactics that become the Action Plan), and the Operations Briefings (which brief the functional area and function leaders on the current Action Plan).

**Medical and Health Administration & Finance Functional Area**

This functional area supports MaHIM in all administrative and financial areas (Figure 8-10).

**Finance Support Function**

All resources (personnel hours, expendable supplies,
medications, equipment, etc.) expended during a mass casualty incident response should be thoroughly documented in a format that is acceptable and easily transferable. This sub-function establishes this procedure, disseminates the methodology (with assistance from the MH-LIF), and collects related information throughout the response. Ideally, financial procedures for documenting expenses should be as close to normal operational procedures as possible for each response entity, so as not to generate additional training and record management requirements. Depending on the nature of the incident, reporting by functional areas may occur as frequently as every operational cycle. This information could be tied to resource status reporting.

Financial Reports and Record Keeping Sub-function

This sub-function supports the functional areas by providing the financial report formatting and documentation assistance. This sub-function would also provide a review of submitted records.

Vendor Contracting Sub-function

A contracting system should be established for paying or financially guaranteeing healthcare and other organizations that provide requested services during a mass casualty incident. This sub-function is designed to support the contracting procedures that are expected to occur for the response system as a whole, though assistance may be provided to individual institutions with their specific organizational contracting. Contingency contracts (for instance, refrigerated trucks for mass casualties, large generators in case of prolonged power failure, etc.) may be established during the preparedness phase. Authorization requirements are best if explicitly established and understood by both the recipient and provider of services and resources.

Mutual Aid Financial Remuneration Sub-function

Mutual aid between assets and jurisdictions occurs regularly, but usually for short periods and in a balanced fashion such that expenses are fairly distributed over time. In a large-scale incident, this balance may be upset. A key component of developing strategic (“master”) mutual aid agreements between jurisdictions and between individual assets is defining the incident parameters where reimbursement for services is triggered. Record keeping and documentation requirements with mutual aid partners (local and state level) should support this “master” agreement, facilitating remuneration for resources used during a mutual aid response. This sub-function addresses procedures to accomplish financial tracking and appropriate remuneration of mutual aid assistance.

Personnel Compensation Sub-function

Procedures used to record and document the hours worked of all incident personnel (hourly and salaried) responding to a mass casualty incident should be reviewed/established to facilitate claiming and receiving reimbursement for the individuals and for their sponsoring institution. Complete responder compensation records (including time sheets) will also be required to support any responder claims for injuries, health related problems, etc. This would include responders who have been accepted in response to a mutual aid request. The Personnel Compensation Sub-function establishes the procedures for this documentation and serves as a central reporting area for work that is to be compensated.

Personnel Claims Processing & Tracking Sub-function

Procedures used to record and document any claims made by responders for injury, health related problems, loss of personal equipment, etc., should be reviewed/established to facilitate proper consideration and resolution. Though individual organizations may have individual procedures in place for this, this sub-function establishes and maintains the procedures for the entire system.

Regulatory Compliance Function

In a true mass casualty incident, response requirements often push the limits of the many regulations prevalent throughout the healthcare industry. The Regulatory Compliance Function (Figure 8-12) is charges with addressing these issues, and attempting to maintain at least the spirit of regulatory guidance.

Liability Sub-function

Individual and group healthcare providers and facilities
should assess liability issues and risks and provide appropriate policies and procedures to their healthcare providers and support personnel. This Liability Sub-function addresses incident response liability at the strategic level, developing and defining liability coverage for critical response actions such as mass vaccination with a new and investigational vaccine during a bioterrorism incident. Potential liability for incident response tools such as triage protocols, the securing of healthcare facilities, and management of large volumes of patients should be considered and addressed during the preparedness phase but will require focus during many mass casualty incidents.

**Licensure/Certification Sub-function**

Licensure and certification issues between potential mutual aid partners, from spontaneous volunteers, and from solicited experts from outside jurisdictions, could become problematic during an incident response. This function addresses and resolves licensure and certification issues without compromising the safety of patients. Some form of credentialing should be established and communicated to local first response (police, fire, EMS) and medical personnel to facilitate the establishment of preapproved licensed and/or certified personnel to provide assistance. The Emergency Management Assistance Compact (EMAC) provides a solid framework to address this issue between EMAC participating states. This sub-function assists with the provision and coordination of these credentials.

**Medication and Medical Device Regulatory Facilitation Sub-function**

In mass casualty incidents caused by unusual hazards, medications and medical equipment may be indicated even though they are not specifically approved for that indication (for instance, lorazepam has never been approved for organophosphate-induced seizures). This sub-function addresses regulatory approval where indicated so that the victims receive the best possible care. Medication and medical device regulations should be reviewed and appropriate policies and procedures established that reinforce compliance or provide explanations for actions that are not compliant. For instance, the use of a medication for a non-FDA approved indication could occur but should be accompanied by an explanation to both the system and the public. This activity must be closely coordinated with MaHIM management approval.

**Healthcare Facility Regulations Coordination Sub-function**

Individual healthcare facilities must operate within guidelines established by the jurisdiction. For instance, facilities are usually licensed for a specific number of beds, limiting the numbers of patients that may be cared for at any one time. These regulations must be considered in light of the parameters associated with a mass casualty incident. This sub-function provides coordination with the individual institutions and the regulatory bodies to amend (temporarily) regulations in order to permit managed degradation of services when capacity is challenged.

**Public Health Legal Interpretation Sub-function**

This sub-function assists management and planning with the interpretation of public health laws in existence for the community, the state, and, potentially, the nation. Interpretation, advice, and representation are all required.

**Equipment Certification Sub-function**

Equipment requiring certification (tests, calibration, etc.) should be identified, appropriately certified, and tagged with the unit-specific certification and date of certification. Incident use or hazard impact may require that the equipment be recertified, which may be a lengthy and complex process. These procedures may be important both during and after an incident, and are addressed by this sub-function.

**Responder Certification for Specialized Equipment Sub-function**

Mass casualty incident response may require the use of specialized equipment (personnel and patient protection, decontamination, treatment, etc.) by response personnel. Appropriate training and exercises should be conducted and documented for each individual. This administrative sub-function assists with the certification procedures for those being trained during the incident. The sub-function establishes the systemwide procedures necessary for appropriate training and documentation of certification when they are required during incident response.

**Healthcare Infrastructure Business Continuity Function**

Business continuity, restoration and recovery preparedness and plans are necessary to ensure the survival and long-term economic viability of the healthcare industry. A thorough consideration of the impact of a mass casualty event on the business operations of the healthcare facility is a necessary component for preparedness, planning, and response. Well-intended actions, taken in the exigency of a mass casualty incident, without consideration of strategic responsibilities and goals, could potentially threaten a healthcare facility’s ability to provide medical care in the long term and even the healthcare facility’s economic survival. Assistance must be provided to this component of the response community to enhance the willingness to participate. Judicious policies and
procedures promote fair treatment for all healthcare assets during a response, which will promote full participation. The Healthcare Infrastructure Business Continuity Function (Figure 8-13) oversees these activities.

**Business Loss Recovery Administration Sub-function**

All resources, (personnel hours, expendable supplies, medications, equipment, etc.) expended during a mass casualty incident response should be thoroughly documented. Additionally, revenue from normal operations that is lost due to mass casualty incident response operations should be thoroughly documented. Direct hazard impact on an organization could require reimbursement as well. This documentation will be necessary for reimbursement and insurance claims.

**Operational Recovery Certification Sub-function**

Following the response to a mass casualty incident, certifications covering decontamination, operational readiness, etc., of healthcare facilities will be required. These requirements should be thoroughly understood with policies and procedures issued that guide response operations to minimize negative impacts on longer-term recovery efforts. This sub-function facilitates important certifications so as to minimize the impact on assets that provided assistance during a mass casualty incident.

**Business and Data Systems Crisis Administration Sub-function**

This sub-function is charged with assisting critical medical assets that have sustained an impact on their business and data systems. Assistance may prevent the impact from affecting the institution’s ability to provide necessary medical care.
This chapter presents concepts that more generally define how the MaHIM model operates throughout an incident. It focuses on important management, operational, logistical, planning, and administrative processes that coordinate mass casualty incident response. Many diverse medical and health resources could be involved, with a partial list provided in Figure 9-1.

While the model is all-hazards based, this chapter emphasizes issues important in mass terrorism incidents, particularly bioterrorism. Commonly accepted, well-established operational concepts in healthcare facility and public health emergency operations (such as those in the typical hospital emergency operations plan) are not delineated.

Assumptions that form the basis for the MaHIM system description and concepts of operation are presented in Chapter 4. If the logic behind the ideas presented here is not obvious, the reader is invited to review the assumptions upon which the concepts are based.

**Incident Response by Phases**

For the purpose of analysis and discussion, the response to a mass casualty incident (mass casualty incident) may be separated into a series of overlapping phases:

1. Event Recognition/Initial Notification
2. Activation/Mobilization
3. Response
4. Demobilization
5. Recovery/Organizational Learning

Throughout all five phases of a response, the functional areas integrate and operate together to achieve the incident objectives. Incident objectives, established by management, evolve as the incident progresses.

### 1. Event Recognition / Initial Notification

Hazards that cause most types of mass casualty incidents are obvious at the outset, such as explosions, tornadoes, and transportation mishaps. With other types of hazards, the human impact may be subtle in onset and therefore harder to recognize as a potential or evolving mass casualty incident.
These include severe heat and cold waves, influenza and other epidemics, and unannounced terrorist attacks with certain biological, chemical, or radioactive agents. For a subtle onset event, the initial challenge will be recognizing that an incident is occurring, and further challenges will be posed if there is no concomitant ability to rapidly identify the scope and magnitude of the event. In an obvious and very large incident, the initial human impact may also be unclear. For instance, immediately after a major explosion in a dense population center, patient numbers and locations can be difficult to ascertain by those managing the medical and health response resources. Furthermore, a rapid evaluation of any blast impact area (which may be widespread) may be required to rule out “dirty” components (radiation, chemical or biological) of an intentional explosive device.

To identify and characterize the human impact of any event, an adequate response system must be capable of:

• First: identifying that an event is occurring.
• Second: determining that the event has significant potential for human impact.
• Third: rapidly establishing the etiology, size, scope, and other characteristics of the actual or potential human impact.

These can only be accomplished with an ongoing surveillance system that allows a robust monitoring of medical and public health parameters. For subtle onset events, recognition may be reliably accomplished only by having a system that is very sensitive in detecting any “anomalies.” Anomalies, or changes from the ordinary medical and public health parameters, could consist of a single suspicious case identified by a practitioner, a cluster of suspicious cases, or even a law enforcement tip that a release may have occurred. The surveillance system must also have an effective capability for rapid investigation of any unusual indicators, including the single report form a concerned practitioner. This investigation uses commonly accepted epidemiological and other public health and medical principles but also employs the well-coordinated MaHIM Information system described in this project, creating a much faster and more powerful methodology. Even in obvious events such as large-scale explosives, definition of the human impact must be defined in a time frame that allows anticipation of medical needs. This requires data gathering and investigations that determine and track health effects and must be accomplished in a very compressed time frame.

The Incident Epidemiological Profile Function, described in Chapter 7, fulfills these requirements. The information system for this leverages multiple data sources, delineated in the Incident Epidemiological Profiling Function (Figure 9-2), to allow swift determination of whether an anomaly is significant. It simultaneously develops a rapid epidemiological profile of any incident, so that incident managers have the information to accurately define response objectives and to appropriately mobilize resources. The sub-functions of Incident Epidemiological Profiling, when coordinated together, provide an increased likelihood of knowing “what” is occurring in the same time frame as narrower surveillance programs provide an indication that “something” is occurring.

As MaHIM is activated and resources are mobilized to begin response, the Incident Epidemiological Profiling Function continues to delineate the size and scope of the incident from a health and medical perspective, and provides continuous monitoring of incident parameters throughout the event. This continuous monitoring could be used for evaluating critical measures of effectiveness to assure that incident objectives are being achieved. Equally important, ongoing incident profiling is invaluable in identifying a sudden change in incident characteristics that could mandate a significant change in response strategies or tactics (e.g., a new or previously unidentified hazard discovered that poses real risk to responders). The Incident Epidemiological Profiling Function also has utility in providing the information to develop an appropriate time frame for demobilization of assets and final incident stand-down. This is critical to anticipate for the purpose of returning a community to normal operations. Additionally, the function is vital for providing authorities with information to confidently define and reassure the unexposed population.
Characteristics to consider when evaluating an anomaly as a possible or actual mass casualty incident are listed in Figure 9-3. This determination should be guided by a preestablished decision support tool, with decisions based upon event characteristics reaching trigger thresholds.

If these conditions are present, a series of notifications is required. To facilitate information sharing during the uncertain time in which the rapid investigation is occurring, it is valuable to have a preplanned notification framework that incorporates a stepwise approach (both in information and in the notified parties) and does not automatically activate the entire system. An example of notification gradation can be found in Figure 9-4.

At a minimum, the personnel designated as the community incident managers would receive an alert, as would the surveillance assets that must report additional information above their baseline data. If activation is implemented, all functions in MaHIM are notified.

With any adequately sensitive surveillance system, anomalies will be detected that may not pose a significant medical threat to a community but that can cause fear and confusion if not investigated and explained. Structured management of anomaly investigation, appropriate notification, and public information are vital. A likely sequence for managing such anomalies is delineated in Figure 9-5.

Even if an anomaly has been judged as non-credible or too low a threat to trigger systemwide action, this information should be conveyed throughout the system with an explanation as to how the determination was made. This promotes system functionality and “buy-in” and demonstrates system reliability. It prevents deleterious effects of misinformation and rumors coming from unofficial sources outside the response system. This public information will also minimize stress and anxiety that could be generated by potentially threatening events such as biological hoaxes.

If the anomaly or an obvious event continues as a concern after the initial rapid epidemiological investigation, notifications are disseminated throughout the system. Initial notification includes a brief description of the incident profile known at the time, the level of activation for each notified function/sub-function, a request for a function/resource status report, and additional requests as indicated. See Figure 9-6 for a list of notification requirements.

The incident dimensions will determine whether the notification is an advisory, alert, or activation accompanied by a request for mobilization of resources within the notified functions and/or sub-functions. Notification is accomplished through the Planning Functional Area’s Information Processing Function, aided by Logistics’ Communications Sub-function according to a preplan. Management should approve the notification message prior to transmittal but without causing a delay in the process (i.e., management should be involved throughout the development of the notification decision).
response phase comprises all efforts that are targeted at the mobilization phase, or it could occur sequentially. The response phase could begin simultaneously with the onset of Depending upon the rate of evolution of the incident, the response state. Mobilization may continue to occur well into state of inactivity or normal operations to their designated Mobilization is the transition of functional elements from a state of inactivity or normal operations to their designated response state. All functions are notified and kept updated. All significant resources would be expected to report on their status as a part of a full Incident Profiling Function (even if the report is “normal operations, no unusual activity encountered”) at the time of the notification and at designated intervals. Each notified resource reacts according to instructions in the notification and its preplan. Initial actions should be to rapidly assess their individual current capacity (including whether they have been impacted themselves by the hazard effects) and to notify internal and “downstream” resources. This assists in keeping incident managers aware of functional capabilities at all times (assisted by the Resource Status Tracking Sub-function of Plans). It also prepares all MaHIM assets to respond if called upon, and incident information may assist in keeping assets’ usual operations intact.

2. Activation/Mobilization

Mobilization is the transition of functional elements from a state of inactivity or normal operations to their designated response state. Mobilization may continue to occur well into the response phase, as additional assets are brought on line or as surge capacity processes are instituted to meet demands. Surge capacity may be required for overall system requirements (general capacity) or for very specialized patient needs (specialized capacity). These processes are described in more detail under the Surge Capacity Concepts of Operations (see below).

3. Response

Depending upon the rate of evolution of the incident, the response phase could begin simultaneously with the onset of the mobilization phase, or it could occur sequentially. The response phase comprises all efforts that are targeted at

![Figure 9-5](Usual Surveillance Anomaly Outcome)

Figure 9-5 notification message and the selection of the notification assets).

While only the functional elements necessary to accomplish the response objectives may be activated during the initial phase of an incident response, all functions are notified and kept updated. All significant resources would be expected to report on their status as a part of a full Incident Profiling Function (even if the report is “normal operations, no unusual activity encountered”) at the time of the notification and at designated intervals. Each notified resource reacts according to instructions in the notification and its preplan. Initial actions should be to rapidly assess their individual current capacity (including whether they have been impacted themselves by the hazard effects) and to notify internal and “downstream” resources. This assists in keeping incident managers aware of functional capabilities at all times (assisted by the Resource Status Tracking Sub-function of Plans). It also prepares all MaHIM assets to respond if called upon, and incident information may assist in keeping assets’ usual operations intact.

![Figure 9-6](Initial Notification Message Requirements*)

• The message must have a date and time of the notification prominently displayed. The party and agency responsible for the notification message must also be identified.

• Message must be conveyed to the intended recipient rapidly, with verification of transmittal and of receipt by the intended party (e.g., simple FAX communiqué would not fulfill this requirement as typically the only confirmation is that a machine received a message. Adequate notification requires that the person or entity for whom the message was intended confirm receipt and acknowledge the contents).

• Adequate information management requires that the following be included in notification message (if it is available — otherwise, it should be conveyed as it becomes available):
  ✓ Etiology of the incident (described as “confirmed” or “suspected”).
  ✓ Identification of potential hazard, including risks to responders.
  ✓ Potential for secondary event.
  ✓ Size and general identity of the estimated patient population.
  ✓ Indications of exposure or injury (an initial “case definition”).
  ✓ Location of potential exposure to hazard if known.
  ✓ Testing methodologies used or recommended.
  ✓ Care being provided and by what entities and locations.
  ✓ Condition of patient(s).
  ✓ Initial case definition:
    ❑ Explosive event – in proximity to the event.
    ❑ Chemical – specific to agent.
    ❑ Biological – specific to agent.
  ✓ Methods of contacting professional sources for further information (technical information assets should all provide similar answers to questions).
  ✓ Reporting mechanism back to functional area command.
  ✓ Format of reporting back:
    ❑ Has to be relatively effortless for entities formulating report, with guidance provided in the original notification.
    ❑ Must include real-time transmission with confirmation of delivery and receipt.
    ❑ Must be available 24/7.
    ❑ What to report includes:
      ▼ Status report of the response entity (current assessment of the impact of the hazard on the resource, and whether a change in usual operational volume has occurred).
      ▼ Hazard information.
      ▼ Changes in response parameters.
      ▼ Other information when prompted.
      ▼ Types of patients to report, if any (defined by a case definition that will become more specific as the epidemiological investigation progresses).

*Note that these requirements can be modified to also apply to notification of a significant change in incident response parameters.
directly addressing the incident impact itself. It is best described through each of the MaHIM functional areas.

**Community Medical and Health Incident Management:**

Community Medical Incident Management is charged with the overall responsibility for the coordination of the health and medical response of a community to any event (subtle in presentation or obvious). With the range of involved resources including private medical and health assets as well as public health and emergency medical services (EMS), most medical assets fall outside the public safety sphere. No clear line of authority exists across this spectrum. Coordination can therefore only be accomplished through effective management systems, not through command. The primary ways in which management fulfills its management role is through the establishment of incident objectives and through adequate information. Both of these are accomplished through the MaHIM Management Process, for which management holds ultimate responsibility (while being heavily supported by the Planning Functional Area).

The MaHIM Management Process incorporates Action Planning, which is defined as the process of establishing and disseminating the incident objectives, strategies (which includes priorities), and tactics through a formal action plan. Figure 9-7 provides an example of incident objectives, strategies, and tactics. During prolonged responses, Action Planning becomes a cyclical process in which revised objectives, strategies, and tactics are established for each operational period, after evaluation and review of response actions during the preceding operational period (see below under MaHIM Management Process). Action Planning is imperative even during response to very short events, although the Action Plan may not progress beyond an oral form. The length of the operational period and timing of transition to follow-on operational periods are determined by management at outset of event, thus establishing the timing of the planning cycle. Operational periods are usually established as 12-hour or 24-hour cycles.

To develop the Action Plan, pertinent data from each functional area must be collected, analyzed, and collated. Information flow follows the incident management architecture, with information “nodes” (for capturing and analyzing data from multiple sub-functions to generate information up and similarly generate information down to the sub-functions) that maintain information “span of control.”

Community Medical and Health Incident Management is closely coordinated with the emergency operations center (EOC), but its function should be kept separate and distinct from the function of the EOC. The EOC is generally focused at broader and higher levels of management beyond the incident sites themselves, and as support to the incident managers. Experience has demonstrated that the two functions (Incident Management and EOC) work best while being closely coordinated but remaining as distinct entities. For this purpose, Incident Management should establish and operate a defined Incident Management “Post” (consistent with the Incident Command Post, the “ICP” of standard ICS). This should generally be in a safe proximity to any incident “scene.”

The management of each individual asset, at all levels of MaHIM, should also be through a defined management structure within the organization and have a clear and consistent method for the interface between the individual resource and the overall MaHIM System.

Safety for all involved in an incident response is an exceptionally important responsibility of the Management Functional Area. All activities are monitored to minimize danger, and the Safety Function also develops and maintains

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**Sample Medical and Health Incident Objectives, Strategies, and Tactics**

Biological agent released causing large numbers of infected AND symptomatic noninfected patients to self-refer to hospitals.

**Primary objective**: provide adequate care to victims of the event.

**Secondary objective**: prevent overloading and ultimate collapse of healthcare facility infrastructure.

**Primary strategy with alternatives:**
- **Primary**: establish transfer capability to transport stable patients to unaffected hospitals (primary strategy for example).
- **Alternative**: establish public education message to refine self-referrals to impacted healthcare. Provide extra resources to impacted healthcare facilities.

**Tactics for selected strategy:**
- Transportation to be coordinated by local EMS and assisted by local metropolitan transit authority
- Supplies to be provided by referring facilities.
- Infection control policy established for transportation and receiving assets.
- Patient medical information to be provided by referring facilities.
- Patient name and demographics to be provided to patient tracking system.
- Management information to provide media briefing. Includes information on infectious risk.
- Referral facility to provide follow-on care.

**Types and quantity of resources assigned to tactic:**
- EMS units
- Transportation units
- Personnel
- Transport equipment
- Receiving facilities.

**Figure 9-7**
a comprehensive, up-to-date Health and Safety Plan (HSP) that is specific to the incident. The HSP should include all known hazards defined geographically and functionally and should delineate each hazard’s specific danger to responders. A brief description of efforts under way to control the hazards or prevent responder injury, and personal safety recommendations for responders themselves, should be a central part of this plan. This includes the recommended type of personal protective equipment (PPE) and what is appropriate for each location and activity. The HSP may also describe a safety evacuation signal from a “hot zone” (collapse area, hazardous materials hot zone, area of patient isolation, etc). Designated regrouping sites after emergency evacuation (for accountability and further guidance) should be clearly identified in these instances. The entire HSP must be dated, reviewed/revised as indicated for each operational period, and widely disseminated. A safety message that summarizes the HSP is also provided as a supporting document with each operational period’s action plan.

**Regional Medical and Health Management Coordination:**

Impacts that cause most mass casualty incidents extend beyond the jurisdictional borders of a single community. Even when there is a focused incident scene, health and medical effects in many instances will spill over the borders of the affected jurisdiction and involve neighboring communities. Mechanisms must therefore exist for coordinating the response efforts of contiguous communities that comprise a region.*

A Regional Management Coordination Function provides this coordination through formal mechanisms of information sharing between communities and through coordination of each individual jurisdiction’s incident objectives. To accomplish this, the activation of the Regional Management Coordination Function must occur at the first sign of a possible incident and a formal process for regional management briefings (RMB) must be defined. The RMB is only intended to provide a brief report from each jurisdiction (possibly by using a summary of each community’s AP) and then allow brief discussion of joint issues. Any in-depth problems between jurisdictions are assigned to appropriate jurisdictional management personnel to coordinate outside the RMB and then report back (i.e., include in the briefing at the next RMB). The RMB does not directly affect the incident objectives and strategy in each member community but coordinates the community’s Action Plans and resolves any unintended conflict through information sharing and discussion.

The product of an RMB should be a set of regional strategic objectives, formulated from templates developed during the planning/preparedness phase of emergency management. These jointly determined objectives form the basis for the Regional Action Plan (RAP), which defines an interjurisdictional coordination strategy for each operational period. For short duration events, there may be only one RAP developed.

Regional briefings are “attended” by each jurisdiction’s medical and health incident manager. Others could include political leaders and/or their designees (usually the emergency manager), the public health and acute care medicine authorities from each jurisdiction, and potentially a few key additional stakeholders and/or technical experts at the request of the jurisdictional incident managers. Attendance may be physically in a single location, or virtually through effective communications from attendees’ remote locations. This should be determined at the outset of the incident so that an appropriate and adequate communication system can be implemented for adequate participation by remote attendees.

The timing of regional management briefings is critical. RMBs occur near the beginning of each operational period, immediately after the time individual jurisdictions conduct their own operations briefings. Participants are therefore fully informed on all new information within their own community’s incident response. A method must also be in place to alert participants for any need for a short-notice, unscheduled RMB when new or unexpected issues develop. This method could be the same one used for the original activation of the Regional Management Coordination Function.

The overall management of any large event will be complex and time intensive. It is therefore important that RMBs have structured formats to force time efficiency. Typical RMBs would last less than 30 minutes and the discussion should be almost exclusively related to strategic regional issues and not devoted to answering multiple questions on incident characteristics. Support and conduct of the process itself should be provided by a Planning Function — this could rotate among the involved jurisdictions or could be performed by the primarily involved community. The reports for the RMB (including each of the jurisdiction’s Action Plans) are coordinated by individual jurisdiction Planning Functions prior to the RMB (i.e., distribution precedes the briefings by enough time that the information is read by RMB attendees prior to the briefing).

* In some events, such as the large-scale dissemination of a biologic agent, coordination may be necessary across geographically remote communities. Information, such as at-risk populations, may be vital to multiple communities given the mobility of current society. National objectives may need to be established, and this responsibility necessarily becomes that of the federal government.
Medical and Health Operations Functional Area:

The Operations Function directly addresses the general incident medical objectives (set by management) in any mass casualty incident. The objectives to be achieved fall into one of three categories:

1. Reduce hazard exposure. Avoid or minimize the hazard exposure to patients and the population after hazard “release.” Evacuation strategies, shelter-in-place, patient isolation and other disease-specific containment strategies, and establishing environmental surety, including site cleanup and “clearance” to return to full function, are included in this category.

2. Increase hazard resistance. Maximize patient and population resistance to the hazard impact after exposure. Mass prophylaxis and immunization for the exposed and potentially exposed fall within this category.

3. Promote/achieve healing from hazard effects. Maximize the rate and degree of patient and population healing from the hazard impact. “Healing” encompasses both physical and psychological dimensions, whereby interventions can be directed at both the level of the individual patient and the population as a whole. Expedient, respectful management of fatalities is included in these operations.

The Medical and Health Operations Functions are described in Chapter 7. While each has discrete objectives and missions, they must operate in a coordinated and interdependent manner. Regular reporting of event parameters and resource status must occur through each of the individual sub-functions. The Incident Epidemiological Profiling Function reports in both the initial and later stages of an event (for example, the Patient Surveillance and Tracking Sub-function reports) are especially important for the other Operations Functions in anticipating response needs. The Operations information node collects the information from each Operations Sub-function. It is applied at the level of the Operations Functional Area and is also forwarded to the Planning Functional Area for processing and use in planning. Similarly, bulletins and updates come from Management to the Operations Functional Area information node for dissemination within Operations. The timing of reports must be established to fit within the planning cycle process.

Medical and Health Support Planning Functional Area:


Action Planning:

The Planning Functional Area maintains the processes necessary for the development of the Action Plan and provides support to management for completion of the Action Planning process. As stated earlier, the goal of Action Planning within the MaHIM Management Process is to develop incident objectives that guide the medical incident response (i.e., “management by objective”). Jurisdictional management (or unified management) is responsible for this, with significant input and judgment provided by the leadership of the Operations and Support Functional Areas. General tactics for achieving the objectives are outlined also, but specific tactics may change during the operational work cycle. This maintains response flexibility, since it is the responsibility of the functional area (usually Operations) to decide specific tactics for achieving the designated objectives. Subsequent Action Planning cycles develop new or revised objectives as indicated.

To provide comprehensive, achievable, and measurable objectives, Action Planning involves multiple processes. While the primary focus is the development and documentation of the incident objectives for an operational period, supportive plans are vital to effective incident management. These planning activities include developing projections for incident needs (Event Epidemiological Projection), evaluating the success of response actions (Measuring Effectiveness), identifying options to consider for response strategies (Alternative and Long Range Strategy Planning), providing emergency plans in the event of a sudden change in incident parameters (Contingency Planning), and establishing demobilization plans.

The Action Planning Function is therefore very complex and requires a defined standard operating procedure and recurring action time line (recurring each operational period). Initial phases of response to an event can be disorganized due to circumstances, and the complex planning process is never immediately implemented. During the first hours of a large incident, planning is commonly reactive at the tactical level (directly responding to perceived important issues) until Action Planning becomes established. As the response structure organizes, planning must rapidly become proactive and “objectives driven” (Figure 9-8).

Initial assessment and response in the reactive period are developed using basic information that has been provided to incident managers under stress, and only very broad, urgent, lifesaving objectives are established. As incident information gathering evolves, incident objectives are refined and developed into an Action Plan. For short events, the Action Planning Process may end with the development of one formal Action Plan. For longer events, formal Action Planning must be initiated as soon as possible, so the reactive management phase is limited to the first operational period (or less).
The second phase of Action Planning becomes a repetitive “planning cycle” for each operational period. It is proactive (rather than reactive) with incident objectives identified through a defined series of meetings and actions. The meetings themselves must be focused and without outside interruptions, and they must be brief (see briefing requirements defined in Chapter 8).

- **The Management Meeting** develops, evaluates, and revises incident objectives. The incident managers and the leadership of the Incident Management Functions participate. They rapidly review all pertinent incident information prior to establishing the incident objectives for the operational period.

- **The Planning Meeting** develops incident strategy and major tactics to accomplish the incident objectives. Participants include Management Meeting members and the leadership of the functional areas and key functions. The Action Plan for that operational period is then completed.

- **The Operations Briefing** presents the current Action Plan to the leadership of all functions. This commonly is done during change of shifts with oncoming and off-going leaders in attendance. This promotes smooth transition of information and management roles. Liaisons from important “outside” functions (such as law enforcement) also participate. Meeting members are given a brief opportunity to comment on the Action Plan and tactics.

There is only one overall Incident Action Plan in each jurisdiction. Subservient Action Plans (such as those of hospitals) should be carefully designated as Hospital Action Plan or probably more correctly as Hospital Operations Plan. Pharmaceutical systems may have a Pharmaceutical Logistics Plan, and so on. The designated operational period must be clearly marked on each titled plan to maintain clarity, since longer incidents can have sequential Action Plans for each operational period.

The Information Processing Sub-functions of the Planning Functional Area provide input to both management and planning meetings. Community health surveillance, patient tracking, resource status, boundary function information, expert information, and functional area status reports all are considered in establishing the objectives, strategies, and tactics for each operational period. Appropriate information from these areas is included in the Action Plan as supporting information.
Some incidents may not be of the magnitude or duration to warrant the transition to a fully implemented planning process and a comprehensive Action Plan. Incident objectives, however, should still be established and disseminated.

A comprehensive Action Plan includes:

- Overall incident objectives and priorities (what is to be achieved during the operational period and what priority should be assigned to each objective).
- Primary strategies for achieving objectives (with alternatives listed).
- General tactics for the selected strategies, including major assignments.
- Types and quantity of resources assigned to each tactic.
- Tactical organization (can be organized geographically or functionally).
- Organization of supporting elements.
- Communications plan.
- Safety message (reflecting all important components of the HSP).
- Supporting documentation:
  - Maps of impacted area
  - Time line of events
  - Time line of meetings
  - Traffic plans
  - Weather reports.

The Planning Functional Area also provides support to management and operations pertaining to organizing and running the management and planning meetings and the operations briefing. It also organizes plans and information archiving so that documents are readily available for ongoing planning efforts. It assures that the information systems are established and functioning to meet the information needs of the incident.

Information Management:

Information processing is the second role of the Planning Functional Area, assuring that information systems are established and functioning to meet the information needs of the incident. In many regards, Information Management can be considered the foundation for effective mass casualty incident responses, and it is therefore critical. To do this for a large-scale mass casualty incident, particularly one that crosses jurisdictional boundaries, many complex and interrelated tasks must be accomplished in a timely and coordinated fashion. This encompasses information acquisition, analysis, and dissemination. Development of critical information documents for this purpose is supported by the Information Processing Sub-functions of the Planning Functional Area.

The information itself is complex and time sensitive. For responders, information is needed about the event itself, the disease processes involved, unusual specifics regarding treatment of patients, responder protection, and healthcare surge capacity. Information specific to individual patients and also regarding defined patient populations is vital to management of the event and must be provided in a controlled format by the response community. The public will require timely, progressive incident information to promote beneficial behavior, to suppress rumors, and to provide a sense of security and safety. To accomplish these objectives across the entire incident, clear and consistent information must be disseminated in a seamless manner across jurisdictional boundaries.

Adequate Information Management requires a system with a developed, dedicated information management operation at the local level that has information acquisition, data collation and analysis, and information reporting as its sole focus. Because of this importance, the Information Processing Function should be delineated by a specific term, such as the Medical Local Information Function (MH-LIF) used in this document. It should be noted that the defined medical information management capability is a function to be performed, not a physical location or a single organization.

In MaHIM, this capability is dedicated completely to acquiring, processing, and reporting information using standardized procedures. Planning receives designated reports at defined intervals from the Operations, Logistics, and Admin/Finance Functional Areas, analyzes the information to develop conclusions, and presents the information in an organized format to incident managers and its other MaHIM “customers.” Liaisons with major organizations outside the local Incident Management System (such as federal law enforcement) obtain appropriate information from these sources for the Action Plan. Action Plans include an attached annex with many of these standardized reports (and a summary of others). The Action Plan for each defined operational period, therefore, becomes the primary written communication from management that is disseminated throughout the Incident Management System. The standardized reports included in the Action Plan annex are product driven, i.e., the format and content are developed to meet the information needs of key MaHIM functions.

Within this structured approach, any entity within the response system has the permission and the capability to talk to any other response entity. Bulletins, advisories, resource requests, and status changes, however, are captured in a formal fashion and must follow the recognized functional approach unless otherwise stipulated in the plan.
Jurisdictional Information Management Responsibilities:

Each “community” should establish medical information systems in meeting its legal and political responsibility for the health and safety of the citizens residing within that jurisdiction. This translates into at least one MH-LIF per state jurisdiction, with division into intrastate regions at the state’s discretion. Furthermore, the state’s responsibility requires that all jurisdictional information functions within a state be linked together (see below) to provide a comprehensive state information system.

A MH-LIF should be minimally operational at all times, supporting ongoing surveillance and resource status activities. This type of regular Information Management is currently performed by some public health agencies (e.g., New York City Department of Health) and facilitates response to natural outbreaks of disease (e.g., West Nile virus) or assists health personnel in the evaluation of specific injury or illness patterns (e.g., pedestrian accidents, product tampering). To clarify the level of activation of a MH-LIF, it may be useful to establish different levels of response. These could be classified as:

- Normal operational status.
- Epidemiology investigation status.
- Alert/confirmation of a medical emergency and partial activation.
- Full activation.

During the response to an incident, the MH-LIF would be accelerating operations rather than establishing de novo capabilities. As the incident evolves, the MH-LIF would be responsible for the wide distribution of any new or additional instructions for standardized reporting of patients, lab data, environmental evaluation, adverse reactions to medications, and other pertinent information described below.

Information must be analyzed and collated by the MH-LIF for multiple purposes in addition to formal planning process reports. Other specific information recipients include:

- Logistics: geographic depiction of data to delineate the areas of medical needs so that medical resources can be rapidly mobilized to meet patient needs.
- Management/safety: geographic depiction of data to develop the perimeters of the areas of risk and to portray the data so that it is understandable for the incident managers. It is subsequently forwarded to responders, political leaders, the media and the public.
- Operations: return of information, in aggregated formats, to the sources providing the data for surveillance and for epidemiological determinations. This promotes better participation by the reporting sources.

- Liaison: for exchange of information with the outside entities.
- Acute care medical community: the regular posting of the following information, ideally through timed public health advisories that are regularly and publicly updated. Information conveyed includes:
  - All public health recommendations (description of the case definition, symptom complex, recommended evaluation procedures, recommended treatment interventions for the ill/injured cases and evaluation protocols for the concerned, potentially exposed patients presenting for evaluation). This should include a written information sheet that could be distributed to each patient, thereby standardizing evaluation, treatment, information distribution and follow-up.
  - A method to check for new information or change in public health recommendations occurs between the scheduled releases (hospital emergency departments, hospital infectious disease experts, hospital medical directors, regional public health jurisdictions).
  - The relevant data (including negative environmental sampling) upon which the public health recommendations are based, updated at least daily during an active incident.
  - A situational report providing a comprehensive presentation of the current public health and medical actions, the locations/times of operation of health facilities, the numbers of patients treated, and a composite of the information above.

Interjurisdictional Information Management Responsibilities:

A regional Information Function is also not a physical entity but rather a function that combines the efforts of participating Medical and Health-Local Information Functions (Figure 9-9). Information Management Functions in each distinct jurisdiction share their information between themselves, creating a regional function with information input, analysis, and reporting equally available to the incident managers from adjoining jurisdictions. This regional Information-sharing Function is especially critical for interstate regional management coordination.

In cases in which the incident involves noncontiguous states and regions (such as the anthrax dissemination mail incident in 2001), this information function may require coordination across geographically remote areas through a national network.
Logistics Function

Logistics provides support to Management and Operations pertaining to personnel (processing, food/hydration, billeting, transportation, preventive medicine, and medical/mental health care as indicated, etc.), equipment and supplies, and technical capabilities. Each individual asset within an incident response has its own internal Logistics Function that meets this need during regular day-to-day operations. This would continue to function during an incident, providing internal support, and may be the internal point of contact that interacts with the MaHIM System’s Logistics Functional Area. In addition to responding to requests for support, the Logistics Functional Area works to anticipate logistical needs (through information from the Planning Functional Area, Action Plans, etc.). For instance, a single hospital will have its Logistics Function work to obtain portable lights and batteries for a prolonged power failure as part of a large, unpredicted hazard impact (tornado, grid failure, etc.). Simultaneously, the Logistics Functional Area would be establishing a capability to obtain batteries and portable lighting for all healthcare facilities in the jurisdiction (i.e., anticipating need).

Logistics must have very reliable communications with all functional areas to receive and confirm requests. The confirmation should provide information relating to the availability and time frame for supplying the resources. Requests for Logistics support must follow the Incident Management architecture, similar to the information node arrangement for data reporting, so that effective span of control (for requests) is maintained. This also allows functional leaders to remain informed about requests for assistance from organizations within their area of responsibility (they may be able to fill the request more efficiently from within their functional area rather than through the Logistics Functional Area). Logistics also coordinates closely with the Administration/Finance Functional Area, since much of the support that is provided (goods and services) must come through a purchase arrangement.

Administration/Finance Function

Financial Support:

The financial impact of both short- and long-term events can be significant on a community’s health and medical sectors and is often overlooked by state and federal funding sources during response and recovery operations. Disruption of regular revenue-generating business, upgrades necessary for response, overtime costs, and money spent for facility and equipment rehabilitation are all factors that contribute to the unrecoverable costs for these institutions. The MaHIM System devotes a function to the tracking, analysis, and recovery of these expenses for MaHIM’s component institutions. Individual entities within the system possess their own individual financial accountability structures for regular operations and provide a point of contact between the entity and MaHIM for this purpose. For instance, individual healthcare facilities have human resource departments that manage the payroll for the staff and billing departments that invoice for care received. During the response to an event, extra staffing patterns, higher reliance on staffing agencies, potential claims for worker illness or injury incurred during response can all bring additional significant cost to the hospital (in addition to other factors listed above). Preparation to receive multiple casualties, and then never receiving them, is another costly impact on regular business. The Financial Support Function would act in support of the individual institutions to track costs and support reimbursement.

Regulatory Compliance:

Support must be provided to the system in the form of regulatory compliance. Challenges can be presented by licensing and certification regulations for additional practitioners brought in to assist, use of pharmaceuticals for non-approved indications, variance from capacity regulations, or interpretations of a community’s public health law. The Regulatory Compliance Function can respond to direct requests for assistance from leaders of operations and management functions. This function should monitor all MaHIM activities to assist with compliance issues.

Healthcare Infrastructure Business Continuity:

From a business perspective, all components of the system have the strategic imperative of maintaining capabilities while providing quality patient care as a result of an event. Maintaining business operations despite overwhelming hazard impact on facilities (as occurred during the 2001 Houston floods) is critical to medical capability, and this function
assists MaHIM entities with this task. Though it may have even a greater role during demobilization and recovery phases, it should be established early in an incident to assist entities with business continuity issues as they arise.

4. Demobilization

Demobilization is the phase that transitions Management, Operations, and Support Functions and elements back to normal operations or to their baseline standby state as their operational objectives are attained. Demobilization transition includes the organized and formal transfer of incident responsibility to another incident asset or the formal phaseout of the asset’s activities. Demobilizing includes the assessment and processing of the function’s assets (accounting for them, evaluating their status, and initial rehabilitation of both equipment and personnel), transportation to the pre-mobilization location, completion of incident documentation (not the after-action report), and an incident review and debriefing. The system (including Information, Planning, and Management) should work to have demobilization of system entities begin at the earliest indicated time. This will limit financial costs, limit impact on the assets themselves (personnel and equipment) and their usual constituents (by returning them to their primary focus), and hasten the process of asset recovery to baseline response readiness. For instance, hospitals should return their operating rooms and emergency departments to normal operations at the earliest possible opportunity. This rapid return to normal operations will also address preparedness concerns for a secondary hazard event or another, unrelated mass casualty incident. It will also promote the return of the community to normalcy. Demobilization of unneeded assets throughout the response phase should be common as individual resources complete their assignments and incident objectives are attained.

A key function of Planning, therefore, is to begin developing demobilization plans as early as possible. In many instances, the decision to transition to demobilization is not an easy one to make. Demobilization may be perceived negatively by the general public and by responders (example: returning FDNY resources to their stations and decreasing recovery assets at the World Trade Center site after 9/11). Demobilization decisions must be supported by a strong response community and public message that defines why assets are being demobilized (i.e., that incident response objectives have been met and that incident recovery objectives are under way).

In addition to Planning, the Logistics Functions are also closely involved in the demobilization phase. Transportation of personnel and equipment, equipment return and rehabilitation, and equipment and stock resupply are key elements of the demobilization process. Responder support activities and other Logistic Sub-functions are also affected.

5. Recovery from the Event / Organizational Learning

Recovery focuses upon returning organizations and community to their baseline levels of functioning, and therefore denotes the period that extends from demobilization until return to pre-incident function and capacity. It includes, in addition to the full rehabilitation of personnel and equipment, full resupply and reorganization of equipment and supplies to a baseline readiness state and baseline nondisaster operations. It also includes an “after-action assessment process” that consists of collection and objective analysis of pertinent response information to produce “lessons learned,” and an incorporation process consisting of improvements in procedures, assignments, equipment, training, and personnel to attain true organizational learning.

Concepts Relevant to all Phases of Response

Certain concepts are relevant across the different response phases.

The concept of “Engineered Failure”

Functional capabilities are generally designed and developed to meet a projected capacity. Consideration must also be given to further designing the capability so that when capacity is exceeded or critical support resources are compromised, the capability “fails” in a controlled (“engineered”) fashion rather than catastrophically. This concept should also be incorporated into response strategy. Some suggested strategies for accomplishing this include:

- Develop processes for internal resource tracking to determine when capacity thresholds are threatened. This process should include built-in alarm triggers if reserves are reaching a critical level or if the rate of reserves is rapidly declining.
- Develop processes to augment/replace resources as they reach capacity. This strategy can be applied to personnel, facilities, equipment, and even medications. If preplanned (and in some cases preannounced to prevent confusion or concern), this strategy could include defining a point where resources with different standards could be recruited/deployed to prevent exceeding capacity. An example could be the deployment of nonlicensed physicians (residents, interns, students) to healthcare facilities to assist in the evaluation and care of patients. If critical shortages arise, the temporary use of medications may be required that are not FDA approved for that particular indication (yet have demonstrated efficacy). This type of strategy would play a role in the Planning Functional Area, Contingency Planning Sub-function.
- Prioritize system components for survival. Management
may identify key functions that must retain adequate capacity. Recruiting resources from less-critical functions and therefore allowing managed degradation of system components may preserve critical operability. Management must continually reassess and adjust priorities as the incident evolves.

- Track excess capacity and incorporate into planning. The development and maintenance by management of the ability to monitor reserve/excess capacity and actively transmit this information to managers (through the Planning Function) is critical.
- Develop “fallback” actions and procedures to accomplish an orderly systems degradation and/or shutdown. If capacity of an individual entity is exceeded, preestablished steps should be undertaken to protect that entity from further response stress. These procedures should have critical issues addressed such as maintenance of future viability of the entity, safety of persons connected with that entity, and public information as to the change in the response system. For example, if hospital capacity is exceeded, a major public information initiative may be required to publicize alternative, adequately prepared sites for medical care.

**Surge Capacity Capability and Processes**

Capacity vs. Capability: Surge capacity refers to an ability to rapidly increase the volume of patients that can be evaluated and treated. To accomplish this, procedures must be in place to provide administrative, logistical, and financial support that allows a more efficient or larger medical and health response. Surge capability provides specialty medical and health services that are not regularly available at the location where it is established (e.g., pediatrics, burn, mass prophylaxis, etc.). The added capability often depends primarily upon expert information from outside resources, coordinated through the Plans function, rather than primarily additional equipment or personnel. There may however, be a requirement for specialized staff and/or physical resources obtainable only from elsewhere (through mutual aid, or regionally/nationally through a request to the jurisdictions EOC). To achieve this, the sub-functions must initially optimize their individual surge capability performance through a preestablished emergency operations plan for each of their assets. The next level of surge capacity comes from the system’s ability to provide adequate logistical, planning (information), and administrative/financial support locally to individual resources. The next level of surge capacity employs the mutual aid concept, using preestablished agreements and relationships with local, regional, and possibly state assets with similar capabilities. These agreements stipulate the parameters for when (triggering mechanisms) and how (where to report, proper credentialing, types of assignments, etc.) neighboring assets assist each other in times of need.

**Examples of Maximizing Community Medical Response “Surge Capacity”**

**General Strategies:**

1. **Optimally match the distribution of needs (patients) with immediately available health and medical resources** (historically, the most overlooked strategy).
   - EMS distribution: EMS system initiates distribution of patients based upon known hospital capacity and specialty capability. Rapidly, information management system (through Planning Functional Area) obtains more current data and information on individual facility surge capacity. System maintains dynamic mapping of hospital capacity and capability/availability through a coordinated report from all hospitals. Provided back to EMS for further distribution of patients.
   - Non-EMS distribution: rapid and effectively disseminated public information is released relaying where to receive appropriate care in a place that currently has open capacity (the model of conveying traffic information to commuters through radio/television/web may be used for this process). Signs and other visual directions could be stationed to influence individuals and populations to move in the directions of adequate, appropriate medical resources.

2. **Maximize the capabilities of individual response resources through the opening of reserve capacities and augmentation with emergency processes.**
   - Individual entities (hospital, labs, etc.) initiate emergency operations procedures for surge processes.
   - Local support provided that optimally increases the individual entity’s capacity (for example, local chapter of American Red Cross deployed to provide feeding and billeting of volunteer workers).
   - Close coordination and mutual aid between all entities performing the same or related functions within a jurisdiction (for example, mutual aid provided between hospitals).
   - Controlled (planned and monitored) degradation of services when maximum capacity is exceeded (engineered failure). The best possible response is provided and catastrophic failure of the individual component is avoided (for example, accepting progressively lower standards or levels of medical diagnostic testing while maintaining the capability to perform all critical tests).

3. **Maximize the jurisdictional system’s capability and capacity.**
   - Hospital medical personnel, equipment, and supplies provided through mutual aid: first local (as above), then regional, state, and nationally provided. In severe catastrophic events or ones with unique aspects, consider the provision of international mutual aid.
   - Outside resources augmenting local/regional response. For instance, specialty services provided by federal government.
   - Provision of expert information that improves efficiency of operations.

Some examples include:

- Information that assists the treatment of patients in areas where their conditions are not normally treated (e.g., treatment of burn patients in nonburn centers, treatment of children in nonpediatric centers, treatment of patients with pulmonary conditions in centers without pulmonary specialists). The basic principle is bring the information to the patient, not the patient to the specialist.
- Infectious disease outreach to public to positively influence population behavior to limit morbidity and mortality.
- Specialist outreach to medical community with recommendations for a more efficient diagnostic process for an unusual incident illness.
- Information on optimal staff protection while maintaining ability to function.

4. **Build and maintain extra (and reserve) capacity.** This is possibly the most expensive option and has utility in an event determined to be inevitable. This is a longer-range option only.
The initial mutual aid would be local (including proximate jurisdictions just across a state line), then regional, state, and, finally, a national mutual aid response based upon the procedures established by the Federal Response Plan. Example strategies for maximizing medical response capabilities are provided in Figure 4-1.

While driven at the tactical level, the mutual aid arrangements should be consistent with the local and regional strategic preplan for mutual aid. For assets to rapidly become coordinated and directed from the strategic level, the Planning Functional Area must be acquiring information, and its Alternate and Long Range Strategy Planning and Event Epidemiological Projection Sub-functions must use this information to address planning for near and longer-term projected needs. For instance, after a large explosion, mutual aid assets are expected to respond based upon prearranged agreements and in accordance with specific preplanned parameters (when, where to report, communication channels, etc.). Once the response system has moved into a strategy and management-by-objectives mode, the Planning Functional Area would be expected to provide information on critical medical needs in the short term and funnel it to the appropriate functions for resolution (Logistics, Liaison, Management, etc.). This will allow for a more-effective implementation and use of designated mutual aid. Simultaneously, the strategic goals of mutual aid agencies can be addressed at the management level and accommodated (see Figure 9-11).

Support to the health and medical community by “outside,” non-jurisdictional resources may be warranted in events of sufficient magnitude or those requiring specialty assistance. Specific procedures must be delineated for the acquisition and management of these assets. If federal or state assets are available locally, jurisdiction managers may plan to incorporate them into local/regional response (subject to the limitations imposed by their primary missions).

- State level capabilities vary greatly by state. Coordination should be provided through the state emergency management agency. Assets include state National Guard assets, which may be activated by the governor after a request through the EOC (except possibly in some areas with Weapons of Mass Destruction – Civil Support (WMD-CS) teams that have arrangements to respond as local assets). Public health departments may be supported by state departments of health (specialty lab capabilities, etc). Department of Defense installations within the jurisdiction may be available in emergencies at the discretion of the local military commander (important to establish liaison methods for adequate preparedness). Veterans Administration resources at local facilities may also be important assets to consider.

- Health and medical assets available through the Federal Response Plan (FRP) generally fall under Emergency Support Function (ESF) #8 – Health and Medical Support (Figure 9-11). Requests for FRP assets are made by Incident Management through the community EOC and then forwarded through the state (these requests should only be approved after a determination that the state cannot meet the request). The actual request for federal assistance should outline specific needs and not ask for explicit federal entities.

Any request for federal assistance should generate a response that outlines specifications of that federal resource’s capabilities and support requirements (transportation, housing, operational support such as manpower and equipment/supplies). Expected and maximum lengths of operation (so follow-on resources may be planned if necessary) are important to establish up front as well.

All responding federal assets should be provided with specific instructions at the time of request for their services. For instance, federal assets should be provided with information on where to report (mobilization center/staging), whom
(designated by management position) to report to, and what
to bring (self/unit support, operational support, regulatory
documents).

• Management of the federal and other “outside” assets
should occur within or under a jurisdiction’s functional over-
sight authority, unless specifically arranged otherwise (such
as the FBI). Once assigned to a specific task, “outside” assets
are no longer a primary Logistics oversight; they become a
component of the function and functional area in which they
were assigned.

Security Processes

Security is a vital area of focus at all levels of response and
throughout all phases. Adequate attention to security require-
ments promotes safety for responders and patients and allows
for optimal response efforts.

Facility security must be addressed. A hazard risk analysis
should define security concerns (pre-incident) that can be
improved through mitigation and preparedness. Procedures
should be established to address the risk that healthcare facil-
ities pose with on-site hazardous materials, radiation sources,
and infectious agents. Consideration must be given to the
potential of healthcare facilities as a primary or secondary
target of terrorism.

During a terrorism incident, medical entities should be con-
sidered secondary targets for attack. Risk is also generated
by the possibility of injured perpetrators being admitted to
healthcare facilities along with victims.

Perimeter management:
• Crowd control (i.e., capabilities to deal with crowds
seeking care or news of love ones).
• Access privileges: procedures for allowing appropriate
facility access to employees, patients, and concerned family
members, while maintaining restricted access to others.
Example procedures are listed in Table 9-12.
• Media management: methodology for management of the
media should be established. The maintenance of patient
privacy and the prevention of interference with facility
response are crucial.
• Effective interface with law enforcement in augmenting
security and in facilitating the investigation.
• Perimeter and premises “sweep” for possible threats.

Personnel Security:
• Transportation to and from facilities to prevent delays in
access (through security lines, through insecure areas, etc.).
• Security personnel available to screen “victims” and find
perpetrators presenting as patients.

Patient Security:
• Procedures to protect patients from perpetrators, the media,
and exposure to hazards (chemical secondary contamination,
infectious disease, etc.).

Medication/Supplies/Equipment Security:
• Procedures should be established to protect supplies from
tampering and from diversion during periods of short supply.

Technology/Automation/Information Security:
• Procedures are required to ensure security of information.
Patient confidentiality as well as institutional proprietary con-
siderations must be taken into account.

Volunteer Management Process

Mass casualty incidents generate a natural outpouring of
well-intentioned volunteers.

Volunteers can be a valuable asset serving many functions, but
must be carefully screened and processed if they are to
become an asset and not a hindrance to the response.

Perimeter Control and Security
Procedures for Hazard Impact Sites,
Healthcare Facility and Other
Medical/Health-related Facilities

• Double fence (if no walls) and gates/doors with independ-
ent credentials check at each gate/door.
• Credentials checked by guards with visual control of area
between first and second check (i.e., between the gates).
• All persons without credentials are referred to a single or
closely coordinated credentials center/s.
• Persons claiming to be family members or significant oth-
ers of either missing or identified victims should be referred
to a family reception area for the facility (outside the “secure”
perimeter), or to the Patient Tracking/Victims’ Family
Support Services Functions as determined by the incident
circumstances and procedures.
• Media should be referred to established media processing
or media message location as determined by the incident
circumstances and procedures.
• Volunteers processed through an outside-the-perimeter
credentialing center.

Figure 9-12
Volunteer Management Guidelines are included in Figure 9-13.

**Volunteer Management Guidelines**

- Volunteers required to sign up at credentials center. Information collected includes names, addresses, immediate contact method, list of their credentials, list of their capabilities.
- Volunteers are either dismissed (after registering) if there is no actual or anticipated need for their services at that time or sent to staging if there is a potential need for their services. (consideration should be given to pooling the service “needs” across the community so volunteer services may be distributed appropriately).
- All volunteers are given written communication:
  ✓ “Thank you for coming and volunteering your services.”
  ✓ Brief explanation of current incident status.
  ✓ Explains that an Incident Management system is in place; explains that responders work within the system and under supervision, that freelancing can be disruptive and possibly dangerous to both the freelancers and/or the credentialed responders.
  ✓ If there is no need for assistance by the volunteers’ service at present, an explanation states that they are released and will be called, if needed, through the contact method they provided. It describes the need for unequivocal credentials of professional capacity if called. In clear terms it states they should not attempt to enter at another entrance as all unauthorized entry will result in trespassing charges.
- Volunteer staging: volunteers have credentials and preparedness checked; they are registered and logged, checked for all appropriate protective gear; given briefing of work assignment (job, job management structure, immediate supervisor, etc.), safety (PPE, evacuation signal, signing in and out, etc.), and the on-site management structure. Deployed to check-in and receive assignment with their direct supervisor.

Figure 9-13
Project Findings and Conclusions

The process of intensive study and focus upon systems development for health and medical response led the investigators to several findings and conclusions:

- Local (community) mass casualty incident management and response must be well defined before comprehensive, regional coordination can occur.

- Medical and Health emergency management is identical to all other studied components of emergency management in that effective development of response capacity requires a “bottoms-up” approach. Interdisciplinary coordination and integration are most important at the level of local incident management systems and emergency operations centers. Federal programs for local preparedness must be restructured such that they promote this community-based approach to enhance preparedness. This equates to providing functional guidance (models) that assist the locals themselves in defining management and response capability.

- Systems must be defined and developed before any meaningful operational training can occur (i.e., operational training can only be effective if the participants are using a defined response system). Otherwise, training can be considered “awareness level” only).

- Effective surge capacity must first be structured using maximum efficiency of individual response components, and then leveraged using maximum coordination of community-based management and response elements. This is critical, since individual communities are expected to be on “their own” during initial phases of response to most events and it promotes the above-mentioned bottoms up approach. Systems may then be enhanced using local, regional, state, and, finally, national mutual aid. To promote this systems approach, common management and response processes at all levels should be delineated and implemented. This will promote more cost-effective training as well as more cohesive integration during an incident.

- In developing medical and health response systems, effective analogies can be drawn from the experience in the nonmedical response communities. Though consideration must be given to the specific parameters outlining health and medical response, these other disciplines possess a wealth of knowledge and experience in performing emergency response.

- When traditional response actions are re-evaluated as functions representing components of a system, coordination becomes easier. Efficiency and efficacy are promoted. One example of this is the combining of the capability for pre-event patient (case) surveillance with post-impact patient tracking and incident case surveillance.

- Lack of funding is regularly cited as a primary cause for inadequate medical preparedness for mass casualty incidents. Financial compensation during an incident is not an effective incentive for adequate preparedness. Furthermore, motivation may be minimized by the perceived low probability of an incident and the concern that response circumstances will prevent adequate compensation. Financial incentives for medical assets should be the same as those for other public safety disciplines: contractual payment in exchange for developing and maintaining a defined response capacity. Systems must be in place, preferably using public safety processes, to address financial remuneration for both preparedness and response activities.

- For mass casualty preparedness to be most effective, measurable requirements must be developed, with healthcare assets contractually obligated to develop and maintain the capacities described in this report.

- Regular “drills” of the regional coordination system should be conducted, evaluating individual system components as well as overall regional coordination.

- The regional management coordination function should be used as the mechanism for regional preparedness as well as response, providing the platform for system development discussions during the implementation and preparedness phases. These regional management coordination sessions during the implementation/preparedness phase should be run using response-style briefings for both discussions and decisions, and should use the regional information system for background materials. This will assure that the regional coordination system is functional when needed for a mass casualty event.

- When adapting this model, individual communities may assign responsibility for the functions and sub-functions to
response resources available for that jurisdiction. Assignments are expected to occur according to traditional roles, legal authorities, and available capabilities inherent to that jurisdiction. It is expected that an individual response asset may be tasked with multiple sub-functions or functions. To be a truly effective tool, MaHIM should be further investigated and validated. The described systematic approach requires more specific information than is provided in the scope of this initial project.

This document describes the MaHIM operational model. It was beyond the scope of this six-month project to provide the educational, training, and implementation guidelines required for the MaHIM model to be established in a jurisdiction. Formal pilot implementation of the model in an actual jurisdiction were also outside the boundaries of this project. A pilot study of the MaHIM model as a tool for MMRS development in Arlington County, Virginia is, however, underway. The project investigators expect that the model will evolve as implementation and response experience progresses using MaHIM. A fully completed implementation tool requires detailed position descriptions, operational checklists for those positions, and other details that were beyond the scope and timeframe of this project.


American College of Emergency Physicians NBC Task Force. Developing objectives, content, and competencies for the training of emergency medical technicians, emergency physicians, and emergency nurses to care for casualties resulting from nuclear, biological, or chemical (NBC) incidents: final report (23 April 01). American College of Emergency Physicians, Dallas TX.


### Appendix A  Document Research List

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Source</th>
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<tbody>
<tr>
<td>Inglesby T.</td>
<td>Lessons from TOPOFF.</td>
<td>Presented at: Second National Symposium on Medical and Public Health Response to Bioterrorism; November 28, 2000; Washington, DC.</td>
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<tr>
<td>Kolavic S et al.</td>
<td>An Outbreak of Shigella Dysenteriae Type 2 Among Laboratory Workers Due to Intentional Food Contamination.</td>
<td>JAMA Aug 1997;278(5):396-98.</td>
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Web Site Review

American College of Emergency Physicians:
http://www.acep.org

American Psychiatric Association, Disaster Psychiatry Page:
http://www.psych.org/pract_of_psych/disaster_psych.cfm

American Red Cross: http://www.redcross.org/

Centers for Disease Control and Prevention:
http://www.cdc.gov/

CDC Bioterrorism Preparedness & Response:
http://www.bt.cdc.gov/

CDC Health Alert Network homepage:
http://www.phppo.cdc.gov/han/

CDC National Pharmaceutical Stockpile Program:
http://www.cdc.gov/nceh/nps/

Consequence Management Interoperability Services,
Battelle/DOD: http://www.cmi-services.org/

Department of Health and Human Services (DHHS),
Office of Emergency Response (OER):
http://ndms.dhhs.gov/index.html

Department of Justice, Office of State and Local Domestic
Preparedness Support: http://www.ojp.usdoj.gov/osldps/

EPA Emergency Response Team: http://www.ert.org/

Federal Emergency Management Agency:
http://www.fema.gov/

The National Response Center, U.S. Coast Guard:
http://www.nrc.uscg.mil/index.htm

The National Response Team, HAZMAT & Chemical
Spills: http://www.nrt.org/
## Project Work Plan and Task Completion Schedule

1. **Project Commencement:** 3/11/02

2. Initial draft white paper: a requirements-based model for mass casualty medical care (as noted above.) Performed by the PI with ICDRM personnel and Anthony Macintyre, MD (George Washington University Department of Emergency Medicine). Input obtained from expert consultants: completed three months from onset of project. **COMPLETION DATE:** 5/31/02

3. Working group meeting (one day) in Washington, D.C., for invited experts and regional representatives to provide comprehensive input to the draft model. **DATE:** 6/5/02

4. Revision and further development of the white paper based upon input from the meeting. **COMPLETION DATE:** 7/19/02

5. One day working group meeting for final review, discussion, and input to the documents. **DATE:** 7/25/02

6. Revision based upon working group recommendations: one month. **COMPLETION DATE:** 8/25/02

7. Presentation to key customers for input (formatting, clarity, and other noneditorial issues). **DATE:** MULTIPLE PRESENTATIONS IN EARLY SEPTEMBER

8. Revisions completed based upon briefings feedback and submitted to proofreader and publishing expert. **DATE:** 9/16/02

9. Completion of deliverables: one month. **DATE:** 9/30/02

10. Presentation of findings. **CONFERENCE PRESENTATION. DATE:** 10/16/02

11. Conference Report and follow-on activity. **COMPLETION DATE:** 12/31/02
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
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<td>Dr. Arn Howitt</td>
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<td>Dr. Ed Lucci</td>
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<td>Dr. Ann Norwood</td>
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<td></td>
<td>Associate Professor and Associate Chair Department of Psychiatry</td>
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<td>Dr. Tara O'Toole</td>
<td>Director, Johns Hopkins University Center for Civilian Biodefense Strategies</td>
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<td></td>
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<td>Mr. Jim Schwartz</td>
<td>Assistant Fire Chief</td>
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<tr>
<td></td>
<td>Arlington County, Virginia, Fire Department</td>
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<tr>
<td>Mr. Mike Wyrick</td>
<td>President, National Capital Region - Emergency Response</td>
</tr>
<tr>
<td></td>
<td>Washington, D.C.</td>
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* Affiliations are provided for identification purposes only and do not imply any institutional endorsement.
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<tr>
<th>Acronyms</th>
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<tr>
<td>AP</td>
<td>Action Plan</td>
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<tr>
<td>CBRNE</td>
<td>chemical, biological, radiological, nuclear, and (high) explosive</td>
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<td>CCP</td>
<td>Continuity of Operations Plans</td>
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<td>CIRG</td>
<td>Critical Incident Response Group (FBI)</td>
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<td>DMORT</td>
<td>Disaster Mortician Teams (U.S. Public Health Service)</td>
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<td>GIS</td>
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<td>HAZWOPER</td>
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**Appendix D Acronyms**