Medical and Health Incident Management (MaHIM) System
A Comprehensive ICS Response Organization for Mass Casualty and Mass Effect Incidents
Version 5 Report - January 2010

Joseph A. Barbera, M.D.
Institute for Crisis, Disaster, and Risk Management
The George Washington University

Anthony G. Macintyre, M.D.
Department of Emergency Medicine
The George Washington University

Supported by The Alfred P. Sloan Foundation
Medical and Health Incident Management (MaHIM) System:
A Comprehensive ICS Response Organization for Mass Casualty and Mass Effect Incidents

Joseph A. Barbera, M.D.
Co-Director, Institute for Crisis, Disaster, and Risk Management
Engineering Management and Systems Engineering
The George Washington University

Anthony G. Macintyre, M.D.
Department of Emergency Medicine
The George Washington University

Versions 1 and 2 supported by The Alfred P. Sloan Foundation

Copyright 2010, Institute for Crisis, Disaster, and Risk Management
The George Washington University
Table of Contents

Preface .............................................................................................................................. 7
Chapter 1 Executive Summary .......................................................................................... 10
Chapter 2 Introduction and Background ........................................................................ 22
Chapter 3 Project Methodology: Objectives, Assumptions, and Description of the Process 28
Chapter 4 MaHIM System: Objectives and Assumptions .............................................. 33
Chapter 5 MaHIM System: Functional System Description Overview ............................ 43
Chapter 6 MaHIM System: Medical and Health Incident Command ............................... 47
Chapter 7 MaHIM System: Medical and Health Operations Section .............................. 56
Chapter 8 MaHIM System: Medical and Health Support Sections ................................. 95
Chapter 9 MaHIM System: Concept of Operations ....................................................... 119
Chapter 10 Project Findings and Conclusions ............................................................... 141
Appendix A References and Bibliography ..................................................................... 143
Appendix B Acronyms .................................................................................................... 152
Preface

Background

This project was originally conducted in 2002 to develop a requirements-based and peer-reviewed operational model for mass casualty response. The MaHIM System revision project kept the original focus, but also addresses the “mass effect” incident that could challenge the operational resiliency of medical and health organizations.

The research and conceptual development is based upon medical and public health science and practice, but also specifically incorporates the principles of emergency management science applied in the healthcare context (Barbera, Macintyre, Shaw et al Emergency Management Principles and Practices for Healthcare Systems, 2005). Using this approach, the resultant model provides a single, comprehensive system description of the functional components critical to effective jurisdiction-level response to any incident with significant public health or medical implications. It describes the response functions according to management system constructs, delineating the critical relationships between functions, both within the system and with important non-medical emergency response agencies such as law enforcement and fire services. It also describes the system processes that coordinate these many component functions so they work efficiently toward common response management goals. These goals include:

- The safety of responders, regular staff, patients and visitors in healthcare organizations, as well as the integrity of the healthcare response systems. This includes the continuity of operations (resiliency) for health and medical organizations.
- The limitation of morbidity (injury or illness) and mortality (deaths) in a population exposed to a major hazard.
- Optimal response efficiency through the integration of the varying health and medical resources with each other and with the broader response community

The original version of the Medical and Health Incident Management (MaHIM) System was developed in 2002, well before the release of the National Incident Management System (NIMS). It was also developed well before the increasing acceptance of incident command and other management concepts by the public health and medical communities. Despite this, the original model incorporated many of the NIMS concepts that were drawn from the Incident Command System.

The original MaHIM System model has been applied in a wide range of settings around the United States, and much informal feedback was provided to the authors. This update to the earlier versions is intended to better align the original MaHIM System concepts with NIMS 2008 and other national guidance documents that have been promulgated since the release of the 2002 version.

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

- An all-hazards approach to system development and response management (i.e., natural, technological, and human induced) that is applicable to planning for all medical and health incidents.
- A peer-review methodology that included 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 structure and process (organization), information management, communication connectivity, medical surveillance, medical patient care capacity, and patient specialty care.

This MaHIM System text does not define the innumerable and rapidly evolving technical requirements for medical and public health response tactics (“exactly what to do”), but rather describes the functional requirements to achieve objectives (“what needs to be done”) and strategy (“how to approach it”) for a comprehensive public health and medical response system. The term “system” in this project means a clearly described functional structure and defined processes that coordinate disparate elements to accomplish a common goal.
The term “mass casualty incident” refers to a casualty-creating hazard incident in which the available organizational and medical resources (both “first” and “second response”), or their management systems, are severely challenged or become insufficient to adequately meet the medical needs of the affected population. Insufficient management, response, or support can result in increased morbidity and mortality among the impacted population. A “mass effect incident,” in contrast, is created by a hazard impact that primarily affects the ability of the organization to continue its usual operations (i.e. continuity of operations). For healthcare systems, the usual medical care capability and capacity can be compromised.  

How To Use This Document

This document provides a broad overview of the breadth and complexity of medical and health emergency response, whether for primarily a mass casualty incident, a mass effect incident, or some combination of both. The document moves through a description of the background information and science upon which this project is based (the “development process and assumptions”). It then provides a functionally-based systems description of how medical and health resources could be organized during incident response.

In this document, the word “function” is a systems engineering term that describes a group of activities.

1 Adapted from ICDRM/GWU Emergency Management Glossary of Terms, accessed December 5, 2007 at http://www.gwu.edu/~icdrm/
2 A casualty-creating hazard incident in which the available organizational and medical resources (both “first” and “second response”), or their management systems, are severely challenged or become insufficient to adequately meet the medical needs of the affected population. Insufficient management, response, or support can result in increased morbidity and mortality among the impacted population.
3 A hazard impact that primarily affects the ability of the organization to continue its usual operations (in contrast to a mass casualty incident). For healthcare systems, the usual medical care capability and capacity can be compromised.

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 and in fact has already been utilized by some of these communities.

The Metropolitan Medical Response System is a program under the Federal Emergency Management Agency of the Department of Homeland Security. It provides preparedness funds for communities to improve health and medical capabilities for mass casualty incidents.

More information is available at: http://www.fema.gov/mmrs/
The authors are indebted to Greg Shaw, DSc, Lissa Westerman, RN, and John R. Harrald, Ph.D., for their research, administrative, and editing support in the original project. The authors would also like to express their appreciation to the experts who participated so fully in the original project review process (a list of participating reviewers is found in Appendix C of Version 1). Their comments and suggestions helped greatly to improve the accuracy and focus of this project and the original model. They were listed in the original MaHIM System, but this listing does not imply their endorsement of the MaHIM System.
Executive Summary

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 prompted the development of the MaHIM System model. These events confirmed that the United States faces a true threat of intentional mass casualty incidents caused by terrorism. In addition, these 2001 mass terrorism incidents, coupled with the results of recent exercises (TOPOFF series, Dark Winter, and others), demonstrated that as a response system, U.S. public health and medical response is not adequately prepared, resourced, or organized to manage mass casualties, particularly those resulting from bioterrorism. More recently, the hurricanes of 2005 vividly demonstrated how hazard impact can affect healthcare systems themselves, creating “mass effect incidents” that disrupt the continuity of operations for healthcare organizations, with resultant morbidity and mortality.

Even with the publication of the National Incident Management System (NIMS), there are no existing standards that organize all health and medical response resources within a jurisdiction for mass casualty or mass effect incidents. With few exceptions, federal and state preparedness programs have not placed visible priority on establishing comprehensive medical and health emergency management systems for organizing these usually disparate healthcare organizations.

No comprehensive, published system model exists, although efforts to address this gap are ongoing through the the national Hospital Preparedness Program under the auspices of the Office of the Assistant Secretary for Preparedness and Response, US Department of Health and Human Services (formerly the National Bioterrorism Hospital Preparedness Program). This program has adopted the Medical Surge Capacity and Capability (MSCC) system strategy as guidance for its preparedness grants (MSCC 2007). MSCC provides a NIMS-consistent strategy for coordinating healthcare organizations from the individual resource through multiple levels of government, across jurisdictional borders and between public and private organizations. The MaHIM System model is intended to complement the MSCC strategy by providing further detail on managing and integrating healthcare response at the jurisdictional level (local, State, Tribal).

Poor coordination between healthcare organizations and local authorities can compromise effective response to mass casualty or mass effect incidents. This has been exacerbated by the negative impact of medical economic and political decisions on the surge and specialty capabilities of individual medical resources over the past several decades. Facility closure, downsizing and consolidation of medical resources, application of business practices with “just in time” inventory and “just enough” staffing, and other consequences have restricted surge capacity and capability in many areas of the U.S.

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

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

---

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

6 A “system” is a clearly described functional structure and defined processes that coordinate disparate elements to accomplish a common goal (ICDRM glossary).

• The response to a mass casualty or mass effect 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 organizations have traditionally planned and responded to emergencies as individual entities, not as part of a larger system.

• Though rapidly improving, public health departments have not traditionally integrated with emergency response operations, including the acute care medical and mental health communities.

Rather than recognizing and specifically addressing these recurring, large-scale integration issues, many of the current initiatives to prepare for mass casualty and mass effect incidents have a primary focus on preparing for individual problems or specific hazard impacts that have been experienced in the past or that are anticipated. Disease surveillance, patient tracking, rapid laboratory diagnostics, facility evacuation, and many other identified issues are being addressed individually in an effort to achieve adequate preparedness. 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 that focuses upon managing critical actions in the context of emergency response. To address these deficiencies in a rapid, effective, and community-wide manner, a well-defined and developed response system must first be established, with a model “response organization”\(^8\) that can manage the response elements effectively under the circumstances of mass casualty or mass effect incidents.

The MaHIM System project and this subsequent revision have been undertaken to address this critical management deficiency.

The project goal was to define one comprehensive Medical and Health Incident Management (MaHIM) System model, adaptable to any individual community, to promote optimal management and response operations in a mass casualty and/or a mass effect incident. “Optimal” means that the response model minimizes future morbidity and mortality through improved healthcare system resiliency and medical surge during incidents that would otherwise overwhelm the usual response.

The Medical and Health Incident Management (MaHIM) System

The MaHIM System model describes an overarching system for organizing and managing the many diverse medical and public health entities involved in major emergencies and disasters. It defines a systematic approach for a community (defined as an individual jurisdiction) to use in developing its own medical response capability. The MaHIM model also addresses methods for coordinating between adjacent communities involved in a widespread hazard impact, including a framework for inter-jurisdictional, regional cooperation during a large-scale response. In a sense, the MaHIM System 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 and simplest to the largest and most diverse. Consistent with ICS principles, only those positions necessary for the specific situation are activated and staffed during MaHIM System operations. The responsibility for the activities of unstaffed positions revert to the next-above staffed position, unless specifically assigned elsewhere.

Some portions of the MaHIM project are stand-alone, in that a community can use these specific components to focus on the narrower management challenges within a healthcare emergency.

---

\(^8\) A “response organization” contrasts with a “preparedness organization” as defined by NIMS. A response organization provides management of emergency decision-making, decision implementation and overarching coordination of resources in the emergency context. Response organizations can include entities that conduct response management for a larger organization (private and for-profit or not-for profit), an agency or department, a government jurisdiction, or a collection of like organizations such as a healthcare coalition or a regional response center. Most response organizations are organized under NIMS as an Incident Management Team or as a Multiagency Coordination System. (ICDRM)
As noted, the revised MaHIM System model is designed to be transparently consistent with the National Incident Management System (NIMS), including the NIMS Incident Command System (ICS). NIMS compliance is required of all Federal departments and agencies, as well as State, Tribal, and jurisdictional agencies and private organizations that seek Federal preparedness assistance (grants, contracts, etc.). A key component of NIMS is the Incident Command System (ICS). “ICS is a fundamental form of management established in a standard format, with the purpose of enabling incident managers to identify the key concerns associated with the incident (oftentimes under urgent conditions), without sacrificing attention to any component of the command system.”

ICS is therefore a structured response management framework with a defined concept of operations (Figure 1-1). The principles of ICS are becoming increasingly utilized by the nation’s public safety agencies, by federal response organizations, by law enforcement personnel and many organizations in the private sector. For some agencies, ICS serves as the means for organizing the management of their day-to-day operations as well as for major emergencies. A functional breakdown and hierarchical architecture in ICS establishes individual responsibility, lines of authority, effective span of control of resources, and defined paths for information flow.

No similarly effective management system description for health and medical resources has been established and 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. Health and medical organizations that intend to respond to emergencies and disasters are therefore required to use NIMS and a consistent ICS organization to manage their response.

Publication of the original MaHIM System pre-dated the release of NIMS, but the MaHIM System model is essentially consistent with NIMS since it is based upon standard ICS. The model incorporates ICS principles to address the interface and coordination issues that commonly complicate medical and public health emergency response. The MaHIM System is therefore based upon three core principles:

1. Medical and Health Incident Command

The MaHIM System model provides a single, comprehensive system for management of medical and health resources in emergencies and disasters. Because of the inherent nature of health and organizations, control of these entities more often occurs through “management” rather than “command.” The authors of this study have purposely chosen the terminology that is consistent with the “Incident Command System” in order to provide transparent compliance with NIMS, but the lack of clear “line authority” in public health and medical incident response must be acknowledged. The reality is that the majority of medical and health resources in the United States are generally autonomous entities, and not connected through any inherently defined “command” structure. The management framework must therefore be based upon authority generated by responsibility or contract, and/or a willingness to participate, rather than by only statutory or regulatory power. The motivation for many of healthcare organizations (outside of public health) to participate in an Incident Command 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 ICS management concepts and processes not currently evident in most other medical response management descriptions including the Hospital Incident Command System (HICS). For example, a disciplined, analytical incident action planning process is described. This process, which incorporates a planning cycle, promotes transition to...
proactive management as an incident evolves, rather than remaining in a purely reactive management posture experienced by most medical and public health responders. The planning cycle defines processes for establishing objectives and strategy based upon the medical characteristics of an incident; addresses current needs and projects future requirements; and provides management guidance across the health and medical response system.

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 and in a useful format for situational awareness\(^{11}\) and decision-making during 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 requirements.

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 fostered through the existence of an information architecture that provides for adequate information exchange between all relevant parties.

3. Functional Description of Medical Response

Medical system response in mass casualty and mass effect incidents can be exceedingly complex, with many seemingly diverse tasks. Responsibilities for each of these actions vary significantly among organizations in different communities, yet all necessary functions must be adequately addressed for a successful response. The MaHIM System provides a description of every major function that may be required of a medical and health response and organizes them into a structured framework that maximizes the effectiveness of an individual community’s resources. It is therefore adaptable to any community and for all hazards (terrorism and other intentional acts, natural hazards, or technological mishaps).

During research and concept development for the MaHIM System model, it became increasingly evident that by clearly defining the purpose (i.e., “objective”) of each function and then grouping seemingly disconnected activities within those functions, processes and relationships can be created to develop a more powerful medical and health response capability. For example, “surveillance” has received much funding and attention in attempting to develop sensitive processes for detecting the earliest onset of bioterrorism health effects. Patient tracking during the post-impact phase has also received much, but similarly narrow, focus. The reality is that the systems used for case surveillance (to identify an incident) and for patient tracking (after hazard impact) 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, determining that “something is occurring” through a surveillance system is relatively useless to the medical response community without simultaneous capabilities for rapid epidemiological investigation to determine “what is occurring.” This requires the ability to rapidly and efficiently determine not just the type of hazard, but also the size, scope, at-risk population, and other vital incident characteristics.

Critical diagnostic information may initially come from animal surveillance, environmental evaluation, or criminal investigation rather than patient examinations and clinical laboratories. All of these activities (many accomplished by non-medical or non-health organizations) must be coordinated and have predetermined pathways for exchange of information. The MaHIM model groups these actions under the function “Incident Epidemiological Profiling” and defines the information processing support required for these activities (provided through the Planning Section under the Situation Unit). This creates potent tools for rapidly defining an otherwise chaotic event. This “situation awareness” encourages and assists with situation projection during decision-making, initiation of

---

\(^{11}\) “situation awareness” was defined as “The perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future.” (Endsley 1988)
proactive rather than reactive interventions and, most importantly, development of accurate measures of effectiveness to determine, in real time, the appropriateness of response actions.

**MaHIM System Description**

The goal of the MaHIM System is to provide a single, comprehensive management system that effectively manages response to mass casualty and mass effect incidents at the jurisdictional and regional levels.

The objectives that achieve this MaHIM System goal are to effectively:

- Provide for the safety of personnel and organizations involved with response
- Limit morbidity (injury or illness) and mortality (deaths) in a population exposed to a major hazard.
- Ensure the continuity of operations for health and medical organizations (i.e. organizational resiliency).
- Promote optimal healthcare surge capacity and capability across the affected area through situational awareness, resources support, and management coordination.
- Manage the integration of the varying health and medical resources with each other and with the broader response community.

From a medical perspective, the overarching strategies for achieving these MaHIM System objectives are:

1. **Reduce hazard exposure.** Avoid or minimize hazard exposure to responders, patients and the general populations after hazard “release.” This includes addressing safety issues for response organizations and reducing organizational hazard exposure to promote business continuity.

2. **Increase hazard resistance:** Maximize patient, population, and organizational resistance to the hazard impact after exposure.

3. **Promote/achieve healing from hazard effects:** Maximize the rate and degree of patient, population, and organizational “healing” from the effects of the hazard impact. Human “healing” includes both physical and psychological dimensions, with interventions directed at both the individual and population levels. Organizational “healing” includes restoration of essential services, recovery to baseline status, and return to readiness for its response elements.

The MaHIM System model is organized according to the functional architecture of successful incident management (Figure 1-2). For clarity of presentation in this publication, the resultant MaHIM System response organization is managed by the “MaHIM Incident Management Team” or MaHIM IMT. The MaHIM IMT consists of MaHIM Incident Commander, Command Staff, and the leadership of the MaHIM Operations, Logistics, Planning, and Finance/Administration Sections.

![ICS: Incident Management Team Primary Functions](image)

**Figure 1-2**

**MaHIM Command**

The Command Function (Figure 1-3) is responsible for the entire medical and health incident response, and addresses all “strategic” incident issues. 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 1-4). The command function is accomplished by a “command staff” that includes an “incident commander” and other defined command staff positions.
**MaHIM Incident Commander (IC)**

This position is responsible for all activities by the MaHIM IMT, and for keeping the agency executive informed about the incident and the response. The IC is solely responsible (within the confines of his or her authority) for establishing incident objectives and strategies. The IC is directly responsible for ensuring that all functional area activities are directed toward accomplishing the IMT’s incident objectives. In many situations, the medical and health IC may participate in unified command.  

**MaHIM Safety Officer**

This is a critical command staff position 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 Officer develops and promulgates the Health and Safety Plan, a written support element to the incident action plan that outlines response hazards and consistent protective measures for all incident personnel. Assistant Safety Officers may be assigned to supervise and monitor safety in a geographically distributed incident response.

**MaHIM Liaison Officer**

This position 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.).

MaHIM Command may also assign a liaison to political leaders, though the incident commander may elect to retain this role and directly brief the political leadership.

**MaHIM Information Officer**

This position oversees and produces timely, structured information, approved by management, for use in briefing the media and the public. The MaHIM Information Officer coordinates with the jurisdiction’s Joint Information Center (JIC) to assure consistency across public messages. The messages serve multiple purposes: they provide general incident information, guide public actions, reassure the public, and prevent speculation and subsequent rumors. In addition, this information can be utilized in guiding responders within the system itself.

**MaHIM Incident Command System (ICS) Senior Advisor**

The position that serves this function acts as an “ICS senior advisor” to the MaHIM Incident Commander and provides management assessment of the overall function of the MaHIM System during the response. It monitors the adequacy and effectiveness of the system itself, based upon ICS principles (i.e., it assures that the response system is functioning as designed). Iterative evaluation of the MaHIM System is conducted during each operational period. Interventions are recommended and implemented via incident action planning, adjusting the response system to fit the given response needs for the next operational period. While this is not a common “senior advisor” position in wildland ICS, it should be carefully considered in health and medical emergency response, since the use of ICS for large-scale incident management is new and unfamiliar to many professionals.

Other senior advisors may also be established. For example, a public health official from a “tier” higher than the government level of the MaHIM System IMT may serve as an advisor to MaHIM.
MaHIM Management Process

**MANAGEMENT BY REACTION**
(Reactive)
Response Phase

**MANAGEMENT BY OBJECTIVE**
(Proactive)
Response Phase

The MaHIM Planning Cycle

---

**INCIDENT ACTION PLAN (IAP):** A written description of the incident objectives, strategies, tactics, and supporting plans for a specific operational period.

**INFORMATION PROCESSING:**
- Community health surveillance
- Patient tracking
- Resource status
- Boundary functions information
- Expert information
- Functional area reports

**SUPPORTIVE PLANS:**
- Health & Safety Plan
- Incident Epidemiological Projection
- Alternative Strategies
- Contingency & Long-Range Planning
- Demobilization Planning

Figure adapted from:
Planning Cycle, U.S. Coast Guard Incident Management Handbook, U.S. Coast Guard COMDTPUB P3120.17 April 2001

---

Command and provide strategic advice on public health authorities and other high-level issues.

**MaHIM System Integration with Community Emergency Response**

MaHIM Command must be closely integrated with the community’s emergency response. The interface may vary, depending upon how the jurisdiction is organized for response and where the healthcare incident command sits within that community organization. This interface, however, must be well defined at the time the incident response is initiated. Options include:

- **Stand-alone IMT with support from the EOC:** If the healthcare incident command is directing the entire incident for the community (or participating in the jurisdiction’s unified command), it is based at the jurisdiction’s incident command post (ICP). It interfaces with the jurisdiction’s emergency operations center (EOC) via Emergency Support Function #8 (health and medical). If the EOC is organized using ICS principles, the primary EOC interface may be through a designated task force in the EOC’s operations section that is directly supporting the MaHIM System incident management team.

- **Integrated into Unified Command:** healthcare command participates with other discipline leaders in unified command per NIMS. MaHIM elements could then be distributed within appropriate sections of the overall incident command organization.
• Operate from a Department Operations Center integrated as a whole within an IC organization: If the healthcare incident command is based in Public Health or another relevant agency, incident command may interface with the agency or Department Operations Center (DOC), which in turn relies on the jurisdiction’s EOC for support. For example, the MaHIM System may be a designated Task Force within an Operations Section of a larger ICS organization.

• The MaHIM System as a response organization supports the EOC: The NIMS consistent framework for developing this relationship between the MaHIM System IMT and an entity that provides support at the jurisdictional level is provided by the principles of the Multi-agency Coordination System (MACS), which is also presented in NIMS.\(^1\) The EOC is expected to provide high-level support to the MaHIM System (large-scale contracts and financing, interface with and obtaining assistance from state and federal support agencies, etc.).

MaHIM Operations Section

The MaHIM Operations Section oversees and coordinates all activities that are directly responsible for accomplishing the strategic goals and objectives set by Command (Figure 1-5). The Medical and Health Operations Section establishes the tactics (methods) necessary to achieve the incident objectives (i.e., tactics are the responsibility of the Operations Section Chief and his/her subordinates). The Operations Section is organized according to activities that address similar objectives and are accomplished under the direction of the Section Chief.

Components of the MaHIM Operations Section are:

Public Health Operations Branch: This branch manages the activities that address epidemiology and other situational awareness efforts, and the activities that address public health hazard containment (disease, injury, contamination, and others) in the affected population. Given the potential complexities, MaHIM further subdivides this important function into the following sub-functions:

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

• Hazard, Threat, and Disease Containment Group: 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 or shelter-in-place strategies, Public Warning/Alerts & Public Education, and mass victim decontamination) and environmental-based interventions.

Some functions in the Hazard, Threat, and Disease Containment Group may not be direct responsibilities of the medical and health response system (e.g., hazardous scene containment or mass evacuation), but critical input into decisions and strategies must be provided by the health and medical communities.

• Pre-hospital Care Operations Branch

This operations branch conducts all health and medical actions from the initial victim field contact with first responders through patient arrival at a definitive care site. EMS and Operational Medical resources (medical -s 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 Operations Branch

This branch manages the jurisdiction’s delivery of all organized definitive facility-based medical interventions to meet the medical needs of the affected population. It includes assuring the coordination of acute care (through hospital and outpatient settings), post-acute medical care, patient diagnostics, and appropriate medical evacuation and patient inter-facility transports. Strategies for providing surge capacity and capability 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). Strategies and processes are also described to enhance the resiliency of the medical care delivery system.

---

\(^1\) NIMS 2008, pages 63-68
In some incidents, alternative settings may need to be established to care for impacted populations. The Medical Care Operations branch could establish shelters that house persons with special medical needs displaced by the hazard impact, or establish facilities to provide alternate medical care sites when traditional healthcare facilities are no longer sufficient to meet healthcare needs (e.g., medical care in an overwhelming pandemic flu).

- **Mental Health Operations Branch**

  This Branch covers mental health population-level 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 group, but through Medical Care Branch.

- **Mass Fatality Operations Branch**

  This Branch addresses the complex activities in 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, forensic evidence collection and disposition. Fatality management includes 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.

**MaHIM Support Sections**

The Medical and Health Support Sections are those that assist Management and Operations in accomplishing their goals and objectives during the incident response (Figure 1-2). They provide logistical support, planning and information support, and administrative and finance support to Management and Operations throughout the incident.

**MaHIM Logistics Section**

The Logistics Section encompasses all functions that support Command and Operations in their use of personnel, equipment, and supplies, and includes supporting the maintenance of facilities used by Operations (Figure 1-6). Critical support activities, such as receiving, managing, and transporting pharmaceutical surge supplies (the Strategic National Stockpile and other caches) are addressed through this functional area. Because of the complexity of healthcare response logistics, the MaHIM System Logistics Section is established with branches as designated in NIMS.
**MaHIM Planning Section**

The Planning Section encompasses all activities that support Command and Operations in the processing of incident information and in the development of action plans for managing the incident (Figure 1-7). The Planning Section is responsible for information collection and dissemination to and from the various response system elements (and is supported by the Communications Function under Logistics). In addition, it is responsible for plans development and assessment, and supports all IMT 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 and accompanying strategy, tactics and assignments, evaluating their effectiveness in meeting objectives, reacting with revised and new objectives, and forecasting future needs or contingency plans.

**MaHIM Finance and Administration Section**

The Finance and Administration Section encompasses all activities that support Command and Operations in incident administrative issues and in the tracking and processing of incident expenses (Figure 1-8). Examples of issues that this sub-function is responsible for include:

- Worker’s compensation
- Regulatory agency compliance issues.
- Financial accounting during the incident.
- Contracting for services and materiel at levels below the EOC.

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

The complete MaHIM 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 as well as those necessary for organizational resiliency. It also delineates 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 surge capacity as well as specialty care surge capability. Coordination is based upon strong management developed through an effective information architecture and a clearly defined planning cycle.

In applying the MaHIM System 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 its mass casualty and healthcare system resiliency requirements. This provides a method to delineate organization responsibilities, inter-organizational relationships, and critical coordination processes. The result is a defined architecture and useful concept of operations, 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 that support effective incident response processes will need to be developed. It is also likely that new personnel response positions will need to be created, with position competencies and operational checklists that will require further training. This is expected to occur, in order to cover the many preparedness gaps that exist in most jurisdictions.

The MaHIM System is important as an effective information management tool for public health to interface with healthcare organizations. Public Health serves this critical role in any incident that has impacted medical care providers. Support to healthcare organizations through the MaHIM System can be very broad, but perhaps what is most important is the ability to provide clear and actionable information. For example, early case definitions, diagnostic methodologies, treatment regimens, as well as concise definition of the population/s at risk can be crucial for the timely delivery of care to patients infected or exposed to a biological agent. In addition to healthcare providers, Fire, EMS, Law Enforcement and others require timely recommendations on Personal Protective Equipment and other health issues.

Finally, application of the MaHIM model to adjoining communities will promote regional management and response coordination. A MaHIM System follow-on work by the authors is the Medical Surge Capacity and Capability: A Management System for Integrating Medical and Health Resources During Large-Scale Emergencies (MSCC 2007). This extends the application of NIMS and ICS principles beyond local and regional management to address coordination across all levels of government, public-private interface, and other issues in large-scale response.

The model is structured so that implementation provides both immediate improvement (by optimizing existing capability) and long-range benefits.

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 and other major hazards will be enduring modern phenomena. 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 threat of mass casualty and mass effect hazards are to America.
Introduction and Background

Problem Statement

A mass casualty incident\textsuperscript{14} is a hazard impact where 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. The much less discussed mass effect incident is one in which a hazard impact primarily affects the ability of the organization to continue its usual operations (in contrast to a mass casualty incident). For healthcare systems, the usual medical care capability and capacity may be compromised, and severely affect patient outcomes. Deficiencies in management or response capability for either type of incident may result in increased morbidity and mortality.

For almost 50 years, until the Oklahoma City Murrah Building attack of 1995 and the impacts from 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 focused on the other more widely experienced 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 traditionally focused on the scene and pre-hospital sectors, assuming that once patients reached hospitals, the responsibility for patient care was transferred entirely to the healthcare organizations and the jurisdiction’s responsibility ended. Comprehensive mass casualty care, from a health systems perspective, received far less attention and government funding and so evolved in a realm separate from the rest of the emergency management and response communities. As a result, a systems-based approach was lacking in medicine and public health and instead, the focus was on narrow topics such as the medical care required for individual hazards (such as nerve agents), methods for traditional patient reception “triage,” and general areas such as “communications.”

The range of probable etiologies for mass casualty and mass effect scenarios widened markedly in recent decades, as the possibilities of chemical, biological, radiological, nuclear, and (high) explosive (CBRNE) mass terrorism were acknowledged. The impact of 9-11 and the 2001 anthrax incidents, together with Hurricane Katrina, SARS, and the prospect of deliberate smallpox or other biological attack or newly emerging illness such as pandemic influenza have now provided funded and widely publicized medical and public health preparedness initiatives. The casualty load from the 2001 terrorism attacks and other incidents, such as the 2001 Houston hospital flooding (Sirbaugh 2002), the 2003 Rhode Island nightclub fire (Dacey 2003 and Mahoney 2005) and the impact of the summer hurricanes in 2004 and 2005 have created an impetus to reevaluate the comprehensive, all-hazard management of healthcare emergencies.

Medical care necessary for mass casualties has been described as “medical surge,” which is the ability to provide adequate medical evaluation and care during events that exceed the limits of the normal medical infrastructure of an affected community (MSCC 2007). It includes the ability of healthcare organizations to survive a hazard impact and maintain or rapidly recover any operations that were compromised. Medical surge includes both “medical

\textsuperscript{14} A “mass casualty incident” was defined in the preface. The term “casualty” refers to any human accessing health or medical services, including mental health and fatality services, as a result of a hazard impact.

\textsuperscript{15} The 1947 Texas City, TX, ammonium nitrate fertilizer explosion killed or injured more than 3,500 people.
The *continuity of operations* for medical and health organizations (i.e., resiliency) has only recently received the level of attention accorded to medical surge. For much of the 20th century, medical and health organizations have focused on the ability to care for large or unusual patient loads, with little concern for business continuity and understanding how hazard impacts might affect their everyday ability to deliver services. Hurricanes Katrina, Rita, and Wilma in 2005 particularly emphasized the importance of preparing adequately for “mass effect incidents.” Increasing technological hazards, the impacts of civil unrest, and the devastating impacts of natural hazards (witness the 2001 Houston Floods in addition to the 2005 hurricanes) have spotlighted the need for better healthcare continuity initiatives (mitigation and preparedness) across all likely hazards.

Careful analysis of the mass casualty and disaster medicine literature reveals many deficiencies in widely accepted *operational definitions of the system* requirements for comprehensive medical and public health response. Few publications in this body of literature incorporate or describe the well-established principles of Emergency Management that have been validated by emergency management and public safety. Instead, a heavy focus is placed upon mass casualty care as defined in relation to a specific hazard or specific medical interventions. Traditional hazards discussed in this area include earthquakes, tornadoes, hurricanes, and floods which cause primarily general trauma. Within the past decade, more focus has been provided on the wide range of biological, chemical, or radiation injuries and their

---

16 Medical surge capacity refers to the ability to evaluate and care for a markedly increased volume of patients - one that challenges or exceeds normal operating capacity. The surge requirements may extend beyond direct patient care to include such tasks as extensive laboratory studies or epidemiological investigations (from MSCC, 2nd edition, September 2007).

17 Medical surge capability refers to the ability to manage patients requiring unusual or very specialized medical evaluation and care. Surge requirements span the range of specialized medical services (expertise, information, procedures, equipment, or personnel) that are not normally available at the location where they are needed (e.g., pediatric care provided at non-pediatric facilities). Surge capability also includes patient problems that require special intervention to protect medical providers, other patients, and the integrity of the healthcare system (from MSCC, 2nd edition, September 2007).

necessary treatments. The resultant common and problematic approach to special hazards is the independent development of hazard-based plans by specialists who deal primarily with their respective hazards, such as pandemic flu response plans. This approach of developing multiple plans, one for each type of hazard agent, risks both duplication and gaps in capabilities and an inability to train and prepare on each distinct plan. Additionally, the approach threatens cost-effectiveness, sustainability, and flexibility.

Neither the medical (partially due to medical economic factors) nor the public health (due to years of underfunding and isolation from public safety agencies) sectors are fully prepared, resourced, and organized to adequately deal with mass casualty or mass effect incidents, whether resulting from large-scale chemical or biological attacks on the civilian population or from catastrophic natural or technological hazards. Prior to the development of the MaHIM System, the Principal Investigator and co-authors investigated the deficits in medical and health preparedness for catastrophic terrorism 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 2001, Ambulances to Nowhere).

Medical care and public health resources are primarily locally managed resources, 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 local emergency management and disaster response in recent years. Recent Federal initiatives such as the Hospital Preparedness Program19 and its related Healthcare Facilities Partnership Program20 are addressing this issue, but it can be suggested that an underlying cause of this

---

18 The term “adequate” is used to denote that the quality or quantity of a system, process, procedure, or resource will achieve the relevant incident response objective.


national deficiency is the lack of a clear consensus for the conceptual “response model” for managing community and regional medical and public health emergencies and disasters.

**Ongoing Emergency and Disaster Response Gaps**

Since the original publication of MaHIM in 2002, the US Federal Government has released the National Incident Management System (NIMS 2004)\(^1\) which was revised and disseminated in December 2008 (NIMS 2008). NIMS guidance includes an ICS incident management methodology, and so promotes a uniform management strategy for all response organizations in the U.S. This is a very valuable start towards integrating public health and medical resources into local, regional, State and Federal response. Unfortunately, NIMS presents ICS principles and application in a manner that is often difficult for the medical and health disciplines to easily adopt and incorporate into their individual operational response plans. As an example, courses teaching the basic principles of NIMS ICS focus heavily upon fire-based applications and are even commonly taught by professionals from this discipline. *The MaHIM System has been developed specifically to provide ICS application by the medical and public health disciplines for mass casualty and mass effect incidents, while maintaining transparent consistency with the NIMS concepts.*

NIMS describes the “preparedness organization” extensively, and describes the generic ICS organization to be used in response, but doesn’t specifically describe or define a “response organization.” From the authors’ perspective, it is critical to establish the “response organization” at the outset of an initiative. All preparedness program activities can then be focused upon a common endpoint, the effective response organization (Figure 2-1) that will be ready when needed.

---

**Response Organization**

In contrast to a “preparedness organization” as defined by NIMS, a response organization provides management of emergency decision-making, decision implementation and overarching coordination of resources in the emergency context.

Response organizations can include entities that conduct response management for a larger organization (private and for-profit or not-for-profit), an agency or department, a government jurisdiction, or a collection of like organizations such as a healthcare coalition or a regional response center.

Most response organizations are organized under NIMS as an Incident Management Team or as a Multiagency Coordination System (*ICDRM Emergency Management Glossary of Terms*).  

**Figure 2-1**

The underlying issue that the MaHIM System addresses is the lack of a method to manage, during response, coordination of health and medical response, which is much more complex than merely “coordinating” medical resources. Individual components and capabilities for medical and health response exist, but they are not comprehensively addressed in an overall management system. This has led to inefficiencies and confusion, risking organizational failure in a truly mass casualty or mass effect incident. In mass terrorism, the potential for health care organizations to fail was demonstrated during the first TOPOFF exercises in 2000, where disjointed and ineffective mass casualty response reflected the lack of a coordinated systems approach to management (Inglesby 2000).\(^2\) These organizational failures became evident in an actual incident during the National Capital Region anthrax dissemination incident (October - November 2001). Healthcare organizational failures with loss of life were demonstrated in a natural disaster during the Hurricane Katrina - New Orleans experience. Added to these very real concerns are the daily healthcare 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

---


\(^2\) Also supported by direct observations by this project’s authors as members of the TOPOFF 2000 exercise control team.
actual incident, complete systems failure may occur, causing needless societal impact. This has unfortunately become a recurring experience in federal response planning. In 1989, the National Contingency Plan for Oil and Hazardous Substances failed as a coordination mechanism during the Exxon Valdez Response (i.e., “We were always reorganizing…”) (Harrald 1992). Three years later, the new Federal Response Plan (FRP) met a similar fate during the response to Hurricane Andrew (Carley and Harrald, 1992). The FRP’s successor, the National Response Plan failed during the response to Hurricane Katrina in 2005. In all of these cases, the national plans had defined relationships at the national level but failed to create a “response organization” system that worked to coordinate and integrate with the state and local response. These failures were costly, with excessive environmental damage in Alaska and human suffering in Florida and the Gulf Coast. 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 management 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 suboptimal, and the surveillance systems’ integration into the medical settings that must report data is rarely adequately addressed. Consequently, many surveillance tools have been largely underutilized or underutilized even during high-risk, well defined activities such as national security events. Users have found data entry and retrieval cumbersome, confusing, and lacking de facto usefulness. Very recent “technological advances,” such as the BioWatch program, have demonstrated very poor interface with the local medical and public health community that should be alerted if its sensors are triggered.

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. During research for the original development of MaHIM in 2001 and 2002, the authors could find no published description of an effective, comprehensive coordination capability that has been developed and implemented in a major U.S. civilian jurisdiction specific to the medical and health disciplines. Since MaHIM’s publication, the MaHIM System model has been utilized by a variety of State and local jurisdictions to help address the development of their respective response systems.

**Focusing on the Management Issues**

Describing a functional mechanism to achieve effective action is the focus of this project. The general strategies for a medical and health model of mass casualty and mass effect response are described in Figure 2-2. Implementing these strategies requires close coordination of many diverse and only loosely connected health and medical entities.

---

### MaHIM System Response Strategies

1. **Reduce hazard exposure.** Avoid or minimize hazard exposure to responders, patients and the general populations after hazard “release.” This includes addressing safety issues for response organizations and reducing organizational hazard exposure to promote business continuity.

2. **Increase hazard resistance:** Maximize patient, population, and organizational resistance to the hazard impact after exposure.

3. **Promote/achieve healing from hazard effects:** Maximize the rate and degree of patient, population, and organizational “healing” from the effects of the hazard impact. Human “healing” includes both physical and psychological dimensions, with interventions directed at both the individual and population levels. Organizational “healing” includes restoration of essential services, recovery to baseline status, and return to readiness for its response elements.

---

23 More information on the Biowatch program can be found on the Congressional Research Service website, accessed December 6, 20067 at: [http://www.fas.org/sgp/crs/terror/RL32152.html](http://www.fas.org/sgp/crs/terror/RL32152.html)
medical infrastructure is segmented, resides predominantly in the private sector, and involves many disparate organizations. It is further complicated because adequate surge capacity and specialized resources have not been systematically organized at the local level to achieve maximum effectiveness. In most communities, recent attention has been given to medical surge resources and healthcare business continuity, but community-wide integration is under-leveraged.

Full community healthcare preparedness must involve the coordination of health and medical resources across both jurisdictional and public-private boundaries. Adequate response requires systems*24 that achieve rapid, efficient expansion of capacity and support to one another through local and regional management of coordination. Realistic planning must therefore be focused at both the local and regional levels.

Besides being “all-hazards” and systems oriented, medical and health response must carefully address operational realities that are obvious only during large-scale events (and therefore are very infrequent and so commonly unrecognized during preparedness). Examples of specific operational problems from large-scale U.S. incidents include the following:

- **Patient distribution among healthcare facilities:** Murrah Building bombing in Oklahoma City, 1995.

Sixteen acute care facilities were located within reasonable proximity to the Murrah Building, the epicenter of the Oklahoma City truck bomb explosion. 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.25

- **Patient tracking among numerous healthcare facilities: World Trade Center Attack in New York City, 2001.**

After the collapse of the World Trade Center towers, 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 under their care, 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 three 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

---

24 The term “system” in this project means a clearly described functional structure, with defined processes, that coordinates disparate parts to accomplish a common goal.

25 Personal communication from EMS providers to author JAB, April 1996.
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. Once an adequate systems solution has been identified, it must be well described with a system description and a concept of operations that explains the “response organizations”. When this is established, staff and resources must then be dedicated by local emergency management, public health, public safety agencies and local healthcare organizations in a nonpartisan fashion to ensure implementation of the system and coordination across the medical and health spectrum of the community and the region. Important considerations include regular interface between system components (informal discussions, interagency planning meetings) and exercises (both large-scale scenarios as well as narrow exercise of critical elements, such as frequent inter-hospital communications tests that also involve public agencies).

Unless an above-described systems approach is accomplished, the medical and health response components 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 long-range resource requirements, including technology, to be developed according to an extended time line.

The purpose of this project is to define one comprehensive system model that incorporates the requirements and functional responsibilities for adequate mass casualty and mass effect incident management by medical and public health authorities. Mitigation (including prevention and decreasing vulnerability), preparedness, response and recovery development must be sustainable and cost-effective, so that the MaHIM response organization is always effectively and reliably ready.
Project Methodology: 
*Objectives, Assumptions, and Description of the Process*

The MaHIM System Project

The process established for developing the original MaHIM System model was carefully designed to obtain broad input and to use structured methods for analyzing and describing the system requirements for medical and public health incident response. The MaHIM System model was based upon medical, public health, and emergency management science. It included a national, multi-disciplinary peer review process to reality test the developed products. Due to time and funding restraints, this revision process was based upon research conducted for projects that closely parallel the MaHIM model, including the HHS-funded handbooks that address Medical Surge Capacity and Capability (MSCC 2007, MSCC Healthcare Coalition 2008).

Development Process Goal and Objectives

The goal was to define one comprehensive Medical and Health Incident Management (MaHIM) System model, adaptable to any individual community, to promote optimal management and response operations in a mass casualty and/or a mass effect incident. “Optimal” means that the response model minimizes future morbidity and mortality through improved healthcare system resiliency and medical surge during incidents that would otherwise overwhelm the usual response.

The development process objectives were to:

- Delineate the MaHIM System model as a *response organization*, with enough detail in its functional requirements and distributed responsibilities to guide preparedness activities by those customizing the model for their locale.

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

- Incorporate NIMS terminology and concepts so that the MaHIM System model is transparently consistent with NIMS guidance (NIMS 2004 and NIMS 2008).

- Maintain the peer review input in the original MaHIM System that was received 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 through oversimplification.

Background to the Development Process

This project was designed to use a structured approach. The project process employed Systems Engineering methods while maintaining a base of sound medical scientific and operational principles. The process relied upon Systems Engineering theory and practice (Eisner), and the extensive medical and health experience of the investigators and the project reviewer consultants (Appendix C of the original MaHIM System publication). The project therefore accomplished a comprehensive analysis of the actual and theoretical components of medical and health incident management and response needs. All categories of potential hazards, including terrorism, were considered.
Application of 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 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

---

**Figure 3-1**


---

**Application of 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 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.”

In the analytic phase of the original MaHIM project, mass casualty and mass effect incident management and response were successively decomposed into functional areas, functions, sub-functions, and processes. Requirements were then delineated for each process and sub-function. Subsequently, these elements were reassembled into a functionally defined incident management system using ICS principles and defining processes for management, coordination, and information sharing (see below for further detail).

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.

Application of the Incident Command System and ICS Principles

The analysis and decomposition phase of the original MaHIM System project was followed by a careful reconstruction of the identified processes, sub-functions and functions into a functional model specific to managing mass casualty incidents. The incident command system (ICS) was used to guide the reconstruction. The authors of this study, however, purposely emphasized the term “Management,” rather than “Command,” in recognition of the reality that medical and health resources in the United States are generally disparate entities that are not connected through any clearly defined line-authority “command” structure.

The above-described approach mirrors the systems approach used by the incident command system (ICS) during response, which guides the incident commander to analyze incident needs and establish an ICS organization for each incident that is specifically organized and staffed to accomplish incident objectives, strategy and tactics. As the incident needs change, the ICS organization changes, and accomplishes rapid demobilization of branches, division, groups, task forces or single resources or creation of new elements as indicated. This approach contrasts with many previous efforts at addressing medical and health response to mass casualty and mass effect incidents, in which traditionally organized agencies and resources attempted to manage unusual incident response using their usual management structure as the organizational system. Other incident management initiatives, such as HEICS (the forerunner to HICS), addressed the management of medical and health response to mass casualty and mass effect incidents by mandating a rigid organizational structure. These contrasting rationales (“traditional” versus “systems engineering”) are summarized in Figure 3-2.

Figure 3-2

The MaHIM System model describes a framework to manage coordination that is based upon authority generated by responsibility rather than exclusively upon statutory or regulatory power. This contrasts with many past planning efforts, which began 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.

In a well run ICS organization, the designation of “who” is actually “in charge” depends very much upon the circumstances of the incident. It becomes apparent that for successful incident management, it is more important to define each critical operational function, and who is responsible for that function, rather than arguing over 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 have been promulgated over the past decades. The National Incident Management System (NIMS) defines a version based upon the National Interagency Incident Management System (NIIMS), and the NIMS ICS is mandated as the nationally used version. NIMS also describes the use of the multiagency coordination system (MACS) to support the ICS organization that is directly managing incident response. This text is not intended to present basic understanding of incident command or MACS. The reader is referred to the NIMS documents (NIMS 2004 and 2008) and to the DHS/FEMA training courses,26 since understanding of these concepts is important for full comprehension of the MaHIM System.

Most ICS descriptions focus only on the on-site management of a scene-based incident. NIMS generally describes how the MACS and other response entities such as area command can coordinate above the scene level. In the original MaHIM System development, the authors drew heavily from the ICS concepts presented in the Standardized Emergency Management System (SEMS) developed and implemented by the State of California in 1994 to manage large, complex and widespread incidents (SEMS 1994). SEMS uses ICS and ICS principles to organize levels of government, cross-jurisdictional response and State-level regionalization for the purpose of response coordination. In addition to having demonstrated effectiveness in major emergencies, SEMS establishes terminology consistent with the “management” orientation of this project, and also was less fire service oriented than traditional ICS. SEMS, along with the MaHIM System research findings, was also used by the authors in the development of the Medical Surge Capacity and Capability handbook (MSCC 2007).

The MaHIM System’s regional orientation was based upon ICS and other management concepts presented in SEMS. SEMS addresses regions as adjoining geographic areas within the state of California. The term “region” in this MaHIM System project also describes adjoining geographic areas, but is qualified as “intrastate” (within a state) or the far more complex phenomenon of “interstate region” composed of proximate jurisdictions that cross state borders.

The ICS concepts in this revised MaHIM System model are based upon the Incident Command System and Multiagency Coordination System described in NIMS (NIMS 2004, NIMS 2008).

Incident Management Team (IMT)

In ICS, the leadership element of the ICS organization is called the incident management team (IMT), which includes the incident commander (IC) and appropriate Command and General Staff personnel assigned to the incident (NIMS). This element directly manages the incident response, and defines the scope of the “incident.” The IMT provides guidance to responders by establishing incident-specific goals, strategy and objectives, and oversees the development of incident tactics and tactical strategy by the IMT Operations Section Chief.

Command: The “command” functional area of the IMT encompasses 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 time interval, or “the operational period.”

Operations: Used in a traditional manner in this project to denote the functions that develop and implement strategies (i.e., approach) and tactics (i.e., Tasks and actions) to achieve the objectives established by Command.

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

Planning: SEMS uses the term “Planning/Intelligence” for this functional area. “Planning” is used in this project to denote the Section necessary to support Management and Operations in Incident Action Planning and in information management. The developed incident information provides the Incident Management Team with situational awareness. Information processing includes collection and analysis of incident data, transforming it into relevant incident information (Situation Unit) and resource information (Resource

Integration of Systems Engineering and Incident Command Systems

Because the theoretical bases for Systems Engineering and ICS are so similar, it was relatively easy to move from the Systems Engineering decomposition findings to a functionally defined Incident Command System structure and process, with regional (intrastate and interstate) coordination defined through SEMS, Area Command and Multiagency Coordination System concepts.

The reconstruction into a functional response system also incorporated other principles of effective ICS such as: formal Incident Action Planning; maintaining reasonable “span of control” in each functional area; and basing authority upon responsibility.

Terminology

Because this project is a “hybridization” of the scientific disciplines of emergency management, 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:

- ICS 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.
Introduction

The goal of this project was presented in Chapter 3. In short, the focus was to develop a peer-reviewed, requirements-based operational model for mass casualty and/or mass effect incident response for medical and health organizations. It is 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. This includes delineating the critical relationships between functions, both within the system and with important non-medical emergency response functions that may be outside the medical and health incident management team, such law enforcement and fire services. It also describes the system processes that coordinate these many elements to work toward a common goal: minimizing morbidity (injury or illness) and mortality (deaths) in a population exposed to a major hazard and maintenance healthcare system operations.

The initial intent for the original MaHIM System project was to focus upon a regional response model. During the early research and analysis phase of the project, it became apparent that regional management coordination is critically dependent upon well-defined and implemented medical incident management systems in each jurisdiction within the region. The MaHIM System model therefore focuses at that level, while providing the framework and concept of operations for regional management cooperation. The regional management coordination was further delineated the Medical Surge Capacity and Capability handbook (MSCC 2007).

MaHIM 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 resources, 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 emergencies, disasters, 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 elements.

The MaHIM System is not intended to be an all-encompassing, “bank buster” 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 incident.

Model Assumptions

In order to fully understand the rationale behind the MaHIM model, the assumptions upon which the model is based are delineated. In systems development, it is important to clearly state the system assumptions that the design team relied upon in developing a truly operational system. Readers can then better understand the rationale behind the development of design elements. More importantly, the system can also be more accurately and effectively applied in a different location or context, because the system assumptions can be examined and adjustments made in the system to address variances in system assumptions.

An extensive research effort and experience-based knowledge were used in developing these assumptions.

General Mass Casualty and Mass Effect Incident 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 non-medical 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. In contrast, they may also begin insidiously, requiring adequate surveillance systems for timely determination of size and scope.

- The hazard impact has the potential to directly impact medical and health resources themselves, compromising 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. 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. Careful planning and preparedness attention may be necessary to avoid compromise of regular medical care in a mass exposure incident.

- 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. This phenomenon was noted in the 1995 Tokyo sarin attack, the 1995 Oklahoma City bombing, and the 2001 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 so was incorporated as a planning assumption in 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 incident will overwhelm this capacity. At a regional level, however, a significant but widely dispersed medical and health surge capacity and capability continues to exist in the aggregate. Well-established coordination is required to effectively address patient needs during a major mass casualty and/or mass effect 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. In addition, appropriate focus on organizational resiliency for the healthcare system through mutual aid and support from jurisdictional agencies is important.

- Many disparate and very loosely connected medical organizations are required to function in a coordinated fashion in order to rapidly and effectively address hazard impacts. 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 (terminology, 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. Emergency Healthcare Coalition and Northern Virginia Hospital Alliance experience).

- Volunteerism and donations are common 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 and impediment). For example, an effective system to manage spontaneous healthcare volunteers may be critical in assuring that healthcare volunteers are a positive rather than a disruptive effect on the incident.

- Profiteering by medical and health resources is not expected but has occurred in the past during some incidents. 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 ICS during day-to-day operations in the fire service, regardless of the scope of the event, and serves as a good model for 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.
• Hazard impacts that affect the operational continuity of healthcare organizations can be similarly complex and may require support external to the organization(s) in question. Formal management structures as well as written agreements are required to efficiently address these issues.

• As medical preparedness for mass casualties and other hazard impacts 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 incident response is rarely isolated to the medical and health sectors — 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 response. 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 healthcare systems trying to develop independent, stand-alone capabilities for each support function. This is the conceptual basis for current National Response Framework (NRF) 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 or that create mass effect on the healthcare system. The all-hazards approach of emergency management primarily denotes the use of a single set of management and response processes for every type of hazard response (i.e., 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 intentional hazards (terrorism, criminal, riots, war, and others).

• A fully integrated, comprehensive emergency management system for mass casualty and mass effect incidents includes both an incident management team (IMT) and the effective use of a multiagency coordination system (MACS). A MACS generally includes:
  ✓ A MAC center, which commonly is the emergency operations center (EOC) that support the IMT27 in its incident operations.
  ✓ A multiagency coordination group that provides oversight for the MAC center and addresses policy-level issues.28

The IMT and MACS each serve distinctly different functions, even if the EOC provides some direct incident services during a response, such as using its information management personnel and equipment to assist the IMT Planning Section with its information activities.

• Tactical mutual aid is commonly used to augment surge and specialized capacity in EMS and other traditional public safety disciplines. It has been much less common in medical, public health and health-related services, although this has changed significantly since the original publication of the MaHIM System. This must continue to evolve, since mutual aid is the single most available and cost-effective way to obtain surge capacity after maximizing the output of individual resources.

• Because mass casualty injury profiles commonly include medical conditions where time-to-adequate-medical-treatment is of the essence, mutual aid strategy should first emphasize local sharing of resources. Subsequently, regionally based capabilities are emphasized, and then finally a national mutual aid process for management of the truly catastrophic event. The concept is based upon “mutual self-interest,” assuring that the sum of the local and regional resources creates a stronger capability for each individual jurisdiction. Tactical sharing between jurisdictions should be guided by state-wide strategic mutual aid instruments that promote local, statewide and interstate regional sharing of resources.

27 The incident management team (IMT) was discussed in Chapter 3. See ICDRM Glossary for definition.
28 The multiagency coordination system is more fully described in NIMS (NIMS Draft 2007).
The Emergency Management Assistance Compact (EMAC)\textsuperscript{29} provides a basis for constructing interstate mutual aid arrangements.

**Incident Management Assumptions**

- To effectively manage response to most complex incidents, a different response management construct, processes and procedures are required compared to managing preparedness activities. The authors emphasize this concept by emphasizing the development and maintenance of a “response organization,” which usually contrasts sharply with a “preparedness organization” as described in NIMS.\textsuperscript{30} Unfortunately, this important point is often missed by medical and public health organizations, resulting in serious deficiencies during incident response (MSCC Healthcare Coalition 2008).

- Response functions can only be effectively coordinated and supported when management responsibility is constructed to maintain effective “span of control” over response processes and tasks. Span of control is emphasized in ICS, but the traditional span of control of “5-7 units” may vary depending upon the activities and information that must be managed, plus the management skill within the units being supervised. The ratio could also be expanded if the functions being managed are very similar or very straightforward in complexity.

- Common and widely understood terminology is essential to prevent confusion and potential harm when coordinating the efforts of multiple organizations in the context of emergency response. This is especially true for the medical and health disciplines that traditionally have not had extensive emergency management or incident response experience.

- Clear-cut, well-delineated organizational roles that match the functional responsibilities in a jurisdiction must be developed and exercised to promote efficient response management.

- The Incident Command System (ICS) provides common terminology, span of control, and a well-defined management framework. ICS structure and concept of operation have evolved well beyond theory through extensive emergency response experience. Effectiveness has been conclusively demonstrated when ICS is properly established and conducted. In addition, ICS now serves as the nationally unifying response management methodology promulgated in the National Incident Management System (NIMS).

- The authors recognize the lack of comprehensive, operational-level proficiency in ICS across much of traditional medical and public health response communities. This has been a major impediment in past large-scale events. Even the Hospital Incident Command System (HICS)\textsuperscript{31} model, now being adopted by hospitals across the country, contains primarily an organizational description without detailed guidance on how to conduct incident management. The critical processes that accomplish information management and incident action planning must be implemented to assure effective management of incident response.

- In a sudden onset, unanticipated incident, the initial phase of response and management is best described as reactive, with management and response resources responding to identified needs primarily at a task level, based upon experience, standard operations, and tactical incident guidance from training based upon the organization’s emergency operations plan (EOP). As soon as is possible, formal incident management planning processes should be implemented and Incident Command transitions to a proactive phase, where the incident is managed by establishing specific objectives and strategy. These are accomplished through incident action planning for each operational period.

- Strategies and tactics for incident response must be based upon accurate, measurable and achievable Incident Command objectives. The objectives must then be adequately disseminated and acted upon to be effective.

- In a well-constructed incident management system at a jurisdictional level, all functions within the system should be notified as the system is activated, even if their only action is confirming

\textsuperscript{29} Further information on EMAC is available through \url{http://www.nemaweb.org/emac/index.cfm}.
\textsuperscript{30} Preparedness Organization definition is provided on page 34 of NIMS 2004.
\textsuperscript{31} Further information on HICS available at: \url{http://www.emsa.ca.gov/hics/hics.asp}.
the notification and providing a current operational status. The report of “no change in medical activity” for certain healthcare facilities, for example, is important data in determining and confirming the size and scope of an incident and the availability of resources. All functions are included in at least the notification phase so that they have situational awareness about an evolving incident. With their status reporting, even the “non-information” (i.e., “nothing’s happening” or “everything is per usual”) is very important for the Planning Section’s Situation Unit and for its contingency planning activity.

- 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 Command (UC) is a management concept in ICS 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 Command is commonly described as not usurping organizational authority or responsibility but it is unclear how authority conflicts are resolved. UC attributes include:
  ✓ A single integrated incident organization.
  ✓ Shared or co-located command facilities.
  ✓ A single planning process and Incident Action Plan (i.e., a single set of strategic goals and objectives).
  ✓ Shared planning, logistical, and administration/finance sections.
  ✓ A coordinated process for resource ordering.

Regional Management Coordination Assumptions

- Intrastate 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 an interstate “region,” or to a federal response agency. Because “unified command” 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 inter-jurisdictional issues and addressing the management coordination (objectives and strategies) required to address these issues.

- The basis for regional coordination and cooperation must be mutual self-interest, assuring that the sum of the regional resources 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 and coordination of incident management strategy.

- The framework for this strategic mutual aid (and therefore coordination of response) is determined at the highest management levels between jurisdictions. 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 and 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 incident 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) inter-jurisdictional 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 master mutual aid plans.
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 local and state EOCs interfacing with the federal Joint Field Office (JFO), and the Disaster Field Office per the National Response Framework.

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 patients and customers, 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 focused at the local level (county or municipality) with state assistance. Public health, however, is commonly organized with state authority overriding local public health authority. These digressing lines of authority and reporting between public health and emergency management/public safety must be specifically addressed and resolved within each jurisdiction.

Regional coordination often occurs within subdivisions of a State. Unfortunately, the public health sub-divisions commonly vary from those of other response disciplines. For example, public health, law enforcement, and “homeland security” regions are not always consistent within a State. How regional response management will be coordinated must be carefully addressed in these situations.

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

Non-medical 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**

- Medical surge can be fully addressed by assuring both surge capacity and surge capability (MSCC 2007). Surge capacity describes the ability to care for an increased numbers of patients. Surge capability addresses the ability to care for patients with specialized care needs (e.g. one SARS victim could disrupt and challenge a healthcare organization’s operations). Medical and public health operations must be capable of producing both types of surge under incident conditions.

- Medical care surge capacity and capability for healthcare organizations should begin with protecting, augmenting, and facilitating individual response capabilities, which is far more effective than instead creating completely separate, isolated, stand-by resources for low-probability incidents. Planning must therefore begin with a priority on maintaining functional integrity of in-place organizations and their services (organizational resiliency). This important point is often overlooked, resulting in the expenditure of preparedness funds for stand-alone resources of dubious value.

- Existing community capabilities that provide, on an everyday 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. Community health centers, outpatient dialysis centers, home health services, elderly services, meals-on-wheels and other critical services are important. This requires identifying (during the preparedness phase), protecting, and augmenting these already existing and functioning advocacy and key service groups. The goal is to assure that they can perform needed services for their constituencies, or coordinate vital services with jurisdictional Incident Command, during times of need.

- The next level of striving for adequate surge is assuring that individual organizations each have a maximally effective individual emergency operation plan (EOP) for their facilities. The EOP
should address local assistance for maximizing their organizations’ 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 director 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 illnesses.

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

Logistics Assumptions

• Prolonged incidents will require significant 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 logistical 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 establishing and maintaining incident facilities, for ongoing maintenance of equipment as indicated, and for other critical logistical activities.

• Spontaneous volunteers, non-requested resources, well-wishers and others can overwhelm responders at the scene of a hazard impact or at sites where healthcare is being delivered. A well-defined capability dedicated specifically to screening, cataloguing, accrediting, and deploying resources, along with the tools and personnel to support tight perimeter management, is necessary to maintain incident control and discipline.

Planning Assumptions

• “Incident planning” refers to planning activities that occur during IMT activation and response. It is important to distinguish from the much more common “preparedness planning” conducted by a preparedness organization during periods between incident response. The methods used are very different between the two categories.

• Information management is vital to the development and operation of an effective medical and health incident management system. The collection, authentication, and analysis of data, and the synthesis and dissemination of information concerning local and regional health and medical resources and the incident situation are vital activities of adequate information processing. The types of information, analyses, and reports vary by hazard type and other circumstances, but the processes are commonly very similar.

• 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 incident and resource information with an intense focus on defining the information architecture necessary to maintain optimal situational awareness during incident response. “Communications” is a narrower and more-focused process that refers specifically to only the methods of conveying information. While communications is a vital element in information management, it cannot be effectively planned and implemented without a clear understanding of the information architecture in which the communications will transfer data and information. Unfortunately, most projects currently funded and under development focus on communications in response to mass casualty incidents, rather than first defining comprehensive information management needs.

• In ICS, “communications” accomplishes the multidirectional exchange of data and information
according to the defined communications plan developed during incident action planning. To support effective incident management, the communications system must be constructed based upon the architecture of the incident information system, which mirrors the incident’s IMT and its extended branches, groups, divisions, task forces, single resources and support units. Communication then allows information flow that achieves optimal situational awareness for decision-makers across all hazard incidents. Specialized communications are then developed to meet the projected needs in any unusual individual hazards.

- To achieve and maintain proactive incident management, the Planning Section must use its situational awareness to undertake informed incident action planning. This includes developing an Incident Action Plan (IAP) and its support plans. It also includes projection based upon incident information, and the development of contingency plans as indicated.

- Incident Action Planning can be a time-intensive process, and specific support is required to facilitate an adequate action planning process. Widely-accepted meeting and briefing methodology that keeps the meeting and briefing processes efficient are critical. For example, a disciplined process for delivering the operational briefing will limit the time spent exchanging ancillary information while providing critical, actionable knowledge for the upcoming operational period.

- In ICS, technical specialists are personnel with indicated expertise, such as infectious disease and epidemiologists for controlling contagious epidemics, radiation experts — medical and technical — for treating radiation exposures, and so on. They may be used essentially as consultants to provide expert knowledge for important decision-making processes. It is important to note that unless these technical specialists are qualified with additional specific incident management competencies, they should not manage or command incidents. The concept that a technical expert should be “in charge” of a medical or health operation is outdated and should be avoided. Experts in incident operations should manage emergency operations, with input by the technical specialist provided as indicated or requested.

### Finance and Administration Assumptions

- Administrative and financial considerations must address all hazards response issues related to finance/accounting and administration. In a cross-jurisdictional mutual aid response, licensing, credentialing, and liability coverage for health professionals becomes important. While conducting credentialing may be accomplished by the Logistics Section in obtaining additional qualified healthcare personnel, the administration personnel should assure that indicated regulations are being met or otherwise addressed. Credentialing 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 planning must address large expenditures, some never reimbursed and others with delayed payments, 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 nongovernment businesses, many with very thin operating margins. Management of and coordination between these healthcare organization during a response requires that systems be in place to provide financial guarantees and/or direct payment to the businesses if requested actions carry significant expenditures (supplies, equipment, personnel time, and so on). Emergency contracting and other concepts have evolved to address this issue for non-healthcare businesses in major responses, but must be applied to healthcare organizations as well. The IMT Finance Section 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.

### Boundaries of the MaHIM System Project

As noted earlier, mass casualty response and mass effect incidents take place within a larger context of emergency preparedness and response. Issues and functions that significantly affect healthcare response but are not primarily within the domain of health and
medical management are designated as General Emergency Response.

- The project recognizes that medical and health response systems function within the larger context of overall Incident Management, and a successful healthcare response system is fully integrated into this larger system, even if an incident requires primarily a medical response. Defining that larger system is beyond the scope of this project, but key integration points, support needs, and other important details are addressed in this project’s requirements framework.

- The “boundaries” for this project include many of the emergency response areas that are non-medical in nature and yet impact upon mass casualty care and/or healthcare system resiliency.

- The MaHIM System is not designed as a model for all four phases of emergency management. For example, it does not include mitigation or recovery and doesn’t address in detail many essential preparedness activities, including MaHIM System implementation, training or exercise. Instead, the authors focused upon describing the MaHIM System model as a response organization, from which response requirements could be derived. Knowing the “endpoint” for preparedness activities (i.e., establishing and maintaining an effective response system), provides clarity in establishing objectives and strategy for system implementation, training, exercise and organizational improvement.
MaHIM System: Functional System Description Overview

Introduction

The MaHIM model provides a comprehensive system description of all functional elements critical to effective mass casualty and mass effect 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 medical and health response system based upon ICS. The system description may also be used in a checklist format for evaluating an existing incident management and emergency response structure, although this is not the primary intent.

The broader “concepts of operations” for the MaHIM System are covered in Chapter 9, including the critical relationships across functions and successive incident stages (i.e., how the system works across a time line). It also provides a more-detailed description of inter-jurisdictional 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 and promoting resiliency in the healthcare system.

Overview of the MaHIM Functional Model

The functional MaHIM System model is constructed according to the NIMS Incident Command System (ICS) concepts. Five major functional areas are described within the MaHIM incident management team (IMT) model, each with defined functions and sub-functions having ICS consistent names. While five functional areas are described, it is often easier to conceptualize ICS and thus MaHIM as having three primary elements (see Figure 5-1):

1. Medical and Health Incident Command
2. Medical and Health Operations Section
3. Support to Medical and Health Command Group and Operations Section:
   - Medical and Health Logistics Section
   - Medical and Health Planning Section
   - Medical and Health Finance/Administration section

![ICS: Incident Management Team Primary Functions](image)

Figure 5-1

General MaHIM System Criteria

The MaHIM System includes 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. This is particularly important for non-governmental healthcare organizations that operate independently outside of direct government line authority. Healthcare organizations must be prepared to provide internal management of their individual responses, plus have the ability to interface with other healthcare organizations as well as jurisdiction-level agencies and resources. This approach is extensively discussed in the MSCC handbook series (MSCC 2007, MSCC Healthcare Coalition 2008).

- Appropriately qualified and trained staff for all system positions, with the capacity to systematically train personnel on the appropriate emergency operations plan (EOP) and its processes and procedures.

- 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 of coordination”) can vary depending on geography, mobility, or complexity of tasks performed by the sub-elements (i.e., routine tasks and straightforward management allow an increased number; more complex tasks or coordination requirements dictate a smaller ratio of supervisor to response elements).

- Adequate communication infrastructure to support the internal and external information processing architecture (Chapter 4 discusses "communication" versus "information processing").

- Effective interface between related functions. The functional relationships may be categorized as: functions support other functions; functions are supported by other functions; or functions coordinate directly with other functions to achieve a functional objective).

- Any medical response organization must have the capability for 24/7/365 operations.

Any incident response that significantly engages medical and public health resources is expected to carry intense information processing requirements. This critical responsibility is therefore addressed extensively in the MaHIM System Planning Section. Important activities include providing information processing support to Management, Operations, and other Support Functions. The Planning Section establishes overall coordination of information by specifying the data to report and establishing reporting requirements such as formatting, timing, and reporting methodology. Information Management across the response system will only work if each functional area can gather data and disseminate information within its own function and very rapidly collect and transmit indicated data to the MaHIM Planning Section in a timely manner.

Information Management activities must be defined and implemented through each successive stage of the incident response: incident recognition; activation/initial notification, mobilization, incident operations, demobilization, and transition to recovery (see Chapters 6 and 9 for more detail).

MaHIM Incident Command

The MaHIM System Incident Commander and Command Staff are responsible for the entire incident response, and therefore for all “strategic” incident issues. Command sets the strategic goals for the incident (the “control objectives” as described in the original NIMS or the “incident objectives”) and defines the major management parameters: IMT structure and key assignments; length and timing of the incident operational periods; priority of objectives, etc.

MaHIM Operations Section

The MaHIM System Operations Section encompasses all functions that are directly responsible for accomplishing the control objectives set by Management. The Operations Section Chief oversees and directly coordinates all of these activities. To accomplish this efficiently, strategy (methods, priorities, and tactical approach) and tactics (actions and tasks) are established to achieve the incident objectives. The execution of the delineated tactical assignments then become the responsibility of leadership within the operations section elements (branch directors, division and group supervisors, task force and team leaders).
**MaHIM Support Functions**

Support functions provide resources and services, *internal to the overall ICS organization*, that maintain the capabilities of Management and Operations throughout the incident. The MaHIM System support functions are comprised of the three support sections commonly found in ICS: Medical and Health Logistics Section, Medical and Health Planning Section, and Medical and Health Finance/Administration Section.

**MaHIM Logistics Section**

This functional area encompasses all functions that support Management and Operations in the areas of personnel, equipment and supplies, incident facilities, and special support such as communications.

**MaHIM Planning Section**

This functional area encompasses all activities that support Management and Operations in the processing of incident information obtained from other IMT sections and from outside sources. Key information-processing sub-functions exist within the Planning Section, including information collection and dissemination to and from the various response system elements. This is in turn supported by the Communications Unit under the MaHIM Logistics Section. Another critical activity that the MaHIM Planning Section is responsible for is the development and assessment of the incident action plan (IAP) for each operational period, along with key supporting plans such as the medical plan, safety plan, transportation plan and others. This activity supports all other system activities through the development and maintenance of a MaHIM system-wide planning process. Actions are conducted as an iterative “planning cycle”: a continuous, deliberate method of defining incident objectives, establishing strategy and tactics to achieve the objectives, assigning resources to perform the tactics, evaluating the effectiveness of incident actions, reacting with revised and new objectives, projecting future incident needs, and developing contingency plans as indicated. Each planning cycle develops the action guidance for the next operational period, thereby providing “management by objective” that coordinates activities across the incident response.

**MaHIM Finance and Administration Section**

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 addresses include:

- Financial accounting during the incident.
- Maintaining time logs and addressing workers compensation and other administrative tasks.
- 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**

The issue of how to provide the command function to an entire multi-jurisdictional incident is very complex.

Unified Command or Area Command may potentially provide a basis for *intrastate regional* management of an incident, especially if this is mandated through State statute or regulation (California and others).

Unified Command or even Area Command for an interstate region, however, is especially difficult, especially when the incident is commanded by non-fire service disciplines without a long history of cross-border incidents. 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 the ultimate focus. Regional management *coordination* may therefore be a more realistic and achievable target, rather than a formal unified command structure. A *Regional Management Coordination Function* is therefore delineated in the MaHIM System model that accomplishes this goal.

The Regional Management Coordination Function in the MaHIM System model presents a management process that could establish a *coordination conduit between jurisdictions* that are significantly affected by an incident. This function can promote consistency in the involved jurisdictions’ incident goals and objectives that leads to a consistent *regional response strategy*. The outcome may even be a regional Incident Action Plan, a brief document that is distributed with each jurisdictional Incident Action Plan and only addresses *strategic issues,*
including parameters for guiding inter-jurisdictional mutual aid at the tactical level.

An important service provided by regional management coordination, one that enhances Inter-jurisdiction coordination and cooperation, is the management of information across multiple jurisdictions. This may be best accomplished through a defined mechanism for collecting, integrating, analyzing, and reporting in real time the information being generated and shared by multiple jurisdictions. This may be a function that is conducted by a higher level of government. For example, a State healthcare response assures that information across multiple local jurisdictions is aggregated and shared with each affected jurisdiction. Alternatively, the local jurisdictions may address this between themselves as an element of their individual incident action planning, or the least impacted jurisdiction within a region may primarily manage the regional information integration and specific high-effort functions such as Regional Patient Tracking (see below) during an incident.

Requirements for an effective regional coordination process include:

- Coordination of individual jurisdictions’ incident response objectives, to develop consistency across the region.

- Review and coordination of incident strategy and tactics between jurisdictions.

- Coordination of the public message to promote consistency between jurisdictions. Differences are addressed with a public explanation/clarification. For example: explaining why West Nile mosquito spraying occurs in some counties and not other counties in the same region.

- Sharing of hazard and other important incident information identified by one jurisdiction with other jurisdictions in the region.

- Strategic mutual aid agreements between the jurisdictions of a region define how tactical mutual aid will be implemented, including standard mutual aid request methods, mutual aid tracking mechanisms, and other critical details addressing finance, licensure, tactical management of mutual aid resources, and other issues.

Many of these issues have been addressed in some detail in the MSCC handbooks (MSCC 2007, MSCC Healthcare Coalition 2008).
Overview: MaHIM Incident Command and Command Staff

In incidents where mass casualties or the potential for mass casualties is a primary consequence (such as the 2001 anthrax mail dissemination), the overall incident response may be managed by a medical and health incident commander (Figure 6-1) or by Unified Command (Figure 6-2). For incidents that are not primarily medical or natural (e.g., bombing with a collapse structure response), overall incident command will usually not be primarily medical, but Medical and Health Incident Management should be recognized as a critical function and should be a respected participant in the Unified Command element. Acute care medicine and public health should be prepared to strongly represent healthcare resources as a participant in unified command in incidents with human victims, or with the potential for human injury or illness among victims or responders. These entities should also participate in any management decision-making process at the jurisdiction level when the incident involves direct impact to healthcare and public health organizations (e.g., utility disruption, roadway disruptions, and others).

Unified Command (UC)

A structure that brings together the incident commanders of all major organizations involved in the incident to coordinate an effective response while at the same time allowing each commander to carry out his or her own jurisdictional or discipline responsibilities. UC links the organizations responding to the incident at the leadership level and provides a forum for these entities to make consensus decisions.

Under UC, the various jurisdictions and/or agencies and nongovernment responders may blend together throughout the organization to create an integrated response team. UC may be used whenever multiple jurisdictions or response agencies are involved in a response effort.

UC may also be established to overcome divisions from:
- Geographic boundaries;
- Government levels;
- Functional and/or statutory responsibilities; or
- Some combination of the above.

(Adapted from: U.S. Coast Guard Incident Management Handbook, U.S. Coast Guard COMDT PUB P3120.17 April 2001)

Figure 6-2

The MaHIM Incident Commander and/or UC is directly responsible for establishing the incident medical and health objectives and for overseeing the development of incident response strategy and operational tactics (defined by the MaHIM Operations Section) that accomplish the objectives. Incident Command also performs high-level problem solving, addressing issues such as resource shortages that cannot be adequately addressed from within the MaHIM incident management team (IMT). In both medical incidents and primarily non-medical responses, the MaHIM Incident Commander assures strategic coordination with the community’s non-medical response functions. The MaHIM IMT
interfaced with state and federal response usually through the community’s EOC. Medical and health incident command should therefore coordinate closely with the EOC, but should be kept separate and distinct from the EOC function that supports the IMT. To effectively manage a complex medical response, it is imperative that medical and health incident management is conducted through an IMT, not from an Emergency Support Function (ESF) in an EOC. The MaHIM IMT’s interface with the EOC, however, is commonly conducted through ESF #8, Health and Medical Support.

Health and medical response commonly includes private medical resources, public health, and public medical resources that are not within the direct command authority of the public safety system (fire, law enforcement, Emergency Medical Service, public works). Operational management of these resources is therefore 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 resources in the Response System.

As noted in the MSCC handbooks, healthcare resources in the private and non-profit sector will generally operate in a “sovereign” fashion, and may organize as a healthcare coalition for mutual aid, information sharing and coordination of incident strategy and objectives (MSCC 2007, MSCC Healthcare Coalition 2008). This healthcare coalition can be supported by the jurisdiction’s MaHIM IMT, whether managed by UC or the local health agency with primary jurisdictional authority over the incident.

Medical and Health Incident Management is accomplished by a well-defined series of activities and meetings that comprise a formal, disciplined Incident Action Planning process. The importance of having this process defined and trained upon so that incident action planning is immediately available and conducted under incident conditions cannot be overemphasized.

Effective incident planning must be based upon timely, accurate information, so appropriate data from each IMT function and sub-function must be rapidly collected, analyzed, and formatted into usable information. Using this knowledge, the incident and operational period objectives, strategy, and tactical procedures and tasks are then delineated in an Incident Action Plan (IAP) to address the defined needs of the incident. An IAP is developed and disseminated for each operational period and provides the “management by objective” that coordinates incident responders without impeding individual initiative.

While the current NIMS document does not specifically differentiate between “incident objectives” (called “control objectives” in NIMS 2004) and “operational period” objectives, both types are important to recognize and define. Incident objectives are essentially the overarching goals, or desired end-state, for the IMT response. Operational period objectives are specific and measurable endpoints for each defined operational period. Both types of incident-specific objectives are developed during the incident action planning process. The MaHIM management process that accomplishes this is presented in detail in Chapter 9 (Figure 9-10).

MaHIM Incident Commander (IC)

This position is responsible for all activities conducted by the MaHIM IMT, and for keeping the responsible agency executive informed about the incident and the response. The IC is solely responsible (within the confines of his or her authority) for establishing incident objectives and strategies as well as operational period objectives. The IC is also responsible for ensuring that all functional area activities are directed toward accomplishing the IMT’s incident objectives. In many situations, the medical and health IC may participate in a unified command.

The requirements for effective MaHIM Incident Command may be achieved through the aggregate knowledge, skills and abilities of the command staff, including senior advisors to the Incident Commander (Figure 6-1). The aggregate requirements for the IC include:

- Legal authority to represent the jurisdiction on public health and medical issues. In most cases, therefore, the IC will be a designee of the jurisdiction’s public health authority.

---

32 It is noted that in some jurisdictions, local public health reports directly to State level public health authorities. This does not obviate the need to coordinate at the jurisdiction level during emergencies or disasters.
• Legal authority to issue public advisories and directives addressing public health and medical issues for the community.

• Comprehensive understanding of the Incident Command System and its operational principles, including how to conduct effective incident action planning during response.

• 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, and others).

• Operational knowledge of public health and epidemiological principles.

• Operational knowledge of the jurisdiction’s emergency public health law and regulations.

• 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.
  ✓ “Field medical care” including medical care provided through special operations teams (DMAT, SWAT, US&R, HAZMAT, and others)

• Operational competency in understanding incident stress and related management strategies.

• Demonstrated leadership qualities and leadership experience in crises and large-scale operations.

• Demonstrated public-speaking skills, plus operational-level 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 National Response Framework, particularly:
  ✓ Emergency Support Function #6: Mass Care, Emergency Assistance, Housing and Human Services.
  ✓ Emergency Support Function #8: Public Health and Medical Service.
  ✓ Emergency Support Function #10: Oil and Hazardous Materials Response.

• Understanding of principles of fatality management:
  ✓ body processing and identification requirements
  ✓ forensics needs
  ✓ jurisdictional authorities (i.e., understand the role of the medical examiner and coroner).

• Knowledge of principles of infectious disease in humans and animals.

MaHIM Command Staff positions (Figure 6-1) assist the MaHIM IC/UC in performing its duties.

A MaHIM System Deputy Incident Commander position may also be staffed. The “Deputy IC” position may fill different roles, including serving as the night IC when conducting round-the-clock operations. The Deputy IC may serve as an executive assistant to the IC. Under Unified Command (UC), the Deputy ICs may represent disciplines participating within Unified Command but not the lead agency. They serve to represent their disciplines being coordinated by the “IC” from the lead agency within UC.

MaHIM Safety Officer

The MaHIM Safety Function, accomplished by the MaHIM Safety Officer position, provides oversight for all issues related to responder safety during incident response. 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 assess safety in IAPs as they are developing, as well as directly or indirectly conduct field monitoring for safety concerns. If hazards are identified by functional elements other than Safety within the response system, they will be forwarded to the Safety Officer for immediate attention. Safety performs an analysis, mandates immediate intervention if safety is seriously
threatened, and makes recommendations through the incident action planning process to address projected health and safety concerns.

Safety is responsible for developing the Health and Safety Plan (HSP), a key supporting plan for the Incident Action Plan (see Chapter 9).

Requirements for this position include:

- Emergency authority to prevent or stop unsafe practices when immediate action is required (Safety Officer and related personnel must therefore be recognizable to all elements of the response system).

- Unrestricted ability to correct unsafe practices through coordination with the incident command and management elements throughout the ICS organization.

- Authority to review all incident objectives, strategies, and tactics for health and safety implications.

- Capability to document incident specific hazards and develop hazard analysis. This requires coordination with MaHIM Operations Section (Incident Profiling and Hazard/Threat/Disease Containment) and the MaHIM Planning Section (for hazard-related expert information).

- Competency in documenting hazard-specific protective measures for responders in all portions of response system. This requires coordination with MaHIM Operations Section (Incident Profiling and Hazard/Threat/Disease Containment), MaHIM Logistics Section (Medical Unit addressing preventive medicine), and MaHIM Planning Section (for hazard-related expert information).

- Competency in using Geographic Information Systems to document hazard zones, hazard control zones, and other visual safety guidance. This requires coordination with the MaHIM Operations Section (Incident Profiling and Hazard/Threat/Disease Containment) and the MaHIM Planning Section (for hazard-related expert information).

- Competency in assuring that contingency planning and plan implementation for responder health and safety is adequate. This includes, as indicated, in-place responder decontamination facilities to address accidental HAZMAT exposure, medical evacuation for injured or ill responders, rapid access to shelter-in-place locations for responders and other issues. This requires coordination with Hazard/Threat/Disease Containment under the MAHIM Operations Section, and the appropriate elements of the Planning Section.

- Competency to rapidly investigate and address safety issues identified by other response entities operating at or near the incident site/s. This requires coordination with the Liaison Function.

- Ability to investigate and address evolving responder concerns, including the competency to provide information to dispel rumors about safety for responders and others outside the MaHIM system. This requires coordination with the MaHIM Information Officer (Media/Public Affairs) and the MaHIM Planning Section.

**MaHIM Liaison Officer**

Liaison actions are important for coordinating incident response with major organizations outside the jurisdictional MaHIM Response System, such as federal law enforcement or intelligence units operating in the incident (but outside of unified MaHIM Command). The MaHIM command staff liaison position, the MaHIM Liaison Officer, interfaces with these outside entities for the purpose of strategic coordination. This is accomplished by establishing and operating appropriate information exchange (and therefore coordination) with outside support resources. The liaisons convey information obtained from “outside” to the appropriate destination functions within the MaHIM System and to the Planning Section for processing and incorporation into the incident action planning process.

The MaHIM IC may also assign a liaison to political leaders, though the incident commander may elect to directly provide briefings to political leadership.

Liaison personnel, supervised by the Liaison Officer, could re-locate to many possible areas, including the local EOC, the state EOC, the Joint Operations Center, 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.

Tactical level liaison also occurs at the operational level within the incident activities, but this activity is
generally conducted by operations section positions in the course of their assigned tasks.

The requirements for this position include:

- Operational understanding of the specific MaHIM System operating in the incident, with the ability to provide a knowledgeable briefing that is relevant to the outside organization.

- Operational understanding of the outside organization to which they have been assigned for liaison purposes, including its capabilities, management structure, and direct point/s of contact.

- Competency in understanding and using the appropriate contact methods for interfacing with the outside organizations, with the ability to maintain round-the-clock availability if indicated.

- Competency in identifying relevant information to be passed to assisting/cooperating agencies and other appropriate outside organizations. This requires extensive coordination with the MaHIM Planning Section, as well as the Information Officer position from the MaHIM Command Staff.

- Competency in rapidly forwarding requests and relevant information from assisting or cooperating agencies and other appropriate outside organizations rapidly to the appropriate MaHIM position.

- Ability to assess whether supporting or cooperating agencies and other outside resources are operating in a method that achieves or supports incident objectives established by MaHIM incident action planning, and identifies potentially conflicting objectives, strategy and tactics.

The requirements for the MaHIM Information Officer include:

- Ideally should be easily recognized by the public, rather than an obscure scientist or relatively unknown public official.

- Available to provide frequent appearances to engender media and public familiarity with both the public information personnel and critical public messages.

- Ability to rapidly access expert information from within the MaHIM IMT so that he/she never portrays being “caught off guard” or unable to answer questions posed by media.

- Communication competency to provide concise but clear, non-technical answers to technical questions.

- Ability to present information in an honest, confident, and competent manner to the public, appropriately portraying caring and sincerity through communication skills. This includes, for example, the ability to show emotion without portraying loss of control.

- Ability to 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 in an unusual incident.

MaHIM Information Officer (Media, Public Affairs and Internal Information)

The MaHIM Information Officer oversees this function and commonly deals directly with the media. The position is responsible for the development of media messages and their delivery after message approval from the MaHIM IC or UC. This function should assure that important response information is first distributed to appropriate “responders,” including the medical, public health, and other involved professional 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 therefore affirm the credibility of the information to the public and to their patients; and so that standardized responses can be developed across the health and medical response spectrum. For example, if recommendations for a prophylaxis regimen is being publicized, healthcare professionals (clinicians, pharmacists, community health clinic managers and others) should receive prior notification and have an opportunity to ask questions and have concerns addressed (This would be a responsibility of the MaHIM Operations Section Hazard/Threat/Disease Containment). 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.
Ability to provide the reasoning behind response actions, if needed to avoid alarming the public. For example, if large-scale mobilization of response resources occurs primarily because of caution rather than an identified threat, this should be explained clearly.

Ability to provide direction to the public for 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.)

For effective information dissemination from the MaHIM System and to assure that the intended public and internal messages are being conveyed across the system, several sub-functions may be necessary. These may be performed by personnel assigned to MaHIM System Sections (such as the Planning section) or may be performed by deputes to the MaHIM System Information Officer (Figure 6-3).

Figure 6-3

Media Message Sub-function: This Information sub-function produces timely, carefully structured media messages, to be approved by the MaHIM IC or UC and released through the Public Information Officer or designee as a briefing and guidance for the media and the public. The 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.

MaHIM System message requirements should be defined to promote optimal effectiveness in communication.

- Messages should be coherent, concise, and attract or focus attention.
- Messages should avoid initiating or fueling policy debates. That is to say, conflicting issues should be resolved 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 non-controversial 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” or “abundance of caution” used effectively by Mayor Rudolph Giuliani during the 2001 anthrax incident in New York City. This same strategy is important in addressing policy debates between jurisdictions and between different response agencies.

- Messages must be consistent with prior messages. Significant change from recommendations in preceding messages should be presented using explicit criteria and be accompanied by a careful explanation as to why the change is indicated.

- Messages must be consistent across response disciplines as well as between adjoining jurisdictions. Again, variances should be explained so that the public understands and the media doesn’t portray the differences as conflicting, as a competency issue in response management, or as a problem that challenges public trust in incident authorities.

- Message development must consider the views of the public and the messages should be shaped accordingly:
  ✓ Recognize that “the public” is not a monolithic group.
  ✓ Different age groups may respond differently to media information.
  ✓ Different cultural groups may respond differently to media information.

Messages and message delivery methods may therefore need to vary to assure effectiveness for specific groups within the affected area. Examples include:

- Socio-economically underprivileged populations with lack of access to traditional medical resources.
- Tourists with little or no knowledge of current medical care resources, familiar landmarks or other details within a public message.

- Messages should be balanced as much as possible. Where appropriate, examples of “triumphs” in face of adversity should be publicized as well as less uplifting information.
Messages should not obscure or “sugar coat” bad news. Instead, a realistic portrayal of the situation should be presented, with appropriate context provided and a clear explanation of the response actions being implemented (including activity to better clarify the situation).

A very early media message should be provided. The initial message should therefore define the issues and set the agenda for follow-on information sessions. Keep the description of the event factual and place the report in context. For example, “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” (This example is paraphrased from the initial press conference by U.S. Capitol Police spokesperson Dan Nichols after the U.S. Capitol shootings, July 24, 1998).

Frequent media briefings may be indicated to release evolving information in a timely manner and to meet the 24-hour media broadcasting realities. Having experts and appropriate incident personnel available to answer questions when possible may assist with public understanding and with public acceptance of recommended actions. This public messaging strategy may include expert commentary, where appropriate, from knowledgeable professionals who are willing to comment publicly and to expand in a consistent manner on action recommendations.

The “public message” should be promulgated across more than just the news media. Other critical releases could include “Fact Sheets” disseminated through web sites, treatment guidance to shape advice through public health and healthcare hotlines (such as primary care call lines), and as handouts in emergency departments and physician’s offices. Consistency across all of these communications must be assured.

The message should be shaped to promote appropriate population behavior. Specific information to achieve the desired population behavior may include:

- Precautions to take against incident hazards such as an infectious disease.
- Where to seek shelter.
- Where to seek aid.

Where to look for missing loved ones.

As much as possible, ensure factual correctness of recommended actions. If incorrect or carelessly misleading information is presented, loss of public trust (or trust by healthcare professionals) can result.

Recommended actions for the public should be personalized as much as possible for the intended audience. This includes how the message is presented. Medical and other healthcare recommendations to the public must therefore be relatively straightforward, with the caution that the recipient may wish to discuss the recommendation with their personal healthcare provider if they have individual concerns. The typical public health message to medical professionals should be avoided when addressing the public. During the 2001 anthrax incident, for example, the medical advice for U.S. Postal Service workers began with “You should consider…” and was very poorly received.

Including information that explains the potential consequences of not following recommended actions may also be beneficial in shaping population behavior.

Public Information Tracking Sub-function: This sub-function’s purpose is to identify misperceptions, rumors, and unintended “messages” generated by the response system’s actions or statements. Special attention is required to monitor messages delivered by political or community leaders.

Concerns and recommendations to address them must be rapidly and clearly defined and conveyed to the appropriate MaHIM functions, so that they may be addressed in a timely and effective manner. The resultant media messages should be shaped to specifically clarify or otherwise address the issue. These can be very active, time-intensive processes and adequate staffing must be accurately projected.

This public information sub-function provides a structured capability for monitoring and evaluating:

- Public message from the media.
- Public response to each media message.
- Public interpretation of actions and other non-verbal communication from the response system.
• Public information from outside sources, including outside “experts” receiving media attention.

• Public statements from political and other community leaders.

• Web-based information commenting on the response and the identified hazards.

• The public perception of the response system actions and their effectiveness.

Public Information Tracking also focuses upon “rumor” management. Rumors are commonly caused by lack of information and subsequent speculation. This can be addressed somewhat through the preventive action of frequent information dissemination and providing an opportunity for the media to have questions addressed.

The need remains, however, for the ability to rapidly identify evolving rumors, to define the issues underlying them, and to clarify or expand upon the public information that addresses the underlying issues. When rumors are detected, the perceived importance of a rumor story and the ambiguity of the story should be reduced (Garcia).

The overarching goal of this sub-function is to maintain the public’s confidence, to promote beneficial population behavior, and to minimize the psychological impact of the incident.

Requirements for the Media Message Sub-function include:

• Ability to monitor the medial message and assure consistency of message. Displaying a unified and consistent response capability, demonstrated by consistent messages and information, can decrease much of any fear. This critical action is facilitated through the MaHIM incident action planning process (see Chapter 9).

• The media message should be monitored by trained media personnel, with the objective of detecting significant misinformation, any sensationalizing of details, the publication of unfounded rumors, and other phenomena that can adversely affect the public perception and confidence in the response. The ability to rapidly address public concerns should be incorporated into the overall response strategy.

• The competency to rapidly provide authoritative information to challenge media outlets that are distributing disinformation.

• The ability to locate recognized, credible experts and provide them access to the media (perhaps through regular media briefings) to provide clarifying information on the relevant technical subjects. The experts must be able to reduce technical jargon to common terminology.

The Information Officer is assisted with its sub-functions by the Population Mental Health Interventions Task Force under the MaHIM Operations Section.

**Incident Command System Monitoring**

This function acts as a “senior advisor” to the MaHIM Incident Commander or Unified Command and provides management assessment of the overall function of the MaHIM System 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.

The **Incident Command System (ICS) Senior Advisor** reports directly to the MaHIM Incident Commander on the assessments of the system’s critical operations and any functional problems not solved through regular system processes. The effectiveness of a complex process such as 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 MaHIM Incident Commander.

This position conducts iterative evaluation of the MaHIM System function during each operational period. Interventions to improved system function (for example, staffing additional supervisory positions or adding divisions or groups to maintain span of control) can be recommended and implemented via incident action planning. The incident-specific MaHIM response system can therefore be adjusted to fit the given response needs for each upcoming operational period. While this is not a common “senior advisor” position in wildland ICS, it should be carefully considered in health and medical emergency response, since the use of ICS for large-scale incident management is new and unfamiliar to many professionals.
Requirements for effective use of the Incident Command System (ICS) Monitoring Senior Advisor position include:

- Extensive understanding of both the structure and function of ICS organizations, and the effective application of ICS to the MaHIM System.

- Extensive management experience and operational competency in the use of ICS to manage response to large-scale incidents.

- Unrestricted access to all the geographic and functional locations of the comprehensive incident MaHIM System.

- Unrestricted access to all documentation and information generated by the incident MaHIM System.

- Ability to directly advise the MaHIM IC if issues with ICS structure or function arise. This position may also function best if granted defined authority by the ICS to directly address inadequacies in the MaHIM System, including misapplication of ICS, with the appropriate level of MaHIM leadership.

**Other Senior Advisor Positions**

The MaHIM IC may establish and staff other senior advisor positions within the MaHIM command staff. These advisors provide strategic advice to the IC and other command staff on managing the specific hazard, on addressing legal or ethical issues, or on other topics of relevance at that time in the response.

A state public health authority, for example, may be consulted as a senior advisor to a local MaHIM incident management team managing a local public health incident. The state official may provide strategic advice as to specific public health authorities, access to outside experts and response resources, and other valuable input.
Overview: MaHIM Operations Section

The MaHIM Operations Section has the mission of accomplishing the strategic incident objectives set by the MaHIM Incident Command. The mission of the MaHIM Operations Section is to implement and coordinate the operational functions, sub-functions, and processes, at the tactical level. All resources assigned to tasks that directly address the incident needs (i.e., the primary response interventions) for a mass casualty or mass effect incident are therefore coordinated under a clear management structure. The MaHIM Operations Section Chief is responsible for assuring the operability and integration of all Operations Section branches and their functions (Figure 7-1).

As with the overall MaHIM System, many of the resources needed to conduct MaHIM Operations Section tasks may not reside within the usual line authority of public health, medical or other healthcare sectors. In these situations, a range of strategies may be used to staff response positions:

Non-medical or non-public health resources may be assigned to the MaHIM response system by prior interagency agreement or by the directive of senior jurisdictional authorities. This is especially likely in a primarily medical or public health incident where the MaHIM Incident Management Team is the only activated IMT for the jurisdiction. An example might be the assignment of public works or other jurisdictional resources (personnel, computers, vehicles) to the MaHIM Operations Section to collect environmental samples during a deliberate contamination incident. Resources performing this type of activity would receive direction and report through the Rapid Epidemiological Investigation Task Force under the Public Health Operations Branch.
Unified Command (UC) may be used by the jurisdiction to manage response to the hazard impact. In these situations, the most appropriate resource from any of the agencies participating in UC can be rapidly assigned to the activity at hand under the MaHIM System structure of the UC Incident Management Team (IMT). UC is therefore the ideal model for managing a MaHIM response to mass casualty or mass medical effect incidents, and for other types of incidents involving significant medical and health issues. In primarily non-medical incidents, the UC may still consider using a Public Health Operations Branch that is similar to the one in the MaHIM System.

The actual task performance such as medical care for victims, forensics investigation with healthcare implications, or animal health surveillance may be physically conducted by resources that are technically outside of MaHIM System. The designated MaHIM position assigned to that task responsibility will closely coordinate with the response resource conducting that activity. “Coordination” is managed via close communication, competent information exchange and support by the MaHIM system for the resources performing the task. Though no direct line authority from MaHIM exists over these activities, close coordination and information management can be effectively accomplished and benefit both response organizations. This type of relationship is important to establish during preparedness planning, since time will be of the essence during life-threatening incident response. Situations where this relationship may be important include:

- Between the MaHIM System and law enforcement, with important medical and epidemiological information potentially collected by forensic investigators.
- Between the MaHIM System and the FBI or DoD sources collecting sensor data.

### MaHIM Operations Section Leadership

#### MaHIM Operations Section Chief

The MaHIM Operations Section Chief ("ops chief") is responsible for setting the tactics and tactical strategy to achieve both the incident objectives and the operational period objectives that were established by MaHIM Incident Commander (IC). The ops chief is appointed by the MaHIM IC and determines the incident-specific configuration for the operations section (i.e., which elements are activated and which positions are staffed for the next operational period), key position assignments within the operations section, and resources to be assigned to positions within the operations section. Under unified command (UC), the Operations Section Chief is generally selected from the lead agency (i.e., the agency with lead authority) within the UC.

#### MaHIM Operations Section Deputy Chief

A MaHIM Operations Section Deputy Chief positions may also be staffed. The “deputy ops chief” position/s may fill different roles, including serving as the night operations chief when conducting round-the-clock operations. Under UC, deputy chiefs may also be appointed to represent disciplines participating within unified command but not the lead agency. They serve to represent their disciplines being coordinated by the operations section chief from the lead agency within UC.

#### MaHIM Operations Section Staging

This function (Figure 7-1) is critical to the MaHIM Operations Section, since it organizes arriving operational resources, holds resources that are not immediately assigned, and upon assignment deploys resources to their designated area at the direction of the operations section chief or designee.

The MaHIM Operations Staging area is supervised by a MaHIM Operations Staging Manager. The staging area is supported by the MaHIM Logistics Section in multiple essential activities.

Staging Area requirements include:

- Location for staging operational resources must be a designated “safe area” (in terms of both security and incident hazards) that can effectively deploy resources as they are requested and assigned.
- Operations Section Staging must be easily located by arriving resources.
- The staging area should provide adequate space for personnel processing and waiting. Processing activities are supported by the “Personnel Processing” unit under the MaHIM Logistics Section. A check-in process must be established for resources and personnel so that accountability
is maintained at all times. Appropriate badging of personnel is also conducted here. For responders from outside the Response System (volunteers, mutual aid responders and outside professionals), verification of credentials is accomplished at this location as well.

Personnel feeding and billeting (i.e., and rest while awaiting assignment), along with other personnel support, may be required. “Personnel Support” under MaHIM Logistics supports this activity.

- Transport of resources and personnel from staging to their operational assignments will often require support by the Ground Support Unit in the Logistics Section.

**Public Health Operations Branch**

The MaHIM Public Health Operations Branch (Figure 7-2) includes many of the traditional public health responsibilities during emergency response. Epidemiology investigative responsibilities, however, are empowered within the MaHIM System, since critical data and information sources are now tied into the epidemiological investigation process. Likewise, hazard and disease containment is enhanced by integration within a larger pool of resources and support. As with any other activity within the MaHIM System, available resources to achieve this branch’s objectives may not come from traditional sources. Personnel may be assigned from other disciplines to carry out activities. In some situations, these personnel and resources could be directly managed by public health personnel. In others, it may be more of a close liaison relationship with two-way sharing of information, expert knowledge and supporting resources.

In a complex incident such as bioterrorism, a large volume of incident information may be generated within this branch. Much of this information will be valuable to the overall incident management and other resources addressing non medical issues. It is therefore necessary that this branch coordinate closely with the MaHIM Planning Section and its Situation Unit. Through the Planning Section processes, information from this and other branches of the Operations Section can be captured for both incident action planning and for appropriate dissemination outside the MaHIM System (through the Liaison Officer). The activities of this branch are supervised by the Public Health Operations Branch Director.

**Incident Epidemiological Profiling Group**

This group encompasses all activities to identify, define, and track an incident from a medical and epidemiological perspective (Figure 7-3). While the title of this Group sounds awkward, it was selected by the authors to accurately reflect the Group’s focus and to stress the importance of epidemiological principles involved in developing “medical and public health situational awareness.”

The information generated through this Group’s activities is vital to MaHIM Incident Command, since it encompasses most of the information needed to define incident objectives, strategy, measures of effectiveness, and projected incident needs.
Accurate and timely development of an incident’s epidemiological profile provides a sound information basis for MaHIM decision-makers to perform incident projection and to determine appropriate courses of action through the incident action planning process.

The Incident Epidemiological Profiling Group’s structure and operations:

- Provide methodology to recognize, as early as possible, any unusual situations (i.e., “anomalies”) that may be developing.
- Provide methods for rapid investigation of identified anomalies that could indicate a significant incident.\(^{33}\) The same investigative capabilities can be used to evaluate unexpected developments as an incident evolves.

- Establishes early evidence that a situation requires a higher level of Emergency Operations Plan (EOP) activation.

- Rapidly provides interval assessments of the size and scope and other characteristics of a hazard’s medical and public health impact and/or threat. These activities include developing and refining case definitions, determining any potentially at-risk populations, and other epidemiological parameters.

In an incident with a surreptitious onset such as an unannounced biologic agent release or a population exposure to a chemical with slow onset medical effects, the initial anomalies that trigger investigation may occur in a variety of ways. For example, unusual activity may initially be noted through community surveillance (absenteeism, increased pharmacy sales, or other parameters). Case (i.e., patient) surveillance in selected emergency departments and outpatient medical facilities may also display unusual patterns. Animal or environmental surveillance may provide indications of an unusual human risk. Law enforcement may provide information that a health hazard may have been released. Finally, a single report of a “case of concern” from an astute clinician (botulism, rabies, or other unusual and potential mass illness without clear etiology) may be the “leading edge” of mass illness or injury. If any of these scenarios are encountered, they must be considered potential indicators of a large-scale incident until proven otherwise. A rapid and robust epidemiological investigation is therefore necessary, so that early confirmation of hazard risk is accomplished and rapid notification and incident response can be accomplished.

The requirements for this Group include:

- Competency in rapidly collecting, analyzing and formatting epidemiological and diagnostic data from all Group sub-functions into a cohesive epidemiological profile of the incident. This information processing activity is supported by the MaHIM Planning Section’s Situation Unit. The

\(^{33}\) The term “incident” is used to describe a situation where the EOP is activated and the ICS response organization (in this case the MaHIM System) is mobilized.
epidemiological profiling information is also used by Situation Unit in supporting the MaHIM incident action planning process.

- Appropriate legal authority for community and case surveillance systems.

- Ability to develop surveillance information across a wide region, which is usually beyond a single jurisdiction (i.e. via similar surveillance systems in multiple jurisdictions within the region). This will provide the most sensitive surveillance and the ability to rapidly determine the size and scope of the unusual findings.

- Competency in establishing effective interface with forensics, animal and environmental experts and other relevant data and information sources.

- Real-time analysis of data must occur that may in aggregate or as a single case indicate a new public health threat. Indicators that may signal a covert biological, chemical, or radiation attack are listed in Figure 7-4.

- Competency to rapidly develop information (supported by the Planning Section’s Situation Unit) from each Group element and aggregate/analyze information from all Group elements to develop a comprehensive incident profile.

- As an incident evolves and response interventions are implemented, continued data collection and analysis by this Group can provide measures of effectiveness and objective assessment of progress in resolving the emergency.

The leadership for this position is the Incident Epidemiological Profiling Group Supervisor.

Organizational elements that could participate in the Incident Epidemiological Profiling Group are listed and described below.

### Possible Indicators of a Covert Attack with Biological, Chemical or Radiological Agents

- Unusual clusters of disease in a population.
- A higher morbidity and mortality than expected from 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.
- Simultaneous clusters of disease.
- 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 7-4**

**Community Health Surveillance Task Force**

This task force tracks community health indicators as a component of a jurisdiction’s ongoing health surveillance. This capability must track, analyze, and report specific health and medical parameters across a jurisdictional area. This activity is distinguished from the individual patient or “case” surveillance data addressed by the Patient Surveillance and Tracking Task Force.

The Community Health Surveillance Task Force follows health parameters throughout a rapid epidemiological investigation and continuously through the entire incident to provide information important for understanding the epidemiology of the incident (size and scope of the incident, at-risk population, etc.).

Information from this task force could also serve as measures of effectiveness as the response evolves. The Situation Unit (under the MaHIM Planning Section) 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 7-5.
**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
  - ✓ Wildlife managers

**Figure 7-5**

The Community Health Surveillance Task Force requirements include:

- Ability to provide rapid information on *initial, evolving, and final/total* size and scope (by pharmaceutical sales data, hospital admission rates, absenteeism rates, etc.) for the incident.

- Ability to adapt surveillance to specific measures that could be used as measures of effectiveness of the incident response.

- Capability to rapidly respond with more focused surveillance when indicated to an event, where general surveillance may be quickly scaled up to intensive surveillance during an event.

- Competency to rapidly report information (supported by the Planning Section’s Situation Unit) so that information from each Group element can be aggregated and analyzed to develop a current and comprehensive incident profile.

Surveillance system design, development, implementation, and maintenance costs should be financed so that private sector healthcare organizations do not incur undue costs for participating in the surveillance initiative.

**Patient (Case) Surveillance and Tracking (PSAT) Task Force**

The Patient Surveillance and Tracking (PSAT) Task Force establishes a capability to collect, track, analyze, and report patient (case) information across a jurisdictional area. This includes case surveillance on a continuous basis and increased or focused surveillance during an incident or epidemiological investigation. Case collection categories and methods should be flexible, so that 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 (i.e., the system should be able to convert from its baseline tracking cases of headache and fever, for example, to tracking blast and shrapnel injuries after an explosion occurs).

The Situation Unit in the MaHIM Planning Section *supports* the tracking, analysis, formatting, and information reporting of this data.

Patient (case) Surveillance describes the ongoing organized collection of information about patients with designated signs and symptoms and diagnosed medical conditions via established data input methods. 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 bombng, 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. The Patient Surveillance and Tracking Task Force should be capable of capturing this data rapidly. On an everyday basis, this entity can provide value by also tracking other non-disaster injury or illness cases. Examples include “all fireworks-related injuries for the two weeks surrounding July 4th,” or “all heat-related illnesses during a summer heat wave.”

During an incident with an unusual illness or injury, cases to be reported and tracked are defined through an initial “case definition” that will usually become more specific as the incident progresses. Cases may be categorized as “confirmed” (per the case definition) or “suspicious.”
Demographics for each case that may be useful include:

- **Primary** (during general surveillance): name, date of birth, gender, race.
- **Secondary** (upon request for intensive surveillance): name, address, and contact information; next of kin with phone number and address.
- Healthcare organization reporting the data.

Medical information and clinical condition data that may be useful include:

- **Primary**: syndrome category (by patient self-reporting form or diagnostic codes), hospitalized level of care (regular, intermediate, or critical care), and disposition (hospitalized, treated and released, morgue/funeral home).
- **Secondary**: chief complaint, primary symptoms/findings by designated categories, patient condition by level of healthcare needs (major, moderate, minor, deceased).

Epidemiological data that may be useful include:

- Location where injury, illness, exposure occurred.
- Other incident and patient specific details as indicated.

General patient surveillance and tracking requirements include:

- Ability to respond such that general case surveillance may be quickly scaled up to more intensive surveillance and individual patient tracking.
- Ability to provide rapid information on the initial, evolving, and final/total size and scope (by patient numbers, locations, and general medical condition) of the incident.
- Ability to track and report case information for use as measures of effectiveness of the incident response.
- Ability to perform data collection during periods of non response for background epidemiological profiles of planned events (concerts, political gatherings, etc.) and recurring hazards (heat waves, etc.).
- Methods for 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 clinician.
  - Emergency medicine practitioners.
  - Infectious disease.
  - Infection control specialists.
  - Internal medicine and “hospitalist.”
  - Critical care specialists.
  - Microbiology and hematology laboratories (hospital, outpatient and reference labs).
  - Pathologists, medical examiners, coroners, funeral directors.
- Ability to interface effectively with Victims’ Family Assistance Services Group and Decedents’ Family Assistance Group to provide rapid reunification of patients (or bodies) with families, providing an effective avenue for search by families trying to locate family members.
- Competency to rapidly report information (supported by the Planning Section’s Situation Unit) so that information from each Group element can be aggregated and analyzed to develop a current and comprehensive incident profile.

The patient surveillance and tracking system design, development, implementation, and maintenance costs should be financed so that private sector healthcare organizations do not incur undue costs for participating in this important public health activity.

**Rapid Epidemiological Investigation Task Force**

This sub-function performs an expedited epidemiological investigation to determine the nature of a new anomaly at the outset of an incident, or any unexpected medical or epidemiological situation as
an incident evolves. Its objective is to develop rapid medical and epidemiological understanding of the anomaly or unanticipated development. Unexpected situations include significant changes in surveillance data, with the need 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 task force is designed to use information systems and response strategy to more efficiently conduct the labor-intensive and geographically dispersed epidemiology investigation. Additional personnel, electronic questionnaires, and other resources may be used as a robust process for querying patients and family members, health practitioners and other health/medical data sources to rapidly (minutes to hours) accumulate the data and information necessary for public health epidemiologists to develop an informed analysis. For example, rather than public health personnel having to individually conduct each interview, questionnaires that emergency department clerks or nursing aids can administer to family members of victims can rapidly gather very distributed data for the epidemiological investigation.

If this MaHIM System function is required to identify whether an anomaly represents a true incident for the system, then at least a partial activation of the MaHIM System (and hence the EOP) is warranted.

The requirements for an effective Rapid Epidemiological Investigation Task Force include:

- The strategy and tasks must be supervised by an experienced, competent epidemiologist to assure the integrity of the collected data. The findings must also be analyzed and interpreted by a health expert with proficiency in epidemiological principles.
- Personnel must be appropriately trained to accomplish the investigative tasks.
- Ability to access clinical diagnostic experts in the medical area relevant to the suspect case(s). Ideally, this expertise should be an integral component of the Rapid Epidemiological Investigation Task Force. For example, an infectious disease specialist would be an invaluable technical specialist for cases of biological concern, or a radiation specialist (radiation oncologist or other) for suspected radiation illness.
- A well defined anomaly confirmation process should be developed for very unusual hazards, since confirmation of these unusual public health threats must be rapidly accomplished. Suspected threats (chemical, biological, radiological, etc.) must be investigated by appropriate individuals and agencies using adequate confirmatory techniques. A well-defined process should therefore be established for this purpose during preparedness planning.

**Incident Diagnostics Task Force**

The Incident Diagnostics Task Force (Figure 7-6) provides the testing capabilities for defining the etiologic agent/s for an incident, for helping to establish the scope of an incident, for delineating case definition, and for tracking purposes. This may include determining the biological agent causing illness and defining any sensitivities or agent resistance to patient therapeutics. It includes the capabilities for defining chemical agents in accidental or intentional HAZMAT incidents (including any significant contaminants that could cause problems beyond the effects of the primary agent).

![Figure 7-6](image-url)

Examples of the type of resources that could be included in this task force are local community labs and groups that conduct field testing (e.g. Fire based resources). As stated above, if not in a unified command situation or if the resources have not been assigned to a MaHIM, then the information from these groups would be coordinated through this task force.
Requirements for an effective Incident Diagnostics Task Force include:

- Available (24/7/365) points of contact for resources that could provide diagnostic and confirmatory testing related to the hazard agent.

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

- Established methods for clinical specimen transportation. Arranging expedited transportation should not be the responsibility for a clinical care area that could be severely challenged with a heavy patient load, plus with certain hazardous agents, very special transportation methods may be required.

- 24/7/365 capability to receive and process specimens in the destination lab facilities.

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

- Established guidelines for submitting demographic data relevant to each individual submitted specimen.

- Lab report templates that provide adequate information about the unusual lab test methodology itself when providing the results to clinicians. Confirmatory testing procedures should ideally have absolute sensitivity and specificity. Since this is rarely possible, reporting of results from any unusual lab tests must always be accompanied by sensitivity, specificity, and other attributes of the individual testing methodology (Figure 7-7). The clinician will then be better informed when interpreting the lab results.

- Ability to provide, through the MaHIM Information Officer, pertinent information about the diagnostic and confirmatory testing procedures for the public.

- Methods to ensure that proper security is provided for handling of specimens, storage of specimens, and chain of custody issues related to specimen collection and handling.

- Adequate surge capacity for major incidents. This may be complex and involve several different testing sites or teams working in close coordination under this sub-function. It includes the ability to utilize established networks such as 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 the provision of guidance for specific sampling procedures (collection, processing, and transportation).

Organization elements within the Incident Diagnostics Task Force are designed to maintain span of control in a very complex incident such as bioterrorism, where incident diagnostics may be pursued by very disparate resources. Examples depicted in the MaHIM System model are described below. The Task Force elements that conduct these activities may be a team, single resource or technical specialists depending upon the circumstances of the incident.

**Lab Test Details Important In Evaluating Validity of Test Results**

- Type of test used.
- Known limitations of test (false positives, false negatives, sampling limitations, environmental influences if any).
- Total number of specimens tested (“denominator”) when presenting a positive finding (environmental or patient based).
- Specimen source and collection methods.
- Timing of specimen collection and test procedure.
- Types of quality control used in the testing procedure.

**Figure 7-7**

Clinical Laboratory Diagnostics: This element within the Incident Diagnostics Task Force captures data from diagnostic testing that occurs on individual clinical samples. The data is aggregated and analyzed by the Clinical Laboratory Diagnostics Team for the purpose of establishing both epidemiological and medical parameters of the incident. Its focus and methodology is distinguished from the Patient Diagnostics Group under the Medical Care Branch, which focuses upon
developing the most efficient and effective diagnostic regimen for suspected cases in a mass illness or injury. It include diagnostic parameters that may “rule out” the diagnosis in suspect cases. That function provides information directly relevant to individual patient treatment, while this group of activities is more appropriately linked to the epidemiology of the incident.

If any testing is performed on individual patients specifically for epidemiology and not as a standard diagnostic test, the purpose must be clearly conveyed to the medical community and affected general population. For example, the nasal swab specimens collected after the 2001 U.S. Capitol anthrax release were for epidemiological purposes, but many patients and clinicians alike thought this was an important element for case evaluation. The resultant demands for nasal swab testing by patients in emergency departments and the specimens submitted by outside clinicians severely challenged regional laboratory services.

Laboratory testing methodology is rapidly evolving in many areas and is very technically specific. Individual testing requirements for specific biological or chemical agents are beyond the scope of this project.

Adequate general and specialty laboratory surge capacity is an important consideration and should be addressed in preparedness planning. This is complex and may involve coordinating multiple testing sites and lab personnel from many organizations.

Environmental Lab and “Field” Diagnostics (Detection): This element within the Incident Diagnostics Task Force includes collecting results of field tests for detecting or ruling out the presence of dangerous substances. Field specimen collection 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 re-suspended 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.

As with other incident activities described in the MaHIM System model, this sub-function may be very small and performs primarily a specific liaison function with resources outside the MaHIM System that are assigned by other authority to these tasks.

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. Unfortunately, well-defined decision support systems rarely accompany field test technology. Findings from technology with significant false positive and false negative rates are not clearly defined as preliminary, and guidance for rapidly determining if a test result is a true or false positive is rarely provided. All of this must be considered when collecting data and information from these resources.

The requirements for effective interface with Environmental Lab and “Field ” Diagnostics (Detection) elements include:

- Capability to report data so it can be cross-referenced and analyzed with findings from other elements of the Incident Epidemiological Profiling Group.

- Ability to interface with multiple independent technical organizations performing the environmental testing, with understanding of the technical aspects of a comprehensive environmental evaluation (e.g., air and surface sampling, evaluation of all at-risk areas, etc.).

Criminal Investigation Diagnostics: This element within the Incident Diagnostics Task Force addresses the collection of 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 MaHIM system that is allowed to view 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 a successful criminal investigation.

Animal Surveillance Task Force

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. As with other activities, the actual testing will likely occur through a variety of organizations not primarily involved in the MaHIM System. In these situations, Animal Surveillance Task Force personnel interface with these organization in a tactical liaison relationship for the purpose of capturing relevant information for the epidemiological profiling of the incident. Pertinent information from the MaHIM System (human epidemiological findings, Situation Unit reports, and others) are in turn provided through this liaison to the animal health resources.

Requirements for the Animal Surveillance Task Force include:

- Adequate understanding of pertinent hazards and their identifiable effect on animal populations. This includes understanding what findings in animal health have important implications for the at-risk human population.

- Ability to survey general and specialized veterinary services as well as traditional sites for animal health assessment (e.g., zoos, animal farms, etc.). The target sources should also include wildlife managers such as fish and game wardens and animal rescue services.

- The capability to investigate insect reservoirs as indicated, or to establish contracting relationships with entities that perform these services.

- The financial ability to reimburse surveillance costs incurred by animal healthcare resources that are conducting activities for specifically human public health services. This includes veterinary lab tests, animal autopsies and specific animal screening examinations. This is especially important for specific diseases such as plague, which can become endemic in animal populations.

Environmental Surveillance Task Force

This function oversees testing and monitoring of key environmental indicators for evidence of 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 non-medical and non-health entities, direction by health experts may be required to maximize effectiveness of ongoing surveillance, and for developing specifically focused monitoring during an incident. This activity may overlap with the Environmental Lab & “Field” Diagnostics, although that Task Force is more focused upon determining the etiology of the hazard than on wider environmental surveillance.

If an environmental surveillance program is established as an ongoing system to detect the presence of hazardous agents during non-incident times, it must be tightly integrated into the public health and medical communities. A finding from that system, if not immediately determined to be a false positive, should be treated as an “anomaly” as described in this text, and notification made to public health and medical community.

A current federal environmental surveillance program is the BioWatch Program, which is operational in multiple urban areas across the US. This system is funded and managed by the Department of Homeland Security (DHS) with assistance from the CDC, the EPA and others. It operates fixed sensors that are analyzed daily for any evidence of any concerning biological agent release. Unfortunately, the BioWatch program demonstrates the difficult issue of integrating with local response authorities. The program has had multiple positive findings (usually tularemia) with very significant delay in notifying local officials and healthcare organizations:

“A lack of consequence management planning was highlighted when a biological agent was detected in Houston in 2003” (US EPA OIG Report 2005-P-0012).

“The DHS was criticised [sic] for allowing a delay [ed. note: 6 days] in informing public health bodies, thereby preventing them from identifying early signs of a possible outbreak” (Oppenheimer 2005).

These events highlight the importance of interdisciplinary integration in regards to any information that has medical or health importance.

**Hazard/Threat/Disease Containment Group**

The Hazard, Threat, and Disease Containment Group (Figure 7-8) intervenes to control, arrest, or minimize the threat of chemical, biological, radiation, and other hazards that can extend beyond an immediate incident scene. It is the most important function in directly addressing two of the three general MaHIM strategies in mass casualty response:

1. Reduce hazard exposure.
2. Increase hazard resistance.

Though some activities listed here (e.g., environmental decontamination and cleanup of hazards) may not be a direct function of the MaHIM System, critical input into these activities from the health and medical communities may be required. The elements within the Hazard, Threat, and Disease Containment Group are listed and described below.

**Public Health Population-Based Interventions Task Force**

This Task Force (Figure 7-9) oversees activities that minimize hazard exposure and impact on populations. As with other MaHIM sub-functions, the primary responsibility for many of these activities may be carried by resources other than public health or medicine. However, the MaHIM System should establish a close interface with the management element for these resources to exchange information and provide public health and healthcare expertise into their incident planning. These include the following activities, which may be conducted by a team, single resource or technical specialists depending upon the circumstances of the incident.

Relevant activities performed by this Task Force include the following,

Managing Mass (or Targeted) Prophylaxis and Immunization: Mass prophylaxis and/or mass immunization or vaccination may be indicated in some incidents. This is a complex undertaking, and so best managed with a robust management element within the Task Force. The resources developed in many communities to provide this service are called Points of Distribution (PODs). In the MaHIM System, they are supported by the MaHIM Logistics Section Supply Unit, which acquires and maintains adequate supplies of pharmaceutical and medical equipment. Materiel may be obtained from local or State sources, or through the Strategic National Stockpile (SNS) Program.35 The SNS Program provides assistance through shipments from pre-staged caches, from vendor managed inventory, and from the CHEMPACK Program.36

---


36 CHEMPACK, is a project within the Strategic National Stockpile (SNS) Program that will deploy containers filled with nerve agent antidotes to approximately 2300 cache locations in the 50 States; the cities of Chicago, Washington D.C., Los Angeles and New York City; and to Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa and the Commonwealth of the Northern Mariana Islands. This is a joint HPP/CDC initiative (Information accessed December 7, 2007 is available at http://www.strac.org/Docs/HRSA4%20Resource%20Docs/NBHPP%20Cost%20Directives.pdf)
Requirements for an effective POD may include:

- Location relatively close to healthcare facilities, so that ill patients may be transported easily if they come first to the POD. Proximity also allows the severely challenged healthcare facility to safely and easily divert asymptomatic patients who are only seeking medications. The facility locations should therefore be selected with significant input from the healthcare organization representatives.

- The location should not pose physical or psychological barriers for post-incident users of the space (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.

- Adequate support systems such as telephones, lights, heat and/or air conditioning, meeting space, kitchen and rest areas, etc.

- Medical supplies and personnel immediately available for treating allergic reaction, or for stabilizing sick patient who arrives at delivery center for treatment.

- Storage space with security and climate control.

- Capable of 24-hour operations.

- Adequate professional staff (properly licensed and certified personnel).

- Adequate protection for staff, by immunization, prophylaxis, personal protective equipment (PPE), and/or facility adaptations (air flow changes and other interventions).

- Adequate pharmaceutical supplies and equipment, with linkage to the SNS and other sources for additional materiel.

- Adequate process for dispensing products efficiently and safely, including:
  - Medications packaged in individual patient course dosing (packet provides enough medication for one patient to take the recommended course of medication).
  - Instructions in patient primary language given with the medication or immunization:
    - Exactly what it protects against
    - Dosing
    - Potential side effects
    - Contraindications
    - Resources to address any concerns.

- Adequate security, which may be provided internally through Task Force resources, externally through coordination with law enforcement, or provided through the MaHIM System Logistics Section, which is also supporting the other general POD requirements.

- Adequate public information, in coordination with the MaHIM System Public Information officer. Convey:
  - Location and directions, with parking and entering instructions.
  - Hours of operations.
What to bring, such as government issued picture ID if indicated.

- Adequate procedures for disposal of bio-waste (Supported by MaHIM Logistics Section).
- Adequate record keeping to allow tracking of persons who have received medication/vaccination (and to prevent individuals from obtaining excessive medication). Personnel coordinate with PSAT Task Force for long-term surveillance of those given prophylaxis for efficacy and for adverse reaction monitoring.

Administrators on site at each POD should be prepared to manage staffing, supplies, services and the facility itself, and to plan for future activities such as demobilization and returning the facility to normal.

Managing Large-Scale Isolation: This Task Force element establishes and supervises the implementation of specific and/or large-scale isolation strategy to prevent spread of disease or contamination. The strategy seeks to accomplish this while minimizing individual freedoms or restricting movement.

The least restrictive methods for preventing or minimizing transmission of the agent should receive priority considerations. This may include recommending or providing:

- Specific medical isolation measures, such as protective equipment for close contacts of contagious patients, to effect respiratory isolation (HEPA filter masks) or contact isolation (gowns, gloves, face shields). With proper training and equipment, “full” isolation is almost always unnecessary. 37
- More general isolation measures, such as strategies to separate persons capable of transmitting the agent to others until they are no longer contagious or contaminated. These include:
  - Social distancing and the use of HEPA masks in indoor spaces.
  - Adequate isolation facilities
  - Security
  - Adequate infrastructure
  - Adequate medical care.
  - Address issues of special populations such as transient populations (homeless, tourists, etc.).
  - Ability to communicate with family and friends.

Recommend against activities with mass gatherings, the use of mass transit, or other activities that bring large numbers of people together in close proximity.

- Use of the “snow day” concept for people to stay at home for a few days until there is better situational awareness and more protective measures are available.
- These options are less burdensome, and more realistic to implement and can be effectively implemented across a community through education of the public and healthcare providers.

Quarantine is the compulsory physical separation, including restriction of movement, of populations or groups of healthy people who have been exposed to a contagious disease. This may include efforts to segregate these persons within specified geographic areas (Barbera et al. “Large Scale Quarantine” 2001). Large-scale quarantine carries the same issues as large-scale isolation, with the added ethical concern of grouping uninfected individuals in with others who could become ill, thereby increasing their risk to protect others.

Requirements for managing large-scale isolation activities include:

- Competency to rapidly and reliably establish a true indication for isolation actions (for example, isolation is not indicated for a person with inhalational anthrax).
- Provide safe and humane isolation conditions for ill individuals:
  - Objective criteria for the suspect symptom complex or the identified agent.
  - Explanation provided to the individual as to why actions are being taken and the expected duration of isolation.
  - Adequate isolation facilities:
    - Security
    - Adequate infrastructure
    - Adequate medical care.
    - Address issues of special populations such as transient populations (homeless, tourists, etc.).
  - Environmental control.
  - Food, water, sanitation facilities.
  - Communication capabilities to outside isolation location:
    - Ability to communicate with family and friends.

37 Medical isolation is the separation and confinement of individuals known or suspected (via signs, symptoms, or laboratory criteria) to be infected with a contagious disease to prevent them from transmitting disease to others. Isolation may be further qualified as respiratory, contact, bodily secretions, in contrast to “full” isolation (ICDRM EM Glossary 2007).
- Access to legal representation if appropriate.

- Ability to provide actionable guidance to the affected population (through the MaHIM System Information Officer).

- With involvement of the MaHIM System Information Officer, establish public education to prevent “scape-goating” of affected population after isolation is completed.

Managing Mass Evacuation Strategies: This element includes all activities that address the movement of populations to limit hazard exposure. It includes the most likely strategies of sheltering in place and small-scale, or directed evacuation. The actual implementation of any evacuation strategy is generally through non medical organizations (Fire service, police, or emergency management). Recommendations from this element of the Hazard/Threat/Disease Containment Task Force may be transmitted directly to the responsible agency, or routed through the MaHIM Command Staff for transmission by the Liaison Officer. If MaHIM is an element of unified command, the actual implementation may be through the General Emergency Response Branch of the MaHIM Operations Section.

This sub-function may also be tasked with developing strategy recommendations for directing an ill population to evacuate from the affected area or to travel to a location where adequate medical evaluation and treatment is available. It may also be charged with developing recommendations for the directed evacuation of high-risk or technology dependent patients in healthcare facilities with threat of impending hazard impact (such as a hurricane).

Any decision to evacuate or shelter in place is complex but must be based upon the medical and physical threat posed by the hazard and other incident characteristics. This may require rapid access to outside expert advice, with support from Technical Experts within the MaHIM Planning Section. 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. Requirements for managing evacuation or shelter-in-place strategies include:

- Ability to rapidly understand the situation, project likely hazard impact, and weigh the options available for population protection

- The ability to convey the approved (by the MaHIM System IC) recommendations to the public with adequate warning and explanation. This activity is supported by Public Warning, Alerts, & Public Education element of this Task Force, and by the MaHIM System Information Officer.

- Competency to develop clear instructions for evacuation (routes, transportation, etc.) or shelter in place (location within structures, taping and plastic sheeting, shutting down air intakes, keeping doors closed, etc.). Multi-lingual and cultural and other “risk communication” issues should be addressed during this process. Reminder messages to bring medications and medical equipment for a potentially long evacuation may be invaluable in decreasing the need for pharmacy and medical equipment services later.

- Ability to determine projected length of interventions, and how to determine and then publicize the “all-clear” message. This includes instructions on what to do when “all safe” is announced.

- In mass evacuations, the health and medical needs of the evacuating population must be addressed by this Task Force element. This includes:
  - Medical support for special needs populations (nursing home geriatrics, etc.).
  - The health impact of environmental conditions along evacuation routes and potential interventions (availability of drinking water, restroom facilities, etc.)
  - Destinations for evacuees
    - Medical shelters for those with clear medical needs.
    - Assistance (wheelchairs, oxygen, etc.) so that medically frail may be able to stay in regular shelters with family members
    - Adequate access to medical care for the evacuated population
    - Prescription and pharmacy services for the evacuated population

- Capable of recommending screening procedures for potential hazards among evacuees if indicated.
Public Warnings, Alerts, & Public Education: The containment of large-scale hazards and threats is contingent upon clear instructions 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, or how to prevent spread (barrier protection, fomites cleansing, insect repellent, treatment regimens, etc.). These activities include efforts to develop the medical portion of the public message that shapes population behavior. It requires close coordination with the MaHIM System Information Officer.

Information to be released to public should be transmitted to the health and medical community first. This prevents confusion and conflicting messages, as the medical community may already be developing its own message for their patients.

Issues of importance in Public Warnings, Alerts, & Public Education include:

- Attributes of warnings and alerts.
  - Not fatalistic.
  - The hazard or hazard threat is clearly defined and explained.
  - Any medical signs and symptoms are carefully described and differentiated from common illness as much as possible.
  - Recommended actions are defined, emphasizing the value of preventing spread of hazard and the positive benefits to the individual.
  - 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.

Victim Decontamination Process: Adequate decontamination of patients assures that biological, chemical, and radiological agents are removed from the victims themselves, and that contamination is contained from spread to other people or to “clean” areas. Decontamination can occur immediately in the “field” (ideally) or at areas of definitive medical care (e.g., healthcare facilities) or at home by the victims or their families. “Hasty decon” generally 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 any healthcare facility, shelter or other populated area.

This element of the Task Force provides decontamination recommendations to first responders, healthcare providers, other targeted responders and the general population. The actual decontamination is likely to be conducted by resources in the Medical Care Operations Branch or the Emergency Response Branch. The Task Force may need to provide detailed recommendations on adequate decontamination facilities and process, and so these are presented in the requirements section below.

Requirements for definitive decontamination capability include:

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

- Management of contaminated victims to avoid cross contaminating areas and other persons until definitive decontamination occurs.

- Protection of responders (including security and support personnel as well as the decontamination workers).
  - Appropriate level of personal protective equipment (PPE).
  - Appropriate training provided pre-incident for the use of PPE and for patient handling (Macintyre 2000).
  - Equipment fit testing if required.
  - Health screening conducted prior to donning respirator PPE.

- A qualified Decontamination Safety Officer with the responsibility to monitor health and safety of responders during decontamination operations.

- Adequate security to secure the decontamination site, to prevent unauthorized entry, to assist with movement/placement of victims, and to secure personal belongings of victims. This requires
security personnel trained in and equipped with appropriate PPE.

- Important decontamination facility attributes include:
  ✓ Protection from elements.
  ✓ Separate from receiving facility.
  ✓ Fixed or semi-fixed preferred, allowing a shorter mobilization for rapid use.
  ✓ Visual control of victims at all times by decontamination staff, but rigorous protection from onlookers (including media and uninvolved hospital staff).
  ✓ Provision to keep parents and young children together.
  ✓ Provision for special needs population.
  ✓ Segregation of the sexes in the decontamination areas.
  ✓ Non-slip surfaces.
  ✓ Adequate water flow, generally six liters per minute of warm water.
  ✓ Adequate drainage to prevent walking through runoff.
  ✓ Lighting for nighttime operations, with all lights and electrical appliances on ground fault interruption circuits.
  ✓ Runoff controlled but usually it can be disposed in drains running to sewage treatment plants. Notification to local water treatment authorities should be provided at time of incident (Macintyre 2000).

- Important decontamination process attributes include:
  ✓ Adequate explanation. Explanation provided to victims, with adequate instructions and directions as the individuals transit the decontamination process.
  ✓ Ability to make decisions without relying on monitors and detectors. Use of monitors and detectors may be limited. Monitoring and detection may not be available or helpful in the healthcare setting, with the exception of radiation detectors. Current technology is such that most detection devices are not reliable enough to exclude the presence of agent on a victim, or the equipment is too expensive and too technically too complex to maintain and train adequately.
  ✓ Effective patient triage. Initial triage of patients (before decontamination) must be conducted without physical contact with the patient (the responders are wearing PPE and so are unable to obtain vital sign measurements and perform rapid physical examinations). In an incident with large numbers of patients, it may be beneficial to conduct rapid visual triage to determine the patients who should receive priority decontamination and rapid access to treatment.
  ✓ Adequate space for both disrobing and showering. Disrobing: requires roughly the same space and same-sex privacy from onlookers as showering requires.
  ✓ Patient and personal effects accountability. Patient and belongings tracked, to maintain medical record and accountability for belongings. Simple methods work best and include a log with name and assigned number. Patient number is attached to plastic necklace and matching number is on belongings bags. Full patient registration occurs after decontamination. Belongings are secured for later determination.
  ✓ Maintain security of patients’ belongings. Demonstrable, adequate protection of patients’ personal property should be achieved. The security process should also maintain “chain of custody” as much as possible as perpetrators may be mixed in with actual victims. Personal belongings are secured in an area preventing cross contamination until final disposition can be made. They may potentially be returned to victims if determined to have minimal or no contamination. If seriously contaminated, priority should be placed upon retaining patient valuables (watches, rings, wallets). This may be accomplished by having patient separate them from clothing at time of decontamination and placing them in a separate bag marked with the same patient identifier number). This may be stored separately for later decontamination. Patients should be given clear instructions as to the hazard threat and why this is occurring. Attention given to weapons collection (e.g. for law enforcement personnel going through the decontamination process) may also be necessary.
  ✓ Ability to decontaminate both ambulatory and non-ambulatory patients, including procedures for transferring stretcher patients to clean stretchers in a safe and efficient manner.
  ✓ Availability of lifesaving medical intervention. Immediate medical care should be available, with a limited cache of medical equipment for adequately trained personnel in PPE to stabilize the acutely injured or ill patient. Interventions should be short and limited.
since they are difficult to perform in PPE and the priority is to decontaminate ill victims and move them rapidly to a definitive healthcare treatment site.

✓ Definitive medical care. After completion of decontamination, definitive medical care should be available if indicated. Most medical evaluation and intervention can occur without definitive identification of a specific agent, and instead relying on symptomatology and medical findings. This is managed under the MaHIM Medical Care Operations Branch.

Risk assessment for individual patients may be aided by information coordinated with Situation Unit of the MaHIM Planning Section and the Incident Epidemiological Profiling Group (including the group’s Incident Diagnostics Task Force).

✓ Ability to address special decontamination needs. This may include the patients with exceptionally poor mobility, extreme obesity, or severe injuries. Procedures for decontaminating seeing eye dogs, expensive medical equipment such as motorized wheelchairs, and special equipment such as law enforcement weapons may be needed.

• Decontamination facility demobilization, cleanup and return to readiness must be accomplished expeditiously.

• Post-incident evaluation and monitoring of responders with any exposure to contaminated victims or environment should be conducted. This includes post-incident physical examination and entry into a long-term surveillance registry.

Environmental Based Interventions Task Force

Environment based interventions involve actions taken to limit environmental spread, dispose of the agent, and conduct cleanup of contaminated areas. This can be very complex, as demonstrated with the decontamination of the Hart Senate Office Building and the Brentwood (District of Columbia) Postal Facility after the 2001 anthrax incident. Although much of cleanup is non-medical, the Environmental Based Interventions Task Force (Figure 7-10) focuses upon optimal safety and efficacy during environment based interventions. This includes minimizing health hazards during the cleanup operations (dust, smoke, heat and dehydration risk while operating in PPE, etc.). The Task Force provides public health and medical advice to support the activities listed below. Each may be conducted by a team, single resource or technical specialists depending upon the circumstances of the incident.

Environment Decontamination & Cleanup of Hazard: This process addresses cleanup of hazards present in the environment so that the area is rendered safe for human reoccupation.

The public health and medical risks of the decontaminating agent/s must be considered and analyzed prior to use. For example, some decontamination agents are effective from an environmental perspective but can pose long term risks to humans. Issues to address include:

• Safety of the decontamination procedures and adequate contingency planning in case of complications.

• Protection of workers in the cleanup area, with medical monitoring of personnel using PPE. This is coordinated with the MaHIM Logistics’ Medical Unit if the organizations providing the cleanup don’t have an intrinsic medical element qualified to perform this.

Figure 7-10

Environmental Based Interventions Task Force

- Environmental Decontamination & Hazard Cleanup
- Food, Water, & Sanitary Inspection
- Animal & Vector Control
- Waste Disposal
- Hazard Site “Hot Zone” Security

Joseph A. Barbera, MD
Anthony G. Macintyre, MD
• Protection of the population and environment near the hazard site during cleanup.

• Verification methods to determine that no significant contaminant remains after cleanup. This may be coordinated with the Incident Diagnostics Task Force.

• Once cleanup is completed, a clear message should be conveyed to the public as to how certification of cleanliness had been made. This message should be coordinated with the MaHIM System Information Officer.

• If complete cleanup is uncertain, a program should be in place to monitor illness/injury/complaints of persons reentering the environment after cleanup.

• Prophylaxis/immunization of workers may be required in the cleanup of biological contamination. This would be coordinated through MaHIM Logistics’ Medical Unit.

Food, Water & Sanitary Inspection: This Task Force element oversees the evaluation of potential hazard impact on food, water, and sanitation systems until it is determined that the public health and worker safety is assured. Activities may include inspection of facilities as well as food, water and sewer systems servicing the general population. The importance of this activity varies according to the incident type and scope. After prolonged electricity interruption to a major metropolitan area, a large work force of qualified food inspectors may be necessary to assure the public that prepared food in restaurants and frozen food in markets is safe for consumption. After an accidental or intentional water system contamination (chemical or biological) extensive water system inspections and sampling may be required. In addition, this may include inspections to assure sanitary conditions for responders operating under “field conditions” (i.e., “camp hygiene”), for temporary shelters servicing the displaced population, and for other groups.

Animal and Vector Control: This element addresses human health considerations related to animal and insect (vector) control to assure disease containment. Examples include managing mosquito issues after flooding to prevent spread of disease, addressing displaced rat problems after flooding, or addressing more specific issues after bioterrorism (for example, addressing the plague bacillus in rodents and their fleas after intentional release).

Hazardous Waste Disposal: This activity addresses human health considerations in the processes used for hazardous waste disposal. It assures:

✓ Treatment, storage, disposal cause no further impact on the population.
✓ Monitoring is in place to assure this and to reassure the public if indicated.

This is coordinated with the MaHIM System Information Officer

Hazard Site Security: Though not primarily the responsibility of the Medical Response System, medical interface and input may become important in establishing adequate site security for containing the hazard’s health effects on victims, uninvited “rescuers,” and official responders. For example, determining the “safe perimeter” may be facilitated by medical and public health input for unusual hazards (such as radiation) in which the health effects of low level exposure are unclear to non-healthcare personnel. These activities are coordinated with general emergency response functions such as law enforcement and HAZMAT to ensure scene security and effective perimeter management.

Public Health Continuity of Operations Group

With some hazard impacts, personnel and other resources may need to be assigned to activities designed to maintain the continuity of Public Health operations. A Public Health Continuity of Operations Group (Figure 7-11) is devoted to this task in the MaHIM System, since this system may be the primary response management method for the jurisdiction’s public health. The ability to maintain normal public health operations and also maintain the function of the MaHIM System should both be specifically assured.
Most MaHIM System support for continuity of operations for healthcare organizations (in contrast to public health) will be provided through the MaHIM Operations Section elements that are directly supporting the healthcare resource response. For example, business continuity support for hospitals would be provided through the Healthcare Coalition Task Force in the Acute Medical Care Group. Healthcare organizations, EMS, and other agencies participating in response in the MaHIM System will generally have an Incident Management Team (IMT) managing their own organization’s response while coordinating with the MaHIM System. This internal IMT within each entity should address business continuity for that organization. The MaHIM System merely supports those continuity efforts. That activity is different from the focus of assuring continuity of operations for public health.

**Public Health Business Continuity Task Force**

Business continuity, restoration and recovery preparedness and plans are necessary to ensure the survival and long-term economic viability of both public health and healthcare organizations. A thorough consideration of the impact of a mass casualty and/or a mass effect incident on the business operations of public heath and related organizations is a necessary element of preparedness, planning, and emergency response. Well-intended actions, taken in the exigency of a mass casualty incident without consideration for the strategic impact on the organization could potentially threaten a healthcare resource’s ability to provide public health and its supporting healthcare services in the long term.

The following functional elements may be helpful in addressing the business issues that could affect public health continuity of operations.

**Business Loss Recovery**: All resources, (personnel hours, expendable supplies, medications, equipment, etc.) expended during a mass casualty incident response should be thoroughly documented by individual resources and tracked by the MaHIM Finance and Administration Section’s Cost Unit. 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. While these are tracked by the Cost Unit, the element within the addressing their impact on the affected MaHIM resources from the public health domain to assure organizational

**Records and Data Systems**: This element is charged with addressing the hazard impact on mission critical records and data systems.

**Equipment, Plant, and Utilities Task Force**

The hazard impact may directly affect mission critical facilities for MaHIM System organizations. This element manages response to a significant physical impact. It addresses physical damage to facilities, maintaining or restoring utilities, and repairing or replacing mission critical equipment such as HVAC. The Task Force also follows through with issues such as decontamination and clean-up to maintain or rapidly return a physical location to mission operations.

**Pre-Hospital Care Operations Branch**

The Pre-Hospital Care Operations Branch (Figure 7-12) establishes organized patient care at the site of impact or casualty assembly. The management activities allow EMS and operational medical care to provide optimal medical services to the affected population in the pre-hospital setting. It encompasses risk assessment and patient care from the initial victim interaction with first responders to patient arrival at a definitive care site and hand-off to a
medical team under the Medical Care Operations Branch.

EMS and operational medicine resources (medical resources attached to rescue operations such as Special Weapons And Tactics (SWAT), urban search & rescue (US&R) teams, HAZMAT teams) must coordinate closely on scene. In addition, coordination is necessary with many of the individual sub-functions within the MaHIM System (e.g. may require coordination with Incident Diagnostics Task Force). Processes to promote this are defined.

Requirements for the Pre-Hospital Care Operations Branch include:

- An established pre-hospital command system for coordinating pre-hospital medical response.
- Adequate communications for EMS to report to health care providers, through a single “disseminator,” that an incident is occurring and the nature and location of the incident. If the jurisdiction has established a “healthcare coalition”\(^38\) with adequate communication, this task can easily be accomplished in coordination with the MaHIM Healthcare Coalition Task Force in the Acute Medical Care Group. Updated situation reports can then be communicated at regular intervals so that receiving healthcare organization can manage their resources accordingly.

It is important to recognize that after a hazard impact, any lack of unusual EMS activity beyond normal, or a dearth of incident patients is important for the healthcare organization to learn, just as information should be conveyed to EMS that the healthcare organizations survived the hazard impact and are open for receiving casualties. This information can prevent the needless suspension of regular hospital activities which can be costly.

- Ability to communicate from pre-hospital providers directly to receiving facilities. This is important, so medical personnel can be briefed on patients being transported to them from the incident. This capability may require significant management attention to out of area EMS units that have responded via mutual aid and become involved with patient transport. The communication link is coordinated with the MaHIM Medical Care Operations Branch and supported by the Communications Unit of the MaHIM Logistics Section if necessary.

- Standard protocols exist for pre-hospital mass casualty patient triage and treatment within the jurisdiction. These may vary according to the type of injury or illness. Triage protocols in a prolonged incident such as an infectious disease outbreak may need to evolve over time as the disease becomes better understood and as healthcare resource availability changes. A process to make these adjustments and disseminate the revised protocols across the jurisdiction is necessary. Triage variances between jurisdictions in a region should be resolved as much as possible, and explanations provided for remaining variances.

\(^{38}\) The healthcare coalition is a response organization that provides management of coordination between healthcare resources during emergencies (MSCC 2007, MSCC Healthcare Coalition 2008).
• Well-established internal EMS safety element to delineate field hazards and implement personnel protection policies (coordinated with MaHIM Safety Function). This includes a comprehensive and disciplined approach to issues such as responder accountability, personal protective equipment, adequate communications to support emergent evacuation, and other safety contingencies.

• Planning that recognizes the reality that many patients (>50% of the total) in a sudden-onset large-scale mass casualty incident are transported to hospitals independent of EMS. This is accomplished through self-referral from the scene or via uninjured bystanders. This does not obviate the need for Pre-Hospital Care Operations Branch to manage large numbers of critically ill, since the most injured or ill are less likely to self-transport.

The elements within the Pre-Hospital Care Operations Branch are organized according to the likely breakout of pre-hospital medical resources during a large-scale incident.

Emergency Medical Services Group

The Emergency Medical Services (EMS) Group’s objective is the effective management of a victim population through casualty collection, patient triage, initial treatment, and the organized transport and delivery of patients to appropriate medical treatment facilities. Many EMS systems have established mass casualty plans with standard structure and key positions identified, and a comprehensive concept of operations for “all hazard” mass casualties. If this does not occur through local EMS field management, it must be addressed by the MaHIM EMS Group, and so the key elements are described:

Victim Extraction/Casualty Collection Task Force

This oversees the removal of patients ("victim extraction") from the direct hazard impact areas if they can’t self-extricate or be guided through commands to evacuate the hazard area. It also addresses “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), but in many areas of the U.S. these are now displaced by more formal medical stations, by an alternate treatment site, or by other medical entities. Medical care in these locations is provided by Disaster Medical Assistance Teams (DMATs), Medical Reserve Corp (MRC) personnel, or volunteer and other initiatives. Definitive medical care at CCPs and these other entities is considered part of the Acute Medical Care Group within the MaHIM System.

The MaHIM Victim Extraction/Casualty Collection Task Force activities will vary according to the MaHIM arrangement with EMS in the jurisdiction. This may range from direct oversight and supervision to providing medical input and oversight of only the medical care delivery by resources actually performing victim extraction and casualty collection.

Requirements for the Victim Extraction and Casualty Collection Task Force include:

• Appropriate interface with scene incident managers for efficient integration into the scene response.

• Appropriate operational level competency in understanding scene hazards and maintaining personal safety while on-site. This may include appropriate training in the level of personal protective equipment (PPE) necessary to safely operate within the scene “hot zone” if indicated.

• Accountability system for responders entering the hazardous environment for victim extraction.

• Clearly designated responder evacuation signals, with pre-established “rally points” for regrouping and accountability if emergent evacuation occurs.

• Clearly marked areas for casualty collection: preferably in an area with the following attributes:

39 DMATs may be state-based or from the National Disaster Medical System (NDMS).
Victim Triage Task Force

The Victim Triage Task Force oversees the process used to triage incident casualties. The purpose of this type of triage in a sudden impact mass casualty incident is usually to determine who needs to be transported first to definitive medical care. This type of patient triage process rapidly evaluates victims and assigns relative priority for their care and transport. Standardized guidelines and implementation of disaster triage criteria should be implemented, to best match patient needs with available and appropriate medical resources.

Victim triage in a slower evolving and more prolonged incident such as pandemic influenza, SARS or some types of bioterrorism may vary significantly from the triage used for sudden onset mass casualty incidents. This triage process may evolve as understanding of the illness and as availability of medical resources evolves. Triage protocols in these very extended incidents would be used during the course of everyday EMS operations when a suspect case is encountered, rather than at a defined casualty collection point per more acute incidents.

Factors to consider in establishing triage guidelines include the projected volume of patients, patient conditions and probable medical needs, a projected probability of survival given certain clinical findings, and the limitation of care available in the mass casualty or mass effect situation.

Requirements for a triage protocol include:

- Simple, easily remembered, understood by all responders with patient triage responsibilities and, ideally, requires little physical contact with patients if they are contaminated (or the triage evaluation is easily performed visually by responders in appropriate PPE).
- Easily repeated triage evaluation for patients not immediately transported. Since triage is a single-point evaluation of a medical dynamic situation, frequent re-triage is required in patients with the potential to deteriorate while awaiting definitive medical evaluation and treatment.
- Accompanied by a documentation system to indicate triage category and to record evaluation findings and any interventions performed on the patient. This information/triage tag should remain inseparable from the victim until it is appended to the patient’s permanent record (“chart”) in the definitive healthcare organization.
- Flexibility in the triage process that allows triage protocols to be adjusted depending upon the hazard agent characteristics and incident parameters. The common triage protocol for mass casualty incidents in the U.S. is Simple Triage and Rapid Treatment (START). This was designed for victims of blunt trauma, and may not be entirely appropriate for other hazard types. For example, if victims considered stable in the “delayed” category after START triage begin to deteriorate, the triage process should be adjusted to “upgrade” victims with specific indicators for that deterioration (such as cough or sore throat which in some situations could indicate impending airway compromise).
- A “two-stage” victim triage process may be indicated in unusual hazard incidents where the physical findings that predict patient deterioration are subtle or not well understood by personnel performing initial triage. The second “stage” of triage after START may evaluate, for example, patients triaged to the “delayed transport” category after blast and shrapnel injury (Neal 2010). This second triage evaluation may look for more subtle evidence of severe injury, such as shrapnel wounds to the thorax, decreased breath sounds, or other findings that indicate the need for expedited transport to definitive medical care.

Victim EMS Treatment Task Force

This Task Force oversees basic medical care provided in the pre-hospital phase that is primarily directed toward stabilization of a progressive and/or life-threatening medical condition. Any more definitive field medical care is supervised under the Acute Medical Care Group.
Requirements for this Task Force include:

- Clear and concise treatment protocols for mass casualty incidents from unusual hazard agents. These protocols should ideally be easily taught and remembered.

- Treatment limited to basic life-saving interventions and not delaying transport to definitive care. Address:
  ✓ Airway management.
  ✓ Bleeding management.
  ✓ Critical intravenous fluid re-hydration.
  ✓ Oxygen administration.
  ✓ Medication administration for life-saving interventions.

**Response Resource On-Scene Staging Task Force**

This Task Force addresses the organization, at the impact scene, of incoming medical and EMS personnel, vehicles, and supplies for use at the scene of a response, and so is differentiated from the MaHIM Operations Staging function described earlier. This process is an operational imperative in organizing the scene so that arriving resources may be effectively utilized by scene managers. It also assures that an over-willingness to assist does not complicate operations or compromise safety.

As resources arrive on-scene, they are registered and held in this tactical staging area until deployed at the direction of the on-scene commander or appropriate subordinate such as the EMS Transport Officer. On-scene staging maintains accountability of resources at the scene, including personnel moving into any hazard area.

Requirements for effective management of on-scene resource staging includes:

- Operational competency in incident response and standard methods for managing on-scene EMS staging.

- An established location that is visible and accessible to incoming resources, and convenient for deployment of resources to medical sites within the incident scene when requested.

- Reliable communication with forward incident response elements (EMS command, EMS patient transport officer, on-scene Medical Unit that cares for responders).

**Patient Distribution Task Force**

Patient distribution denotes the processes that best match patient medical needs to available medical facilities. This function is typically accomplished by an EMS transport officer. This position in typical EMS response to mass casualties matches patients with their most appropriate medical destination. The EMS transport officer also addresses the transportation modalities that accomplish the movement of patients to healthcare facilities. He/she matches available transport resources to projected patients’ needs, sending seriously injured or ill victims with adequately equipped and trained personnel. Perceived stable patients are assigned to lower capability transports, including buses for minor cases.

The Patient Distribution Task Force interfaces with the transport officer. It provides up-to-date information on the availability of healthcare organization to receive additional patients and the status of the organizations specialty services as indicated (trauma, neurosurgery, pediatric, critical care, etc.). 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. Hazard impact on healthcare organizations and the effect on patient care capacity and capabilities may also be dynamic. Finally, some incidents require special processing of victims to protect medical staff and other patients (chemical or radioactive contamination or dangerous contagious disease). These patients should only be distributed to adequately prepared and protected healthcare facilities, and this may also be a dynamic situation.

This Patient Distribution Task Force coordinates closely with the Healthcare Coalition Task Force in the Medical Care Operations Branch to maintain a current situational status of each patient receiving facility. This information is conveyed to the appropriate on-scene management elements including the EMS Transport Officer(s).

This Task Force provides other support to the EMS transport officer(s) as indicated.

Note that this function is distinguished from that interfacing with inter-facility medical transports,
which is addressed by elements under the Medical Care Operations Branch.

Requirements for effective management of patient distribution from a mass casualty scene includes:

- Ability to rapidly understand the projected incident casualty profile (even if it is only an initial on-scene assessment) and rapid reporting of healthcare receiving capacity and capabilities across the region, so that the transportation officers can make the most accurate decisions in assigning patients to healthcare facilities.

- Ongoing reporting by healthcare organization to a central location (ideally to the Healthcare Coalition Task Force) to provide aggregate up-to-date status and available patient capacity/capability that can be conveyed to the EMS transport officer(s) throughout the duration of the incident.

Operational Medicine Group

“Operational Medicine” is medical care capability that exists as an integral component of a primarily non-medical emergency response resource. It includes the medical elements integral to SWAT teams, Urban Search & Rescue teams, HAZMAT teams, and others. These operational medicine elements 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 command system structure, but it is imperative that they also closely coordinate with EMS, with field medical teams, and with other elements under the MaHIM Pre-Hospital Care Operations Branch.

The Operational Medicine Group manages this interface with the MaHIM elements operating at the scene(s), assures that the operational medicine elements are meeting the medical standards and reporting requirements established by local public health, medical, and medical examiner authorities, and following generally accepted medical practice. The Group also conveys to these medical professionals any important information related to responder safety and preventive medicine.

Requirements for effective management or interface with operational medicine entities within the mass casualty incident include:

- Established process for arriving operational medicine units to brief the MaHIM Operational Medicine Group and appropriate on-scene EMS command elements 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 the MaHIM Operational Medicine Group and/or EMS, defining the EMS scene management structure, contact and reporting methods and requirements, patient handoff procedures, and safety issues.

- An established briefing and planning meeting schedule with EMS management and other operational medicine units to coordinate ongoing scene medical care and preventive medicine.

Medical Care Operations Branch

The Medicare Care Operations Branch (Figure 7-13) encompasses all organized definitive medical care services that address the incident medical needs of the affected population. Medical care services include diverse activities such as alternate treatment facilities and “definitive care” resources set up at the site to perform a screening evaluation and medically release victims. The Medical Care Branch Director assures that his/her branch addresses the following objectives:

- Information processing. The Branch facilitates coordination of incident data and information between medical care resources and the MaHIM System (ideally through interface with the Healthcare Coalition described below). The goal is to establish and maintain optimal situational awareness for both the jurisdiction and the responding healthcare organizations.

- Healthcare response coordination. The Branch supports the responding healthcare organizations in establishing consistent objectives, strategies and major tactics across the incident area. This includes promoting or supervising the development and implementation of standardized evaluation and treatment protocols as indicated by the type of injury or illness in the incident.

- Resource assistance. The Branch facilitates mutual aid between healthcare organizations and
provides direct assistance as indicated to responding healthcare organizations. Alternatively, this Branch facilitates appropriate assistance from other local, regional, State and federal sources if unable to fill the request through the jurisdiction’s resources. The actual arrangement for State, interstate and federal assistance may be conducted by the jurisdiction’s EOC.

- Continuity of operation assistance. The branch also supports MaHIM System healthcare resources for the purpose of promoting organizational resilience to the hazard impact. Support is provided to assist in maintaining normal healthcare services as well as for achieving and maintaining optimal medical surge capacity and capability.

**Acute Medical Care Group**

The Acute Medical Care Group oversees the traditional medical evaluation and treatment resources that care for incident patients with injury and illness, or that require support with their organizational resiliency to keep their patients from becoming incident victims. This may include hospitals, community health centers, clinics, physician offices, and other general outpatient resources, specialty outpatient resources such as dialysis centers, patient home care services and long term care facilities.

**Healthcare Coalition Task Force**

Many of the resources that address the tasks of the Acute Medical Care Group reside within the private sector, and so are not under the direct command of public health or any other jurisdictional authority. This significantly complicates incident management across these resources. This critical management issue led to the research and development of the original MaHIM System model. Concern for this issues also generated the tiered system description and concept of operations in the Medical Surge Capacity and Capability model (MSCC 2007), and the follow-on response model for the MSCC Healthcare Coalition (MSCC Healthcare Coalition 2008). Those texts provide an extensive discussion of the Healthcare Coalition. The concepts are only briefly summarized here. The Healthcare Coalition Task Force provides the primary interface for information exchange and supporting the Coalition.

The healthcare coalition is both a preparedness initiative and, more importantly, establishes and maintains a *response organization* that coordinates and facilitates support for its participating healthcare organizations during emergency response and recovery. The healthcare coalition response organization addresses the many concerns of healthcare resources that need to integrate into emergency response. Issues that the healthcare coalition addresses during response include decision-making sovereignty, managing costs, maintaining information accessibility (situational awareness) and coordinating response strategy and tactics. It creates

---

A “response organization” is stressed to distinguish it from the usual preparedness organization that coordinates healthcare emergency preparedness efforts. A NIMS-consistent response organization is an ICS organization designed to manage incident response under incident conditions.
a single “management of coordination” entity for these healthcare organizations to interface with the jurisdiction’s agencies, incident management team and emergency operations center.

This healthcare coalition performs a multiagency coordination function during response (like an EOC) for the participating healthcare organizations from a defined geographic area. The Healthcare Coalition Operations Center (HCOC) is consistent with basic NIMS principles that describe the importance of the Multiagency Coordinating Systems (MACS) in managing large-scale incidents.

The Healthcare Coalition’s objectives extend the three primary objectives of the Medical Care Branch (noted on the preceding page). Its ICS organization may even have its Operations Section structured according to the objectives:

- Information processing. The HCOC coordinates information among its participants according to incident needs, using pre-formatted templates to aggregate and organize the data and information collection. It sets the reporting requirements and reporting schedule, collects the data, and returns the aggregated data to the participating organizations. The incident and resource information is also forwarded, through the MaHIM Healthcare Coalition Task Force, to the MaHIM Situation Unit or the Resource Unit of the MaHIM Planning Section as appropriate.

- Resource assistance. The HCOC supports the participating healthcare organizations by facilitating the mutual aid and/or cooperative assistance\(^{42}\) process within the coalition and by expediting requests for assistance from the jurisdiction. The sharing of resources such as personnel, supplies (e.g., ventilators), and facilities (e.g. accepting patients evacuated from another organization) from across the coalition can promote distribution of medical resources to meet medical and organizational needs. It therefore promotes optimal surge capacity and capability and organizational resiliency.

- Healthcare response coordination. The HCOC can manage a process for the participating organizations to develop consistency in their incident response objectives, strategy, and major tactics across the impact area. This is accomplished via the interface between the MaHIM System Healthcare Coalition Task Force and the HCOC. For example, an algorithm for evaluating patients for an unusual disease may be standardized across organizations that are receiving members of the at risk populations. The algorithm can be developed and adjusted as indicated in real-time, with significant public health input through the MaHIM Healthcare Coalition Task Force. This effort may be coordinated with the Patient Diagnostics Group within the Medical Care Branch. A singular approach to medical evaluation will provide a visibly consistent approach for the concerned public.

To achieve these objectives, the Healthcare Coalition response organization, the HCOC, must have several important attributes:

- An equitable platform: Trust and collaboration among healthcare organizations depend upon an equitable platform that focuses upon the collective interests and needs of the participants during both preparedness and response.

- Executive level support: The healthcare coalition concept and accompanying mutual aid and other instruments must be supported at the highest level of administration in each participating organization.

- Defined management: An effective management system is necessary, one that is robust enough to achieve the three above-listed objectives. At the same time, the coalition tasks should be accomplished with minimum staff, and its positions may be staffed in a distributed arrangement among the participating organizations. In smaller or more rural jurisdictions, the coalition may be limited in size or scope.

- Problem-solving capability: An effective method to resolve policy level or contentious issues that may arise during response between the participating organizations. This may best achieved through the development of a Senior Policy Group, using the NIMS MAC System guidance for a Multi-agency coordination group or MAC Group.

\(^{42}\) “Mutual aid” implies unreimbursed assistance between like organizations. “Cooperative assistance” connotes that an arrangement exists where the receiving organization reimburses the donor organization for its costs.
The sharing of resources between healthcare organizations within the coalition requires effective mutual aid or cooperative assistance instruments. These are formal understandings between the participants to support one another during times of crises.

The written instruments should delineate the mutual aid and/or cooperative agreement process, including methodology for:

- Communication between healthcare organizations for requesting assistance.
- How formal requests for assistance are made and by whom within each organization.
- Types of assistance that can be provided:
  - Staffed healthcare “beds” (for transfer of patients).
  - Supplies, pharmaceuticals, and equipment to deploy to a requesting healthcare organization.
  - Credentialed personnel sent from one hospital to another (and how credentialing and privileging will be accomplished by the receiving organization).
- Methods for transferring supplies, personnel, or patients.
- Financial reimbursement for supplies, personnel, or services.
- Liability coverage for loaned personnel and donated supplies and equipment.
- Return of transferred personnel and materiel, including rehabilitation of equipment.
- Resolution process for disputes.

One template example that addresses many of these issues was developed originally through the District of Columbia Hospital Association (DCHA) as a Memorandum of Understanding. It is provided as a national template through the American Hospital Association and is available on multiple State hospital association web sites.43,44

The MaHIM System should be notified of any mutual aid resource request, regardless of whether the coalition can obtain the resource or not. This will allow the MaHIM Situation and Resource Status Units to maintain situational awareness and anticipate future resource needs by the healthcare organizations.

**Emergency and Hospitalized Care:** This element of the Healthcare Coalition Task Force focuses primarily upon the healthcare organizations providing emergency department and hospitalized medical services to patients from a mass casualty incident, and to the organizational resiliency issues for hospitals in a mass effect incident.

For healthcare organizations to optimally participate in and benefit from the healthcare coalition and the MaHIM System, each healthcare organization should have a clearly defined emergency operations plan (EOP). The EOP must provide an ICS-based response management structure, including roles and lines of authority.

The EOP should establish how each organization will respond to information and data reporting requirements from the healthcare coalition and the MaHIM System, and how they will receive and apply important information from those sources. A robust ICS response organization with action planning methods is necessary within each coalition participant in order to coordinate its actions with its partner organizations, and to request, receive or provide mutual aid and cooperative assistance.

**Non-Hospital Based Care:** This element of the Healthcare Coalition Task Force focuses primarily upon healthcare resources that deliver medical services in settings such as community health centers, outpatient clinics, physicians’ offices, and long term care facilities. Many of the parameters described above for hospital based activities apply to this group as well. In a large incident, this element is staffed to assure that medical service providers other than hospitals receive appropriate attention during the MaHIM System response.

**Alternate Care Facilities Task Force**

An alternate treatment facility for a major medical incident is generally established only when regular healthcare organizations are severely challenged or overwhelmed. It is likely, therefore, that any successful alternate treatment facility will be managed by jurisdictional authorities or outside resources under the supervisions of jurisdictional authorities. As such, a separate Task Force is established to assure that the many management and administration tasks necessary to operate an alternate

---

43 Revised template available through the California Health Association, accessed December 4, 2007 at: http://www.calhealth.org/public/press/Article%5C103%5CAHA%20Hospital%20MOU%20MODEL.pdf
44 Revised template available through the Kentucky Health Association, accessed December 4, 2007 at: http://www.kyha.com/documents/ModelMOU.PDF
care facility, or multiple facilities, are addressed. The Task Force is within the authority of the Acute Medical Care Group Supervisor, so its efforts can be well coordinated with the Healthcare Coalition Task Force.

Alternate care facilities have been discussed as having applicability in a wide range of scenarios, including pandemic influenza. For the alternate treatment facility concept to be successful in practice in any of these overwhelming scenarios, significant management and administrative efforts must be expended by the management element of each treatment facility or by the Alternate Care Facilities Task Force itself.

Requirements for an Alternate Care Facilities Task Force include:

- Methods to address the administrative needs of the (e.g. staffing, organization, of the activities, managing inventory, etc.).
- Location near enough to regular healthcare facilities that transport of patients beyond the capability of the ACS can be rapidly transported to a higher level of care.
- Adequate physical facilities to support the provision of care to patients in a non-healthcare organization setting.
  - Environmental control (functioning HVAC systems)
  - Appropriate lighting
  - Space for patient care (ideally that respects patient privacy or allows isolation of specific types of patients)
  - Separate space for management personnel
  - Roads, loading docks, pathways of access that permit patient reception and evacuation
  - Food facilities for patients and staff
  - Restrooms and showers for patients and staff
  - Communications capabilities to link to overall MaHIM System (through the Alternate Treatment Facilities Task Force)
  - PPE for personnel working at the facility
  - Security for the facility
  - Others.
- Personnel must be available to staff the alternate care facility. This important point is often overlooked by planners seeking to establish an alternate treatment facility capability. As these are typically managed by public sector entities (which typically have limited staffing to begin with), the reliance on medical and health volunteers is often discussed. An effective volunteer management system is important to have established before the discussion of alternate care facilities can be realistically engaged, and is discussed in the MaHIM Logistics Section.45
- Supplies must be available for the care of the patients. This includes regular medical supplies specific to the hazard (e.g. antibiotics or antivirals) as well as more general support supplies such as bedding, linens, personal hygiene supplies, and others.
- Diagnostic testing may be required at the alternate care facility – otherwise, the capability to transport the patient or patient samples to appropriate facilities must be in place.
- Emergency medical care treatment capabilities must be available at the alternate care facility in case a patient acutely deteriorates. Reliance on the response of an Emergency Medical Services (EMS) unit may not be adequate.
- Occupant emergency procedures should be established for the facility in case of fire or other hazard (aftershock, flooding, etc.) requiring emergency evacuation or shelter in place is necessary.

Post-Acute Medical Care Group

This Group supports the development and maintenance of follow-on medical, home-care, rehabilitation and other services for incident victims after their acute care hospitalization phase is completed. It includes assuring the surge capacity and specialized capability services indicated by the incident illness or injury. It includes chronic care and/or post-hospitalization follow-up medical evaluation and treatment.

To accomplish this surge, the MaHIM System must also promote continuity of operations for healthcare organizations that provide these services during regular times. Otherwise, a second medical crisis will be experienced when affected individuals cannot be safely discharged from hospitals, or when patients seek the unavailable but critical services (such as outpatient dialysis) by returning to acute care

facilities. An example is the home visiting nurse services that care for post-hospitalization patients.

This Group can also be assigned to enter all victims into a follow-up registry for various purposes such as sending them follow-up information on the incident, expected stress effects, and available resources for physical and/or psychological concerns.

The Post-Acute Medical Care Group requirements include:

- Facilities and other resources for appropriate follow-on care, including:
  - ✓ Chronic care facilities for those who require it.
  - ✓ Home nursing and supportive services.
    - ❑ Home IV therapy support
    - ❑ Home wound therapy
    - ❑ Home oxygen therapy
    - ❑ Outpatient dialysis
    - ❑ Home respiratory therapy services
  - ✓ Rehabilitation services
  - ✓ Physical therapy
  - ✓ Occupational therapy
  - ✓ Speech therapy.

- Outpatient pharmaceutical supplies

- Coordination with the Patient Surveillance and Tracking Task (PSAT) Force to assure that all victims that have accessed the medical or mental health system are entered into a patient registry that can provide:
  - ✓ A method to offer further information on the incident as noted above.
  - ✓ Capability to conduct tracking and allow surveillance (usually by the Public Health Operations Branch) for long-term health effects of the hazard impact, such as performing epidemiological and other analyses.
  - ✓ Capability to notify patients concerning a change in periodic evaluation and/or in ongoing treatment.
  - ✓ A patient-reporting mechanism for new health concerns, possible side effects from treatment, or other problems.

- Outreach to the medically frail:
  - ✓ Identification and assessment to assure continued health support for the medically frail populations (the elderly, physically and/or mentally impaired and 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 Group

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 that are addressed in the MaHIM Public Health Operations Branch.

Patient diagnostics are provided by hospital and reference laboratories, medical imaging services, and other diagnostic modalities. A critical component of this Group’s activity could be defining, in real-time during an incident, 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 (within acceptable sensitivities and specificities).

Another critical incident strategy this Group focuses upon is to determine, if possible, a simple test or battery of 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. For this approach to be effective, this Group must draw upon information from across the MaHIM System and its interfaces. Incorporation of existing laboratory and other evaluation resources capabilities must be addressed (e.g. reference labs, imaging services, LRN networks, etc.).

In its interface with individual diagnostic resources, this Group may also provide them support for the purpose of surge capacity and continuity of operations. The Patient Diagnostics Group can assist by facilitating the finding of qualified personnel via outside resources or via the volunteer management system (see the MaHIM Logistics Section), or through acquisition of supplies and equipment.

Another important function of the Patient Diagnostics Group, which may require a full separate Task Force, is supporting laboratory surge capacity. This may occur through facilitation of additional supplies and equipment, through facilitation of locating and integrating additional skilled personnel, through assistance in transporting specimens, reporting out results or a myriad of other issues that could become “rate-limiting” steps in processing large numbers of lab test or imaging procedures.

Requirements for effective performance of the Patient Diagnostics Group include:

- Competency to assure that efficient and effective diagnostic regimen are established and standardized across the MaHIM System clinical areas.
- Oversight to manage and prioritize diagnostic requests if capacity is challenged.
- Promoting diagnostic laboratory and imaging surge capacity by assisting with processing of requests and specimens, transport of specimens, transmitting results, maintenance of quality control and other issues.
- In cooperation with appropriate public health authorities and technical experts, defining what constitutes positive versus suspicious test finding (e.g., widened mediastinum on an X-ray is “suspicious” for inhalational anthrax).
- Developing clear instructions to clinical areas for specimen collection, handling, labeling, clinical correlation information, storage, and transport.
- Providing understanding to clinical areas of limitations of tests being used, including turnaround times for testing.
- Assuring that the test reporting mechanism is coordinated with PSAT Task Force so that significant test results can be linked to patient’s location and reported there.
- Assisting with transport methods, containers and handling protocols for delivery of specimens to specialized state or federal labs.

**Medical Evacuation/Inter-Facility Transport Group**

This Group supervises the capability and capacity to safely and expeditiously transfer patients from one treatment location to another. If the specific jurisdiction has a functioning Healthcare Coalition that addresses inter-facility transport, this Group may only function to support Coalition activities. While the direct responsibility for this lies with the transferring healthcare organization, the overall process in a mass casualty or mass effect incident (such as Hurricane Katrina in New Orleans) may become a public health responsibility when large-scale, urgent patient transfer becomes a life-saving matter. In some communities, this falls under the direct supervision of the General Emergency Response Branch (i.e. EMS services as an element of Fire and Rescue).

Resources that execute this sub-function (ambulances, buses, aero medical transport services) may come from multiple organizations, both private and public. Assuring that these efforts are coordinated to maximize efficiency and effectiveness, establish priorities, and facilitate the transports themselves is necessary in a large-scale incident.

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 lack of staff). It also may involve the movement of stable non-incident patients out of the impacted area for the purpose of maintaining the capacity to treat additional ill or injured victims. Finally, mass patient
movement may be initiated if the level of threat to the medical infrastructure is high, as occurs in coastal areas with impending hurricanes.

Requirements for the Medical Evacuation/Inter-Facility Transport Group include:

- Ability to facilitate the identification of adequate patient receiving facilities, and facilitating the notification and acceptance of patients by the receiving facility.
- Assuring adequate infection control procedures are followed in the event of an infectious biologic agent.
- Assist with locating safe, reliable transportation vehicle/s with adequate medical support systems during transport.
- Ability to provide guidance on efficient methods for evacuating healthcare facilities and interfacing with EMS and other transportation resources.
- Ability to provide guidance for supporting patients during transport, conveying patient records with transporting units, and other important issues.
- Reporting mechanism for any adverse incidents during transport.

**Mental Health Operations Branch**

The Mental Health Operations Branch (Figure 7-14) oversees services providing mental health counseling for injured and ill victims, the “concerned, possibly exposed” population, the remaining at-risk population, and the general public. In addition to providing individual counseling services, it coordinates closely with MaHIM Information Officer and MaHIM Public Warning/Alerts/Education Task Force to provide strategic mental health preventive measures through targeted messages to the at-risk sub-populations. It also coordinates closely with the Medical Unit (MaHIM Logistics Section), which provides mental health assistance to all incident personnel.

Patients requiring acute and chronic psychiatric interventions care addressed through Medical Care Operations Branch. The Mental Health Operations Branch Director assures that all of these activities are coordinated and that consistent messages are being provided.

**Population Mental Health Maintenance Group**

This Group 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 MaHIM System Information Officer, since population-based interventions depend upon providing both incident specific details and mental health information targeted to the general or specific sub-populations.
• Assist the MaHIM System Information officer in providing messages that are easily understood by the multiple socioeconomic and cultural populations within the community.

• Ability to educate the public about stress and its manifestations, (through the MaHIM System Information Officer. This includes the concept that emotional 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.

• Ability to convey recommendations for constructive avenues for the population to pursue if they wish to help. If productive volunteer task assignments are available, provide recommendations for pursuing this interest after coordinating with the volunteer management system in the MaHIM Logistics Section.

• Many mental health problems experienced by disaster survivors are often stress-induced symptoms precipitated by post-impact personal challenges. Finding ways to meet the needs that stem from the immediate and practical problems of the hazard impact is helpful (Myers, 1994). Publicizing information that assists the population in setting post-impact “priorities” and accessing assistance resources may therefore be a useful mental health intervention. This includes:
  ✓ Information to help locate loved ones
    (coordinated through the Victims Family Assistance Services Task Force – see below)
  ✓ Information regarding financial services.
  ✓ Information regarding transportation.
  ✓ Information regarding employment.
  ✓ Information regarding infrastructure status.

• Another important issue for population mental health is the perception that all segments of the affected population are being treated fairly and appropriately by response authorities. If this is indeed the reality, public information should be conveyed to support this.

• Competency to assist the MaHIM System Information Officer in developing messages that address any particularly significant mental health issues for distinct segments of the community, including:
  ✓ Ethnic groups.
  ✓ Child and adolescent age groups and their parents (the very young, elementary versus middle versus high school populations, etc.)
  ✓ Trade and union 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 Group

In contrast to the Population Mental Health Maintenance Group, the Victim Mental Health Intervention Group oversees mental health counseling services provided to incident victims. For the purpose of this group’s focus, a “victim” is defined as any person with obvious injury or illness as a direct result of the hazard impact or any person with perceived injury or illness as a result of the incident. This group therefore addresses persons who are concerned about being potentially exposed in cases of potential contamination with a chemical, biological, or radiological agent.

This Group includes or works closely with the jurisdictional Mental Health authorities to assure that individual and small group counseling is available through qualified and appropriately credentialed providers. This is an increasingly important task, since the convergence of volunteer mental health counselors has been an increasing phenomenon over the past several decades.

The Group also includes or works closely with social service providers, since this type of assistance is important for many seeking mental health services.

Requirements for the Victim Mental Health Intervention Group include:

• The ability to manage surge capacity and capability for mental health counseling services, both individual and small group. This may require establishing a Task Force within the Group specifically to manage this issue. If the jurisdiction has an established entity that performs this surge service (such as a public or private counseling center), then the Victim Mental Health Intervention Group supports this organization in its surge.

• Capability by the service providers to identify suicidal and other behavior indicating that more
intense (i.e., inpatient) psychological or psychiatric intervention is indicated.

- Since incident victims may not desire mental health intervention immediately post-impact (it should always be voluntary), the system should be capable of prolonged surge operations that actually could increase as other functions are concluding operations.

- Capability to coordinate with social services and other victim support resources to assist individuals seeking mental health assistance.

**Victims’ Family Assistance Services Group**

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

This Group may also support centers established to process information about missing victims (names, identifiers, collection of DNA samples, dental records, etc), in coordination with the Mass Fatality Care Operations Branch.

Requirements for the Victims’ Family Assistance Services Group include:

- Ability to verify that requests are legitimately from family members and then assist them with locating loved ones. This is conducted in coordination with the PSAT Task Force.

- Ability to assure confidentiality for the victims as well as for those seeking news of loved ones.

- 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. This requires coordination with the MaHIM System Information Officer.

- Capable of documenting identifier information and points of contact from families so that the family can be rapidly located if the missing are found or identified, or if other information suddenly develops pertaining to missing persons.

- Capability (with additional staff) to assist with emotionally distraught family members. This may require support from mental health or psychiatric (acute care medicine) services.

- Specific families may require the services of Decedents’ Family Assistance Services Group in the Mass Fatality Operations Branch. Close coordination between these sub-functions is important.

**Mass Fatality Operations Branch**

The objective of the Mass Fatality Operations Branch (Figure 7-15) is to address the complex requirements of processing fatalities (i.e., deceased victims) following a mass casualty incident. This Branch may also be necessary for processing smaller numbers of bodies with unique requirements, such as dangerously contaminated bodies.

Attention must be paid to such critical issues as 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 the relatives of the deceased. While search, extrication, and resuscitation of the living take precedence over the recovery of and processing of human remains, this is a very important function to accomplish correctly, in order to assure adequate forensic evidence and to promote family
and community healing. The statutory duty of the medical examiner or coroner does not change when victims are multiple, but the overall process commonly must adapt (Mass Fatality Incidents 2002).

**Body Recovery and Processing Group**

This Group supervises the required interventions necessary for recovery, field storage, and transport of remains.

Requirements Body Recovery and Processing Group include:

- Ability to closely **coordinate** 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 human remains, including any scene disturbance not necessary for authorized activities (e.g., search and rescue, fire suppression, victim extraction, removal of contaminants from live victims, or other vital activity). This is **coordinated** with Hazard Site Security, and should include:
  - Controlled access/egress points.
  - Visible and secure identification system (badging).
  - Methods for maintaining accountability and chain of custody for human remains and for personal effects must be established very early and adhered to across the response.

- Competency to identify hazards present that could pose risk to body recovery personnel:
  - Assure that hazard identification and PPE recommendations are received from MaHIM Safety.

- Competency to determine who has overall legal authority for the human remains.
  - A Legal authority and responsibility varies from State to State, but local and State medical examiner and/or coroner authority must be respected. If responsible authorities are not directly participating with the Mass Fatality Operations Branch, **coordination** through the MaHIM Liaison Officer should be pursued.

- In certain cases, the Federal Bureau of Investigation (FBI), Department of Defense (DoD), State, and local jurisdictions can all have authority and a role in the processing of the human remains. This Group promotes the early establishment of the authority structure and processes for fatality management.

- Ability to project the outside resources that will be needed, since few locales have the internal capacity for processing large numbers of deceased. This must be established early to assure timely resource acquisition to meet response objectives related to mass fatality. It is **coordinated** through MaHIM Command Staff to the EOC. Examples of potentially available outside resources include:
  - DMORTs
  - FBI (e.g. Hazardous Materials Response Unit or HMRU)
  - DoD assets
  - State resources
  - Canine search or cadaver teams
  - Federal Urban Search and Rescue System (Federal Emergency Management Agency or FEMA)
  - National Transportation Safety Board (NTSB).

- Fatality documentation and processing requirements defined for search and rescue and other body extraction personnel (defining procedures for a “recoverable fragment” of human remains, recording location of bodies, belongings, and other evidence, body removal procedures, etc.). This is **supported** by a Liaison function with search and rescue and other emergency response functions.

- The ability to establish an adequate on-scene fatality collection site (secure, no visual access for 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. This is closely **coordinated** with search & rescue and with law enforcement at both the strategic and tactical levels.
Mortuary Services Group

The overall objective for Mortuary Services is to establish victim identification, determine manner and cause of death, collect and preserve forensic evidence, and provide information for death certificates.

Identification methodology for deceased victims commonly uses traditional methods, including physical characteristics such as scars, tattoos and other body markings, types of injury, and personal belongings. Victim identification may initially be considered “presumptive” from direct visualization or photo identification, from personal effects, or from location where remains were discovered. The process then accomplishes confirmatory identification using more technically specific methods, including fingerprints, odontology, radiology, and DNA analysis. Final approval of positive identification is made by the legally responsible medical examiner or coroner.

Requirements for the Mortuary Services Group include:

• Maintenance of chain of custody of bodies, personal effects and evidence related to the bodies and cause of death.

• Sophisticated inventory system for tracking and maintaining the large volumes of information involved.

• Technical resources for the identification and forensic investigation processes.

• Competency to process both the traditional information for body identification as well as the technological methods (i.e., DNA, fingerprints, odontology, radiology).

• The ability to obtain and process ante mortem identification information, records, and DNA samples through the Decedent’s Family Assistance Services Group.

Post-Morgue Services Group

This encompasses procedures and activities that occur after morgue functions and involve body storage and transfer of human remains for funeral services and burial. This Group may need to support the funeral directors with information and training on safe body handling and processing after an unusual chemical, biological or radiological incident. Information and training to address this is coordinated with the Environmental Based Interventions TF.

Requirements for the Post-Morgue Services Group include:

• The ability to provide technical information, including any special personal protection and body processing issues, for funeral directors and for families of the decedents.

• Capacity for body storage, and eventually for disposing any unclaimed human remains.

• Ability to address religious or cultural issues for families of decedents.

• Providing support on locating and confirming next of kin, coordinated with Decedent Families’ Assistance Services Group.

• A process for transfer of human remains to funeral directors’ control.

Decedent Family Assistance Services Group

This Group has a wide variety of activities that focus upon interface with the families of the deceased. Objectives of this Group are to obtain and provide information to the families and legal representatives of deceased victims, to obtain information, records and DNA samples from family members to aid in body identification, and to provide direct access to grief services for victims relatives.

Requirements for the Decedent Family Assistance Services Group includes:

• Shield families from intrusions of media and curiosity seekers when receiving family assistance services

• Provide timely and private information for the families.

• Provide direct access for grief and mental health counseling services for families of the deceased. This is accomplished through coordination with Mental Health Operations Branch.
• Support a forensics process 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 (from home) or from the families of the deceased. This activity supports the Mortuary Services Group in obtaining necessary consents, confirming credentials and establishing biological relatedness of DNA specimen donor, logging contact information, maintaining chain of custody of donor sources, and others.

  Obtaining, processing, and tracking samples (usually blood and buccal swabs from parents and/or siblings) and preventing cross contamination of samples must be assured.

**General Emergency Response Function**

Emergency response to a mass casualty incident includes many functions that are essentially non-medical but are critically important to successful response (Figure 7-16). It is unlikely that any Medical and Health Incident Management System will have any defined authority over these functions. If the MaHIM System is participating in unified command, this function may be a formal Branch and so is depicted as such in the MaHIM System model. If it is separate from MaHIM Command, these response resources work in parallel to address incident needs and their specific assignments.

The MaHIM Incident Command and MaHIM Operations Section Chief usually do not directly manage these functions. Close coordination of response actions, however, may be accomplished through effective training and familiarity with each others incident action planning process during pre-incident preparedness. Some medical response functions require direct involvement and/or interdependence with specific General Emergency Response Functions (examples: include mass evacuation, traffic control for hospital transport, victim extraction by search and rescue). Furthermore, in unified command, situations, some resources from these organizations could conceivably be assigned to a MaHIM System.

**Fire Suppression Group**

This Group assures the ability to extinguish or control fire and potentially flammable/explosive environments. Fire suppression requirements are standard and widely understood. In addition, technical rescue capabilities may exist in the Fire services for some jurisdictions. This expertise includes collapsed structure response, high angle rescue, and others.
Scene Security/Perimeter Control Group

This Group 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 assigned responders. General security process requirements (for all response sites and resources) are delineated in Chapter 9 Concept of Operations.

Requirements for the Scene Security/Perimeter Control Group include:

- Adequate personnel to control entry points.
- ID system for access by 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.

Note that this function is distinct and separate from any investigative, deterrent, or apprehension function that law enforcement may also provide.

Search and Rescue Group

Bystanders and local responders accomplish initial search and rescue following most mass casualty incidents. Organized response may also involve specially trained search and rescue resources, including: urban search and rescue, wilderness search and rescue, swift water rescue, HAZMAT extraction, and others. Many of these resources now contain an operational medicine element, and coordination of on-scene activities with the MaHIM Pre-Hospital Care Operations Branch should be assured.

Traffic Control Group

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 Group

This sub-function encompasses the specialized response to hazardous environments to provide detection, victim extraction, hazard containment, scene decontamination, and direction. Hazardous materials incidents include deliberate incidents (terrorism and other criminal intent) that are chemical, biological, or nuclear/radiological in nature. This Group focuses upon the hazardous materials scene, rather than the definitive victim decontamination process that may be taking place primarily off-scene at healthcare and other facilities.


Law Enforcement Group

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

Mass Evacuation Group

Population behavior can be critical to minimizing or completely avoiding the hazard impact. Much of this is non medical, with emergency management, fire service or law enforcement responsible for the movement of potential victims out of harm’s way. 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 resources that accomplish these population actions. This is coordinated with
Evacuation Strategies element within the Public Health Population Based Interventions Task Force.

**Public Works and Engineering Group**

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. In addition, this Group is critically important for the continuity of operations of impacted healthcare organizations. Especially for this reason, 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 resources.

**Mass Care Group**

This sub-function is responsible for the temporary care and sheltering of incident caused displaced persons. It also addresses emergency assistance, housing beyond mass temporary sheltering, and other human services. It is *coordinated* with the Mass Evacuation Group, the Mental Health Branch, and Public Health Population-based Interventions Task Force. Historically, the Mass Care function was commonly assumed by the American Red Cross, but is now considered to be a primary governmental responsibility. The medical element necessary for any large-scale mass care would be provided from outside this Group (i.e., the MaHIM Medical Care Operations Branch).
Overview: MaHIM Logistics Section

The MaHIM Logistics Section manages activities that provide logistical support to MaHIM Command and to the other MaHIM System Sections. This support includes equipment and supplies, transportation, personnel and personnel support, facilities and facility maintenance, and technical services in order to maintain their response function (Figure 8-1). This Section’s resources are used when individual assets and functions are unable to meet their logistical needs directly through their own internal resources. Reliance on effective and accurate information from the MaHIM Planning Section is crucial to the effectiveness of this logistical support.

Two critical concepts apply to the MaHIM Logistics Section and its activities:

- **Mutual aid between resources within the MaHIM System:** Pre-established mutual aid or cooperative assistance instruments will facilitate rapid and effective response across the MaHIM System. For example, healthcare organizations may have these instruments established and supported by their healthcare coalition (see Chapter 7). These arrangements can delineate how resources within the response system can assist one another. However, these agreements should not be executed in isolation, meaning that when these resources are being shared, the larger response system should be made aware. For example, if a healthcare coalition is executing its mutual aid agreement, the Operations Section leaders (chiefs) should be informed so as to be better prepared if the needs cannot be met within the agreement and for general situation and resource status purposes. The consequences of not doing this can be challenging.

- **Support from outside the MaHIM System:** Logistical support not obtained from within the response system is typically obtained in most jurisdictions by requesting assistance from a jurisdictional agency or response organization such as the Emergency Operations Center (EOC). The point of contact for this generally resides within the health and medical emergency support function (ESF #8) in an EOC. This critical function serves to provide high level support to the response system as well as to serve as a connection with higher levels of government to obtain the outside assistance.

![MaHIM Logistics Section Diagram](image-url)
Logistics Support Branch

The Logistics Support Branch is composed of three units (Figure 8-2).

Supply Unit

Resources are traditionally defined as personnel, supplies, and facilities. The supply unit in ICS is typically responsible for supporting the response organization with personnel and supplies, with “supplies” including both equipment as well as expendable materiel. During any MaHIM System response, the Logistics Section Supply Unit (Figure 8-3) may be tasked with providing a wide variety of supplies throughout the MaHIM System. Some of these are very specialized, such as blood products, and hence the supplier(s) are limited. Distribution of these critical resources must be coordinated across the response system and based upon actual and carefully projected need.

In addition, the supply unit supports the response system by identifying available and qualified personnel for defined response positions. These may be obtained through mutual aid, cooperative assistance, direct contracting, from a volunteer pool, from higher levels of government as well as other sources.

Supply and Equipment Support

The activities in this element of the MaHIM Logistics Section Supply Unit are focused upon the identification, ordering, tracking, distribution, maintenance, and demobilization of supplies and equipment needed within the MaHIM system. As with any response system, these resources should be obtained internally first (e.g. within a hospital or other single resource), and so an internal logistics capability is important to obtain specific supplies during emergency response. When these methods are exceeded, the Logistics Section steps in to assist with the needed resources. If the resource is still not obtainable through the jurisdiction’s resources,
MaHIM Logistics may then seek assistance through regional coordination (regional mutual aid) or through an EOC support entity to reach to higher levels of government such as State and Federal resources. Similar principles apply to acquiring an adequate cadre of competent personnel.

### Acquisition and Maintenance Support

This element of the Supply Unit provides the services necessary to acquire and maintain medical supplies and other equipment and arranges delivery to the requesting Operations Section resource. Requested supplies and equipment may vary markedly depending upon the hazard and the operational objectives.

Categories of potential supplies acquisitions include:

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

The last category is expansive and can include any supplies needed for the continuity of an organization’s operations. For example, fuels (for generators), food, linens, and many other items may be needed within the MaHIM System for organizations to continue their operations after hazard impact.

Multiple approaches may be used to acquire, stage and deploy upon request any needed supplies. The process and mission critical procedures for supply acquisition are best established during pre-incident preparedness.

A reliable system is needed to track requests from Management or the MaHIM Operations Section, and to track resources and supplies from request through receipt and use. The range of processes and their process requirements for resource acquisition include the following categories.

**Mutual Aid:** Comprehensive, accurate and fully agreed upon mutual aid or cooperative assistance instruments between organizations within the MaHIM System is important. This will decrease the load and increase the efficiency of the Logistics Section. The MaHIM System needs similarly well established mutual aid instruments with other “like” jurisdictions.

- An established process for requesting supplies, personnel and facilities that designates authorities for making requests, for agreeing to requests for assistance by others, and for establishing the standard resource sharing agreement that includes the many details described in Chapter 4 and in other texts (Emergency Management Principles and Practices for Healthcare Systems, Barbera, Macintyre et al 2006).

**Sharing of supplies and personnel from other jurisdictional resources:** A primary method for the jurisdiction to assist in a mass casualty or mass effect incident is by providing direct assistance through the jurisdiction’s resources. For example, providing mass transit agency buses during a hospital or long term care facility evacuation is direct support by jurisdictional resources.

**Direct contracting:** The MaHIM System can provide supplies for its operations section response entities through direct contracting for the requested items, and arrange delivery to the specified location within the necessary timeframe. This can be a time-consuming process and so for critical supplies needed on short notice, other methods or an expedited, pre-arranged contracting mechanism should be used.

**Pre-established supply cache:** It is important that the equipment and supplies be maintained in a ready state, through the jurisdiction and/or its responsible agencies, so they are ready for deployment when emergencies or disasters arise. Requirements include:

- Clear instruction for how responding resources can request and receive the cached materiel.
- Inventory control of infrequently used supplies and pharmaceuticals to address shelf life and stock rotation concerns.
- Automatic notification systems when inventory reaches reorder thresholds.
- Shared inventory maintained between like organization within the jurisdiction’s MaHIM System, which may allow for redistribution through mutual aid arrangements to sites of need.
- A 24-hour internal resource supply such as indicated pharmaceutical products should be maintained, based upon the estimated time for activation and receipt of additional supplies.
The SNS is a Federal cache of supplies for a large-scale public health and medical response. It is not, however, a first response tool. Local and state preparedness must have plans for immediate supply and re-supply of pharmaceuticals and equipment to meet critical needs until SNS arrival and processing through the MaHIM System. The SNS would then augment response capacity.

Operational understanding of the process for requesting the SNS package and for requesting and receiving supplies from the deployed SNS resource is important. For example, an individual private sector organization can not directly request deployment of the SNS.

Prepared local plan to manage SNS push packages, including receipt, distribution (among multiple organizations), 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 Group, Resource Unit, and other MaHIM elements. Transportation and storage of pharmaceuticals, vaccines and blood supplies require adherence to specific regulations re: sites, inventory controls, temperature regulation, etc.

Unsolicited Donations: The Logistics Supply Unit is also responsible for the management of unsolicited, donated goods. Capabilities to evaluate, sort, inventory, maintain, and/or properly dispose of unsolicited donations is imperative to prevent unneeded, expired, or otherwise dangerous supplies from complicating response efforts in the MaHIM Operations Section. Processes for re-donation of supplies not usable for the incident (for example, to Community Health Centers for their everyday service delivery) should be established during the preparedness phase.

Equipment Decontamination, Rehabilitation and Return

This sub-function provides the specialized or surge expertise for demobilizing equipment, if used on loan, assuring its return. This usually applies to durable items (e.g. ventilators). Processes should be established to return these items to their original functional status before return to the “lender.” The other option would be for the “receiver” to pay for the replacement of the item.

Specialized Equipment Maintenance & Repair

This sub-function provides for the upkeep and repair of specialized equipment necessary to maintain the operation. In addition, some organizations within the MaHIM System may not have the internal capability or access during emergency response to conduct some of these specialized activities. For instance, generator repair can be problematic for some hospitals during emergency response.

This sub-function, therefore, supports incident specific equipment not normally in use by the MaHIM Operations Section (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 and Administration Section (vendor contracting and others), obtaining assistance from equipment manufacturers and their designated service agents.

Personnel Support

The Personnel Support element of the Supply Unit supervises the acquisition and pre-deployment processing of all additional personnel deployed to an incident beyond the usual cadre manning positions within MaHIM System assigned resources. It also assures that all responders, including mutual aid and volunteers, are incorporated into a common system for accountability and for controlling access to the site/s. In addition, it provides specialized services necessary to “maintain” the functional utility of these individuals.

---

**Personnel Processing**

A process must be established so that all personnel resources are tracked. The majority of responding personnel are tracked through the specific resource (such as an EMS crew or a DECON Team) in which they reported for their incident assignment. Single resource individuals assigned into the incident must also be tracked for accountability. For professionals responding through mutual aid or through direct request, an expedited process may be established. For others offering assistance outside of a formal request, a volunteer management process should be established.

**Volunteer Management**

This element processes and manages all converging individuals or responder groups that were not specifically requested. These personnel remain a Logistics Section resources until they have been accepted and assigned into the response system, deployed to Operations Section Staging in anticipation of an assignment, or instructed that their services are not needed (i.e. with some unsolicited volunteers). Activities also include volunteer support during the incident and demobilization of the volunteers as they are no longer needed.

Volunteers can be broadly grouped into two categories.

- **Solicited**: These individuals or groups have been formally requested by the MaHIM System for inclusion in the response organization. Examples include mutual aid personnel or response personnel from higher levels of government (e.g. State epidemiologists). In some well managed systems, solicited volunteers have been prescreened for qualifications and have received adequate operational and protective equipment, though this is not always the case.

- **Unsolicited**: These individuals or groups present spontaneously and converge to assist with response efforts. If not properly managed, this convergence can complicate response by providing a distraction and/or inadvertently disrupting operations. In other situations, however, they can provide valuable service to the MaHIM response. As a relatively unknown entity during response, they typically require more rigorous in-processing methodology.

Despite the fact that these groups can differ significantly, similar processes are utilized to ensure that the individuals or groups of individuals can be effectively and safely incorporated into the MaHIM response organization. Some processes can be expedited or “fast-tracked” for solicited volunteers.

Registration and Credentialing is critical to the effective management of volunteers in public health and medical response, since so many of the positions filled by volunteers may be in a “high trust” category. Just the confidentiality of patient information is important for volunteers to understand and respect.

The following procedures are provided for clarity in understanding the required system for managing volunteers.

**Registration**: A process in which volunteer personal contact information and self-reported professional qualifications are documented. This process can also be used to provide volunteers with basic information about their potential roles, as well as “rules and regulations” that must be agreed to before they can be considered for placement. Further detail on managing unsolicited volunteers is provided in Chapter 6 and in the Standardized Volunteer Management System (Barbera, Macintyre, Shaw et al, 2006).

**Credentialing**: Credentialing involves providing documentation that can authenticate and verify the identity and proffered qualifications of designated incident command staff and emergency responders. This system helps ensure that personnel representing various jurisdictional levels and functional disciplines possess a minimum common level of training, currency, experience, physical and medical fitness, and capability for the incident management or emergency responder position they are tasked to fill (NIMS 2004).

In simple terms and for medical and health personnel, credentialing involves the verification of the qualifications of personnel. Credentialing of healthcare/medical practitioners and other professionals, for example, provides legal assurance that the personnel meet minimal criteria for clinical practice, which is required by regulatory agencies (including the Joint Commission) even during emergency response.

Credentialing for organized teams is best accomplished during the preparedness phase. Individual responders not affiliated with or responding with a pre-credentialled group should...
know to bring acceptable credentials that can be easily verified.

One strategy to reduce this credentialing burden is for the mutual aid instruments to specify that “donated” personnel must be credentialed and privileged in the requested professional area, and that a log is provided of the response cadre with a certifying statement. The receiving hospital then is accepting the credentialing of another accredited healthcare institution, rather than relying only on the individual responder credentials. Another strategy is to use personnel from the Medical Reserve Corps or from the Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VHP).

Whether volunteers are solicited or unsolicited, these two steps must occur before individuals can be incorporated into the MaHIM response system. Even if the MaHIM System is accepting federally prescreened individuals to work within the system, minimal registration and credentialing is necessary. The following concepts apply:

- Select responders may be prescreened for qualifications and adequate operational and protective equipment. In this situation, a mechanism should exist to verify that the credentials presented in the registration information are current. For Federal responders, presentation by the US Government may be accepted as demonstrating that individuals have current qualifications to the level required by the specific Federal program.

- Registration into the response system requires personal information acquisition for accountability and collection of data for administrative tasks. Volunteers should present information that includes hospital or government issued identification with a photo.

- Credential verification procedures should be as expeditious as possible while meeting the intent of the verification requirement: to assure only qualified personnel are assigned onto the incident. Methods to screen credentials by accessing records of another accredited organization to verify responder credentials (“secondary verification”) or conducting primary verification (through access to appropriate data bases and primary employers) should be established. Alternatively, the Joint Commission provides an emergency credentialing standard for extreme situations.

The screening process for volunteers should have the ability to capture specific skill sets such as foreign language fluency. A basic orientation should be provided to all volunteers at the registration and credentialing step.

Volunteer Privileging and Badging

The following definitions are provided for clarity:

Privileging: The process where appropriately credentialed personnel (see credentialing) are accepted into an incident to participate as an assigned resource in the response. This process may include both confirmation of a responder’s credentials and a determination that an incident need exists that the responder is qualified to address. Privileging is associated with a separate process, badging (see badging).

Badging: The act of providing an identification badge to physically identify personnel who have been privileged to access a specific incident or to access a specific incident location.

Privileging and badging are therefore secondary steps after registration and credentialing. Privileging may occur at the level of individual organizations (e.g., mutual aid accepted) but in the context of this discussion would be at the level of the MaHIM response system. Badging then applies.

Privileging should not be construed as permitting persons or groups to operate independently within the MaHIM response system. Instead, volunteers require supervision while operating within the MaHIM managed incident.

Badging of all personnel deployed into the incident allows consistent identification and regulated entry into various operational areas.

---

47 Medical Reserve Corps, information accessed December 7, 2007 at http://www MEDICALRESERVECORPS.GOV/ / Home Page
49 Joint Commission, Disaster Privileging Standard (M.S. 4.110) available through the Joint Commission at http://www.jointcommission.org/
Volunteer Assignment and Support

This process assigns volunteers to fill requests from the MaHIM System sections for additional personnel. Solicited volunteers generally already have an assigned task or are directed to report to Medical Operations Staging. Unsolicited volunteers would be kept out of the response area until their credentials are verified and they have accepted an assignment. This sub-function coordinates with MaHIM Operations Section 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 deployed into the response, transported to their area of duty, and report to a supervisor at their assignment destination.

In addition, this sub-function provides support to assigned volunteers through various fashions including ‘trouble shooting’ problems not easily resolved within their position. Applicable concepts include:

- Tracking mechanisms to follow assigned volunteers in their assigned capacities.
- Abilities to provide just in time training for specific positions.
- Mechanisms to provide necessary PPE or other equipment to volunteers.
- Transportation requirements addressed by volunteers.
- Basic needs (food, hygiene, billets, etc. as appropriate) support to volunteers.
- Well disseminated mechanisms for the MaHIM system to address volunteer concerns about their assigned position.
- Capabilities to demobilize volunteers in an orderly fashion to include return of assigned equipment, badge, provision of performance review as well as others.

Readers are referred to the Standardized Volunteer Management System (VMS) for additional details on the management of healthcare volunteers during incident response.  

50 Standardized Volunteer Management System, accessed December 2, 2007 at www.gwu.edu/~icdrm/

Responder Rehabilitation

This element of Personnel Support assures adequate location and amenities for responder breaks and “rehabilitation.” It coordinates with the MaHIM Logistics Facilities Unit and Food Unit to provide this support for responders at incident work sites. This may involve provision of supplies as noted (e.g., food, water, etc.) or recommendations (i.e., work cycles, rehydration directions, cooling measures, etc.) which is coordinated with the MaHIM Safety Function.

Personnel Family Assistance

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. Depending upon the nature of the incident or the participants in the MaHIM System, this can take several forms, including providing primary services or supporting those services provided by constituent organizations of the MaHIM response system. Example services include assistance with day care, house maintenance advice, and other stress-inducing problems while family members are occupied as incident personnel.

Facilities Unit

The Logistics Section Supply Unit (Figure 8-4) provides support to the MaHIM System through the acquisition, mobilization, maintenance, and demobilization of facilities required to support response activities.

50 Standardized Volunteer Management System, accessed December 2, 2007 at www.gwu.edu/~icdrm/
equipment, and meeting space. Multiple other "facilities," including secured open spaces such as parking and staging areas, may be indicated according to the specific MaHIM System response. Additional space may also be indicated for extended management activities as an incident evolves, and the Facilities Unit addresses this need.

When individual organizations such as hospitals within the MaHIM response system cannot acquire functional facilities for their response assignments individually, the MaHIM Logistics Section supports the facility needs or obtains outside assistance. A range of potential facility needs may become important in a mass casualty or mass effect incident. Common examples are cited below.

Personnel billeting: Facilities for billeting response personnel can be an important support activity during prolonged incidents. Billeting should be addressed as soon as it is recognized that an incident will extend beyond a usual work cycle for responders and that responders have no self-determined location to billet. This may be due to factors impeding transportation to and from home (e.g., snow), due to hazard impact on responders' homes (e.g., tornado), or due to the long commute that outside personnel may have to home. Issues related to providing sleeping quarters include:

- Billeting areas should be located a safe distance from the impacted site but should not require excessive transport time between work sites and housing area.
- Security provisions must be addressed, as well privacy.
- Laundry and facilities for cleaning personal equipment, such as work boots, should be provided for any extended incidents.
- Consideration must be given to the billeting requirements for teams that include animals such as search canines.
- Billet facilities should provide adequate comfort features, if possible. This is especially important for rest and sleep areas: comfortable bedding, environmental control (temperature, noise, light for night shift workers’ sleep cycle). Ideally, a set-up for exercise and recreation during prolonged response should be arranged.
- Procedures such as changing clothes, boot wash, showering should be considered to prevent contamination of billeting areas by responders returning from work sites.
- Certain response groups may have specific requirements for billeting (e.g., US&R, DMATs). Coordination with these groups is required to determine these needs.
- Hotels and private entities can potentially be identified during the preparedness phase.

Alternate treatment facilities: Some hazard impacts may require the development of alternate treatment facilities (as denoted under the Acute Medical Care Group’s Alternate Care Facilities Task Force). The MaHIM Logistics Section can support these facilities through the establishment and maintenance of the physical structure for these activities. Alternatively, the complex logistics issues involved in setting up and maintaining an alternate treatment site may be addressed within a logistics element within the Alternate Care Facilities (ACF) Task Force according to the ACF pre-plan. In this situation, the MaHIM Logistics Facilities Unit would assist only very specific requests. Pertinent concepts to consider in selecting physical structures for an ACF include:

- Security may be required at alternate care facilities. This can be especially important when supplies or procedures (e.g. medications or vaccinations) are being provided that are considered in short supply by the general population.
- Access and egress from the facility should be evaluated for issues such as assuring easy access for stretcher bound patients or mobility-impaired individuals. In addition, the existence of loading docks can be helpful for the delivery of patients or supplies.
- If the facility will be housing patients, support systems should exist within the facility to adequately address adequate ventilation, climate control, toilet and other basic hygiene needs (including staff hand washing), and the many other issues necessary for a safe and effective environment of care. This includes fire safety (sprinklers, rapid egress, etc.) and other occupant emergency issues, and back-up systems for critical utilities.
Ground Support Unit

This MaHIM Logistics Section Ground Support Unit (Figure 8-5) supports Management and Operations by addressing transportation needs for personnel, equipment, and supplies. It is important to remember that assistance with the transportation of resources may be affected by the hazard impact (directly or indirectly). Mass casualty or mass effect incidents can result in damage to transportation infrastructures; roadways, rail, etc. In addition, curtailment of specific types of transportation may be instituted (e.g., mass transportation during an infectious epidemic or for security reasons such as the air traffic halt after 9-11-2001). Another specific example includes the travel of healthcare workers to and from their place of work after the imposition of security restrictions in a jurisdiction. Coordination with public works and law enforcement will be required to accomplish the transportation support for the MaHIM response system.

Transportation activities include:

- Transportation to/from work areas for necessary responders.
- Parking for responder vehicles.
- Vehicular permits for travel or access to restricted areas.
- Prearranged contracts with transport companies for acquisition of vehicles and drivers.
- Contracts and arrangements for gasoline/diesel supply and maintenance of vehicles.
- Vehicular arrangements and security necessary for transport of sensitive equipment, personnel, or evidence.

- Specialized transportation needs, including refrigerated trucks and rail cars for transport of human remains.

Logistics Service Branch

The Logistics Services Branch of the MaHIM Logistics Section provides support in the areas of food, communications and medical care for responders (Figure 8-6).

Communications Unit

Communications is the “vehicle” for data and information transmission, a central core sub-function supporting and coordinating functional areas in achieving their mission objectives. The MaHIM Logistics Section’s Communication Unit (Figure 8-7) could be required to support this need for the response organization. Central to this is the potential to support both telecommunications and information technology needs. Ideally, common specific technologies have been established pre-incident for all potential participants in the MaHIM System. This is essential from an inter-operability standpoint, but also eases the potential requirements of the MaHIM Logistics Section to support this need.
During response, the Communications Unit supports the Planning Section in its acquisition and dissemination of information. The communications architecture mirrors the information architecture, and can be conceptualized as the transportation means for moving data and information for developing situational awareness, making informed decisions, communicating and directing actions that implement those decisions, and determining through measures of effectiveness whether the actions are achieving their purpose. Communications hardware connectivity must match the information flow requirements for each functional area.

Requirements for the Communication Unit include:

- The communications capability must be immediately available with interagency interoperability/compatibility.
- Potential for secure voice and data transmission if indicated.
- A communication link with the emergency alert system.
- Response personnel must be familiar with the devices and system operations or have personnel available to directly support the users.
- All mission critical communications systems have redundancy and reliable capacity incorporated. This includes:
  - Hard-wired phone systems, wireless phones, cellular and radio communications.
  - Broadband communications for relaying digital, voice, video, and multimedia messages.
  - Fax capability.
  - Computer/internet access for receiving and transmitting data and information, and for receiving “expert information.” Examples of web based information resources include chemical databases, geographic information system (GIS), weather forecasting, and incident management programs.

Medical Unit

The Logistics Section Medical Unit (Figure 8-8) is tasked with providing medical services for response personnel during an incident. Historically, the medical and health disciplines have often focused upon care delivered to affected populations at the exclusion of ensuring similar services are available for responders. The Medical Unit is distinct from any medical services provided through the MaHIM Operations Section to assure that focus upon the response personnel is maintained. The medical support requirements for responders can vary tremendously, depending upon the nature of the incident, but represent a critical MaHIM Logistics Section function. The MaHIM Logistics Section Medical Unit can also support participating organizations within the MaHIM System response. The range of services are described below.

Personnel Medical Care: Personnel medical care refers to those activities that address the acute and long term health and medical needs of responders. Healthcare of responders must be a high priority response element to ensure a successful response while maintaining responder health. Even in events that are not primarily medical or health in nature, this can be an important set of activities to address in any response system. Both acute care and follow-on care should be addressed.

- Acute Care (Medical and Psychological): This element conducts medical and psychological care for incident personnel requiring such assistance during the response. It is coordinated with the Compensation and Claims Unit in the MaHIM System’s Finance and Administration Section.

Many established response organizations that respond within the MaHIM System may have an internal operational medicine element for care of their own members. Resources to provide extended care beyond the capability of the internal medical team should be coordinated through the MaHIM Medical Unit.

For responder entities without an internal medical and/or mental health response element focused upon its responders, provisions for sick call/first
aid and EMS response capability should be arranged with the MaHIM Medical Unit.

The mental health element of the Medical Unit monitors and provides for the psychological care of responders to ensure their continued ability to operate in the mass casualty or mass effect environment.

Follow-on Care (Medical and Psychological): This includes evaluation and care at the resolution of the response phase and assuring any indicated follow-up medical/psychological care for personnel (coordinated with the Finance/Administration Compensation & Claims Unit). An important concept here could be the establishment of post-incident medical evaluations for responders who have potentially been exposed to a hazard of any type. It can be much more productive to address this in a prospective fashion upon demobilization of exposed personnel, rather than retrospectively trying to roster the exposed cohort well after the conclusion of incident response. Activities include coordinating the overall surveillance of responder personnel health status across the response system.

This may be a very general surveillance, such as monitoring a sick-call roster looking for emerging patterns and evaluating for any potential common risk (such as preventable food-related illness).

Alternatively, this element may be required to assist with specific health monitoring tasks, such as unique lab testing for personnel with exposure to a chemical hazard.

This element coordinates with the Demobilization Unit. Health surveillance of responders, however, may be a major responsibility that persists well beyond demobilization, and so this element assures that long-term surveillance of responders is carried out if indicated.

Preventive Medicine: This element addresses interventions to prevent worker illness or injury (physical and psychological). In addition to providing general preventive medicine capability, it coordinates with the Hazard/Threat/ Disease Containment Group, the MaHIM Safety Officer, and the Epidemiological Profiling Group to identify threats to responders. The preventive medicine element of the Medical Unit coordinates with MaHIM Operations Section and with other units within the MaHIM Logistic Section to address health maintenance issues as they are identified.

Preventive medicine activities that are important services for the MaHIM System Safety Officer may include:

- Monitoring of work cycles, avoidance of excessive fatigue in responders, and other concerns.
- Monitoring of food sources, distribution, preparation, handling, and storage.
- 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.

Food Unit

The Logistics Section Medical Unit (Figure 8-9) assures that response personnel have adequate nourishment and drinks during response. As with the Medical Unit, the Food Unit’s services are
distinguished from the Operations Section’s feeding of impacted populations which would be an operations section function within the General Emergency Response is a more generic response within the response system.

Typically, this Unit is focused upon services for the MaHIM IMT and perhaps field units, since many participating healthcare organizations will provide food services internally within their organizations. In some situations, however, the response organizations participating in the MaHIM System may request support with feeding of response personnel.

In large-scale or prolonged incidents, a range of considerations are important related to food service.

- Supplied foods should be selected with professional input for both nutritional considerations and safe food preparation conditions.
- Certified food managers or certified food handlers\(^{51}\) should be tasked with supervising food sources for safe food preparation, serving, and storage. Hand washing for food preparers should be assured.
- Separate hand washing stations (or at least hand wipes) for responders should be provided at all food sites.
- Food and hydration should be available at billeting locations as well as at controlled areas near work site if possible (at “break stations” outside any potentially contaminated areas).
- Food donations from private entities (individuals, small groups, unwrapped baked goods, unregulated sources) should be discouraged or if allowed, rigorously supervised by certified food managers or handlers.

**MaHIM Planning Section**

Consistent with general ICS principles, the MaHIM Planning Section (Figure 8-10) is responsible for “collecting, evaluating, and disseminating operational information related to the incident (NIMS 2007 – page 54).” Almost every incident with medical and health components will have robust planning requirements to fulfill these responsibilities. The MaHIM Planning Section provides the critical support that accomplishes this within the response organization.

The MaHIM management process (Figure 9-8) incorporates Incident Action Planning and is extensively discussed in Chapter 9. The MaHIM Planning Section and its elements are responsible for supervising or conducting many of the activities that produce effective Incident Action Plans.

The “collecting, evaluating, and disseminating” activities can be quite extensive. Many of the MaHIM Operations Section’s elements, as noted earlier in this document, feed information to the Planning Section through defined lines of communication. The information is then applied to activities related to the Incident Action Planning process (see below). Besides development of the action plan for the next operational period (see Chapter 9), activities include conducting long-term and contingency planning for the MaHIM response system. Dissemination of the information can achieved through written communications as well as through managed meetings.

---

\(^{51}\) Certification for these positions is a State-level authority. The designation and the certification requirements varies from State to State.
Due to these multiple critical activities, the original MaHIM System publication delineated two branch-level sub-functions under the Planning Section:

1) Medical and Health Information Processing
2) Plans Development and Assessment

Item (1) above was modeled on traditional ICS Planning Section functions whereas item (2) above focused on the many less well described traditional Planning functions that are only described in the advanced versions of ICS. These activities – such as direct support to the Incident Action Planning process, contingency planning, and long range and alternative plans, can be resource intensive during a medical and health event. Hence, a separate sub-function was described in the original MaHIM System Description. Since that time, NIMS has been published by the Department of Homeland Security which mandates the adoption of ICS in its “pure form.” To adjudicate the need for this resource intensive group of activities with traditional ICS, a separate unit is maintained under the Planning Section for Plans Development and Assessment. The remaining sub-functions are re-described as traditional ICS Planning Section units.

The objectives of these information units include:

- To provide comprehensive, continually updated information regarding the incident, the affected patient population, and available resources for the MaHIM functional elements to assist them with decision making and action within their assigned position and operating area of the MaHIM System. The Situation Unit focuses upon the incident, the Resource Unit focuses upon the status of incident resources.

- To provide the MaHIM Command and General Staff with the information support necessary for the development and evaluation of Incident Action Plans.

- To develop information that can be used by the MaHIM Information Officer to provide both the public and response personnel with credible information regarding the incident and the population actions most likely to achieve preservation of health.

- To establish an information process that allows individual jurisdictions and resources to share pertinent information and thereby promote coordinated management objectives and strategy.

- To provide a system in which individual patients can be located easily by family members.
To contribute to a system that, during regular operations, can be used to monitor the public health of a community.

To support the suppression of misinformation through actions by the MaHIM Information Officer and the Public Information Tracking element.

Information Processing

Both the MaHIM Resource and Situation Units involve the management of information that at times can be quite complex. This information processing capability includes managing interconnectivity, data collection, collation, and analysis; formatting of operational reports; and appropriate dissemination of the information. It should be noted that 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 MaHIM Planning Section establishes this architecture for the response organization through the following.

- Establishing reporting requirements, reporting formats and timeframes.
- Establishing and maintaining specific cross-functional information processes to support MaHIM Operations Section such as Patient Tracking. Ideally, this should use the already established system for ongoing patient/case surveillance as noted in Chapter 7.
- Providing the information infrastructure to track public information and help identify misinformation and its sources. This supports Public Information Tracking (i.e., rumor control).
- Establishing the capability for access to hazard-related and other expert information for personnel across the MaHIM System.

The MaHIM Planning Section’s Situation and Resource Units should be recognized as providing an official system for collection and verification of healthcare data for that jurisdiction. It should also be cohesively integrated with the jurisdiction’s overarching incident management if that is separate from MaHIM command, so that the MaHIM Planning Section is the sole source for “official” and “confirmed” healthcare information from its jurisdiction.

It is important to also consider the inter-regional interdependence of this official information. Each major jurisdiction should 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 the need for a capable Planning Section in each state jurisdiction, with division into intrastate regions at the state’s discretion. It then follows that the state’s responsibility requires that all healthcare information management efforts within the state be linked together to provide a comprehensive and cohesive state information system.

Finally, it is important to consider that some baseline functional capability that performs situation and resource monitoring (for surveillance reasons as well as many others) should be available at all times. This will accelerate activities when needed for a sudden onset incident, as compared with an information system that has to mobilize from a completely inactive state. This baseline operational capability could then perform 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.).

Requirements for a baseline operating health information system (situation and resource focused) include:

- A 24 hours/day, 7 days a week capability.
- Defined Standard Operating Procedures, with adequate staff training on the procedures.
- Adequate redundancies and back-up systems to maintain continuity of operations during and after a hazard impact.
- Efficient transition from everyday operations to incident response process and procedures.

For the Situation and Resource Units to operate effectively during response, the following concepts apply regarding span of control:
- Maintain information “span of control” through the use of information nodes. The complicated information processes can only be successful if the information architecture incorporates information control as described in ICS 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. The information architecture should be similarly organized so that the Planning Section 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 example, “down-flowing” information relevant to hospitals would come from the Planning Section through the MaHIM Operations Section, which would be responsible for disseminating the message, through the Medical Care Operations Branch to the Healthcare Coalition, which relays the information to participating health care organizations.

Example of possible nodal organization for healthcare information:

- The Healthcare Coalition develops an information system using an existing 24-hour healthcare communications center, 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). In a sudden onset mass casualty incident, the participating healthcare organizations can rapidly collect the operational status of each and provide a composite report to EMS managers. The EMS transport officers on scene will then be in a better position to assign patients to medical destinations with adequate capacity and specialty capability. As “walk-ins” and other factors change the status of hospitals, updated composite reports may be developed and transmitted to EMS without impacting EMS operations.

As reflected by the example above, the Situation and Resource Units could be required to manage a range of communication methodologies.

Each communication method must be selected for its appropriateness to the particular type of information exchange. In some situations, combinations of communication methods may be required for adequate information exchange.

Information Collection, Analysis, Formatting and Reporting for Situation and Resource Units

This can be considered the “endpoint” for all information required for the Situation and Resource Units. It includes a final review of information using deliberate mechanisms to evaluate and verify any new information prior to its use or dissemination.

The evaluation of all new information must include a deliberate verification process to assess the veracity of the reported data.

- Verification should confirm that the message came from the indicated source.
- Verification should confirm that the message was transmitted properly (i.e., message not changed by the 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.
- Assessment of the 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 the Planning Section, bringing the information to the attention of management and the other appropriate MaHIM System elements.
Situation Unit

The Situation Unit (Figure 8-11) is “responsible for the collection, organization, and analysis of incident status information, and for analysis of the situation as it progresses (NIMS 2008).” For effective operations of the MaHIM System, many essential elements of information that could potentially be needed and tracked. Four key elements are delineated within the Situation Unit for the MaHIM System.

General Medical Situation Processing: The Situation Unit should be prepared to collect, format, and communicate a range of information categories in order to maintain situational awareness for MaHIM System incident action planning. The reporting mechanism for these types of information should be established during preparedness and delineated as part of the MaHIM System Description and Concept of Operations. In very complex incidents, the following areas may need situation or resource reporting to support the appropriate MaHIM Operations Section elements:

- **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 and other healthcare 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 Task Force 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 where hazardous materials teams and similar resources have responded. The information may include site assessment, laboratory evaluations, and related findings.

- **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.

- **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.

- **Vector evaluations and their results:** captures information from vector investigations, such as mosquitoes after a flood.

- **Animal/plant surveillance activities and findings:** captures information from animal and plant surveillance to assess toxicological or infectious disease impacts.

Community Health Surveillance Data Processing: This process provides the data processing support to the MaHIM Operations Section’s Community Health Surveillance Task Force (both ongoing surveillance and during incident profiling).

Collection requirements include:

- **Appropriate nodes for data processing before reaching the Planning Section (e.g., professional vet organization forming a communications network, with data summarized and then transmitted to the Planning Section).**

- **Data collected so that it may be easily collated for aggregate reports.**
Resource Unit

The Resource Unit “is responsible for recording the status for resources committed to the incident (NIMS 2008).” Resource status tracking maintains a constant accounting system for condition and status of all resources available for response.

The Unit tracks the status of health, medical, and mental health resources, personnel, equipment, supplies and facilities impacted by the incident, an impending incident, or a threat. This master list includes personnel, equipment, supplies, pharmaceuticals, and vehicles. It includes resources originally from within the jurisdiction and resources arriving from outside the jurisdiction (mutual aid, state, and federal assistance) that are enrolled as available incident resources. The location of specific resources is another important parameter for this 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 is incorporated into an element of the Incident Action Plan (AP) as the resource status report. This provides an information base so that the Logistics Section may anticipate and prepare for future resource needs.

Requirements for the Resource Unit include:

- This resource tracking process requires close linkage/communications with the MaHIM Logistics Section.
- The MaHIM Resource Unit should establish a process for maintaining accountability of response resources.
- The required information should be transmitted to Resource Unit at least once during each operational period and more frequently upon request for specific elements.

Formatting of the resource status report must provide easy-to-read documents that are clearly marked for the relevant operational period.

An efficient method of conducting resource tracking can be through functional area reporting that follows the nodal methodology discussed above.

Frequent, regular resource updates from the various response elements are critical to an adequate management system. Updates contain summarized information from the relevant MaHIM areas and are

- Addresses (i.e., screens out) reporting redundancy such as the same animal illness reported from multiple sources.
- Confidentiality maintained as indicated for patients and responding healthcare organizations.

Analysis requirements include:

- 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 case definition, 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 include:

- Capable of providing concise reports that can visually present GIS and epidemiological data.
- Capable of producing regular, frequent updates if indicated by the incident circumstances.

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

General Incident Response Information Processing:
This activity is supported by the Liaison Function and maintains the relevant information from the resources of the General Emergency Response Branch, or general response resources that may be operating outside the MaHIM System. It particularly addresses information from these sources that is relevant to health and medical incident action planning.

Joseph A. Barbera, MD
Anthony G. Macintyre, MD
processed by the Planning Section to produce a cogent resource status report. This information is used for Incident Action Planning, and the written updates may also be attached as annexes to the IAP. Each functional area should develop and transmit a situation update for each operational period. This should be delivered to the Planning Section 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 complete the decision-making for that operational period’s IAP, see below).

For functional elements with specific assignments within the incident, their resource updates should include the status of their progress towards meeting their objectives (i.e., objectives attained or in progress with a projected timeline; tactics established or revised; problems; etc.). The report may also include:

- Designation of the operational period the report describes.
- Title of functional area producing report.
- The status of resources that the reporting resource requires to meets its objectives.
- Newly identified hazards.
- Other relevant response information.
- Signature of person preparing update with date and time of submission.

Demobilization Unit

The Demobilization Unit develops comprehensive plans for disengagement of all response elements, and eventually the MaHIM System itself.

Demobilization planning includes establishing procedures and guidelines for disengagement (including transfer of continuing activities and responsibilities to designated entities).

Demobilization planning begins early in the incident and is reformulated throughout, with the demobilization plans being considered during incident action planning and delineated as appropriate within the IAP. The Demobilization Plan itself may be utilized in part or in complete form at the “beginning of the end” of the incident at the direction of Incident Management.

Pre-established demobilization plans prevent misunderstandings and provide for orderly, rapid disengagement of various entities from the incident. The demobilization plans should address:

- Logistics requirements.
- Transportation requirements.
- Rehabilitation of equipment and return to readiness for response resources.
- Personnel “rehabilitation” and any indicated medical or psychological follow-up (established in coordination with the MaHIM Logistics Section Medical Unit).
- Status reports from demobilizing entities during their demobilization process.

Plans Development and Assessment Unit

The Plans Development and Assessment Unit (Figure 8-12) within the Planning Section oversees and coordinates the many support activities for developing and completing MaHIM incident action planning (IAP) products. Multiple elements within this unit are presented, since each could be important in health and medical incidents. It is noted, however, that in some situations the required activities for this unit may be minimal. Only needed elements are staffed during a specific response.

The Plans Development and Assessment Unit may require specific elements within it to assure that adequate planning, including incident projection for future planning, is accomplished.

Incident Epidemiological Projections: This element focuses on short- and long-term predictions of future incident parameters based upon analysis of currently available data. This informed projection is critical to developing and implementing incident strategy that maintains a proactive rather than reactive posture. Based on the nature of the incident, data may allow rapid prediction of the numbers and types of patients, status and condition of response resources, as well as other incident characteristics (weather, etc.). Much of the information used for these projections is provided by the Incident Epidemiological Profiling Group and by other Planning Section Units. The projections
developed by this process are made available to MaHIM Command and Operations Section leadership for consideration during the Management Meetings and Planning Meetings that define incident objectives, strategy, and tactics.

Incident Epidemiological Projections: This element focuses on short- and long-term predictions of future incident parameters based upon analysis of currently available data. This informed projection is critical to developing and implementing incident strategy that maintains a proactive rather than reactive posture. Based on the nature of the incident, data may allow rapid prediction of the numbers and types of patients, status and condition of response resources, as well as other incident characteristics (weather, etc.). Much of the information used for these projections is provided by the Incident Epidemiological Profiling Group and by other Planning Section Units. The projections developed by this process are made available to MaHIM Command and Operations Section leadership for consideration during the Management Meetings and Planning Meetings that define incident objectives, strategy, and tactics.

This information is also provided to the MaHIM Logistics Section to allow accurate anticipation of future logistics support requirements. Finally, summarized data may be more widely disseminated within the entire MaHIM System so that all participating organizations can better conduct their own long term and contingency planning. Projection requirements include:

- Close communication and linkage with the Incident Epidemiological Profiling Group.
- Information processes that assure current data and information is received during each operational period.
- Personnel with the competency (expert knowledge and experience) to develop projections based upon available information.

Measuring Effectiveness: This element focuses upon the use of incident information to evaluate whether the incident strategy and tactics are achieving the stated incident and operational period 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 from applying the measures of effectiveness. This allows a cyclical evaluation, repeated in each operational period, of response objectives and strategy by the management team. To accurately measure effectiveness, it is important that the incident objectives as well as the objectives for each operational period are crafted to be specific, measurable, and achievable within the specified time interval (see Chapter 9).

Alternative and Long-Range Strategy Planning: This element 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 Incident Action Plans. For example, in a novel infectious disease outbreak, this element may develop alternative plans in case the just-identified infectious agent has different antibiotic resistance, contagious characteristics, or other attributes than those assumed by the current operational period action plans. Based upon the projections provided by the Incident Epidemiological Projection element, tentative action plans may also be formulated 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: The Contingency Planning element develops guidance for emergent response actions in case a sudden calamitous change occurs in the incident parameters that would negatively impact victims or responders. Contingency plans should focus on sudden life-saving measures that could be required in responding to this precipitous change. For example, during response to a terrorist incident, the contingency planning element would develop response guidance in case the terrorists struck again.

Meeting and Briefing Support: In a complex ICS organization such as the MaHIM System, a large number of meetings and other interactions may be necessary to develop a robust and appropriately focused Incident Action Plan, and to coordinate across the system. The Plans Development and Assessment Unit may be tasked with meeting support, with assuring that adequate information systems are in place to support the incident. This is discussed further under the MaHIM System Concept of Operations (Chapter 9).

This element provides the framework, administrative and secretarial support for the meetings and briefings that establish Incident Action Plans, determine operational tactics, and develop the many supporting documents produced by the incident action planning process. The primary meetings and briefings supported by this element are the Management Meeting (which develops the incident objectives), the Planning Meeting (which develops the incident strategy, assignments and tactics that become the Action Plan), and the Operations Briefings (which brief the MaHIM System functional leaders on the Incident Action Plan for the upcoming operational period). Tactics, assignments, and other specific meetings prior to the Planning Meeting may also occur during the planning cycle.

Documentation Unit

This Unit maintains current and prior incident documents in easily researchable and retrievable formats. It maintains document availability for reference during the incident action planning process, for appropriate inquiries from response elements, and for the after-action report process.

Information products for cataloguing include:
  ✓ Incident Action Plans (See chapter 9 for more information.)
  ✓ Maps
  ✓ Communications plan

✓ Traffic plan
✓ Weather – current and forecasted
✓ Medical and Safety Plans (for responders) and Safety messages, including preventive medicine recommendations.

Technical Specialists

In ICS, Technical Specialist positions can be established as needed depending upon the nature of the incident. These positions provide subject matter expertise to decision making and can be assigned throughout the MaHIM System in an advisory capacity. Expertise may be categorized according to whether it is hazard related or response system related.

Hazard-related technical experts: 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 for maintaining access to adequate technical information include:

- Critical information and/or the experts themselves should be made directly available to the appropriate response elements.
- Contact methods to reach information sources should be provided by the Planning Section early in the incident. New or updated contact information should be provided as it is received by the Planning Section.
- Sources of information should be listed according to types of technical information they can provide. Examples of information types include
  ✓ Information on hazard agents.
  ✓ Information on diagnosis, treatment, prophylaxis, immunization.
  ✓ Information on responder protection.
  ✓ If information being provided has not been scientifically established, it should be indicated as such.
Examples of expert sources for hazard information include:

✓ Poison Control Centers.
✓ Experts in managing infectious disease in large populations, such as USAMRIID\textsuperscript{52} experts
✓ Experts in infectious disease from the CDC.

Response-related expert information: This area of expert technical information focuses upon hazard impact on response systems and maintaining continuity of operations despite the hazard impact. It also may include technical experts on the operation of ICS processes. The personnel staffing the “ICS Senior Advisor” position in the MaHIM Command Staff, for example, is a technical expert providing strategic advice on how to optimally apply ICS principles during the response.

This technical expert cadre primarily supports the Public Health Continuity of Operations Group and the other MaHIM Operations Section elements that assist healthcare response resources in maintaining operations after a hazard impact. It is helpful to have incident specific experts identified for use during high-risk hazard incidents identified in the Hazard Vulnerability Analysis for the community and its key MaHIM System resources. This will expedite the Planning Section’s ability to rapidly obtain appropriate technical expertise in evaluating key response facilities and equipment. For example, after a major earthquake, structural engineering technical experts can either assure healthcare organizations that their facilities and equipment are intact post-quake, or define the impact issues that must be addressed so the facilities can maximally support operations.

Potential areas of technical expertise 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 an unintentional 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 and information 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.

- **Public Health Legal Interpretation:** This element assists MaHIM Command and Planning with the interpretation of public health laws and regulations in existence for the community, the state, and, potentially, the nation. Interpretation, advice, and representation are all required.

- **Other infrastructure areas:** These include electrical systems, medical gases, and other utilities.

\textsuperscript{52} U.S. Army Research Institute in Infectious Disease, with a long history of researching the protection of soldiers from biological weapons.
MaHIM Finance & Administration Section

Response to a mass casualty or mass effect incident can be very expensive for both the jurisdiction and the healthcare resources providing response services. It involves diversion of resources from everyday business operations, impacting everyday services. It can also involve significantly increased costs related to time and effort from medical care providers and support personnel, the depletion of expendable medical supplies and medications, and wear and tear on nonexpendable equipment. All such resource expenditures should be accurately and thoroughly documented to facilitate claims for appropriate reimbursement.

Additionally, mass casualty response disrupts normal healthcare business operations, upon which an organization’s budget and cost structures are based. Lost revenue from normal business operations should also be thoroughly documented for potential reimbursement. When healthcare delivery organizations have diverted their income generating systems to provide the “public safety function” of mass casualty care, public funding should be used to preserve their balance sheets. Accurate financial record-keeping may be necessary to achieve either this or to seek grants or other funding when a hazard impact directly affects the healthcare organizations.

These types of activities fit well within a traditionally defined ICS Finance and Administration Section. The MaHIM System Finance and Administration Section follows the traditional construct (Figure 8-13). Four units are traditionally described in ICS within this section and have applicability to the MaHIM System:

- Compensation and Claims Unit
- Cost Unit
- Procurement Unit
- Time Unit

A fifth unit, the Regulatory and Administrative Unit, is established to specifically address issues related to healthcare delivery.

Time Unit

In some situations, documentation of personnel time may be required to support payment of these personnel. 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. This is particularly important in a medical and public health incident response since many personnel assigned by the jurisdiction to its response may be drawn from nongovernmental organizations. 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 assigned through a mutual aid request. The Time Unit establishes the procedures for this documentation and serves as a central reporting area for work that is to be compensated.

Compensation and Claims Unit

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

In NIMS (December 2008), the “Cost Unit provides cost analysis data for the incident. This unit must ensure that equipment and personnel for which payment is required are properly identified, obtain and record all cost data, and analyze and prepare estimates of incident costs. The Cost Unit also provides input on cost estimates for resource use to the Planning Section. The Cost Unit must maintain accurate information on the actual costs of all assigned resources.”

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 simple and easily transferable. The Cost Unit establishes this procedure, disseminates the methodology (with assistance from the Planning Section), 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.

Procurement Unit

As per NIMS (2008), the “Procurement Unit administers all financial matters pertaining to vendor contracts.” In a mass casualty incident involving response by nongovernmental healthcare resources, a contracting system should be established for paying or financially guaranteeing healthcare and other organizations that provide requested services during a mass casualty incident. In addition, contracts should be available to assist with supporting issues that may arise from mass effect incidents on participating organizations.

This Unit 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. Areas where this Unit may become involved include:

General support: Services or supplies necessary for many response elements to begin or maintain incident operations. For example, the Procurement Unit may be tasked with assisting the jurisdiction’s healthcare coalition in contracting for services or supplies that will be needed by all coalition partners after an unusual hazard impact.

Contingency contracts: The jurisdiction may maintain contracts that are used only for specific types of emergencies. Ideally, contracts are established during preparedness so that the jurisdiction has priority from the suppliers. Examples include refrigerated trucks for mass casualties or large generators in case of prolonged power failure for hospitals, alternate care sites and other incident response locations. Authorization requirements are best met if they are explicitly established during preparedness and understood by both the recipient and provider of services and resources.

Mutual Aid Financial Facilitation: Mutual aid has occurred regularly between public safety resources for decades, and increasingly between local and State jurisdictions. This assistance is usually for short periods and in a balanced fashion such that expenses are fairly distributed over time. In a large-scale, very rare incident, this balance may be upset. A key component of developing strategic (“master”) mutual aid agreements between jurisdictions and between individual resources within a jurisdiction 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.

Regulatory and Administrative Unit

For the MaHIM Finance and Administration Section, there are additional considerations beyond the above-described Units. Administrative requirements specific to the medical and health disciplines have never been delineated by NIMS ICS. These are presented as administrative activities that may be considered within the domain of the MaHIM Finance and Administration Section.

Regulatory Compliance: In a true mass casualty incident, response requirements often push the limits
of the regulations prevalent throughout the healthcare industry. The Regulatory Compliance elements charged with addressing these issues, and attempting to maintain the intent of regulatory guidance even if the regulations must be suspended or healthcare delivery modified in order to provide necessary medical surge capacity and capability.

Liability: The jurisdiction as well as its individual and group healthcare providers and facilities should assess liability issues and risks. Appropriate policies and procedures should be developed for organizations as well as individual healthcare providers and support personnel. This Liability element 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 in an alternate treatment site should be considered and addressed during the preparedness phase. This issue, however, will also require focus during mass casualty incident response.

Licensure/Certification: 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 element works closely with the MaHIM Logistics Section Supply Unit and its Volunteer Management System in addressing and resolving 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 (via the Medical Reserve Corps or the ESAR-VHP programs) to facilitate the establishment of pre-approved licensed and/or certified personnel. The Emergency Management Assistance Compact (EMAC) provides a solid framework to address this issue between EMAC participating states.

Medication and Medical Device Regulatory Facilitation: 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.

This element addresses regulatory approval where indicated so that the victims receive the best possible health 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 example, lorazepam has never been approved by the Food and Drug Administration (FDA) for organophosphate induced seizures, but is likely far superior to valium in suppressing seizures without requiring intubation. The use of this 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 command.

Healthcare Services Regulations: Individual healthcare facilities must operate within guidelines established by the jurisdiction. For example, 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 or mass effect incident. This element provides coordination with the individual institutions and the regulatory bodies to temporarily suspend or alter regulations in order to permit managed degradation of services when capacity or capability is challenged.

Equipment Certification: In an unusual or large-scale incident, 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 administrative element.

Responder Certification for Specialized Equipment: 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 element supports the Logistics Supply Unit (Personnel Support) with the certification procedures for those being trained during the incident. The element establishes the system-wide procedures necessary for appropriate training and documentation of certification when they are required during incident response.
Introduction

This chapter describes the concepts that operate the MaHIM System model throughout an incident life cycle. It focuses on important management, operational, logistical, planning, and administrative processes that coordinate mass casualty and mass effect incident response. As noted in the MaHIM System Description in the preceding chapters, many diverse medical and health resources could be involved, with a partial list provided (Figure 9-1).

The model is all-hazards based, including mass terrorism incidents such as bioterrorism. Commonly accepted, well-established operational concepts in healthcare organization 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 Concept of Operations 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 Stages

For the purpose of analysis and discussion, the authors have decomposed the response phase of Comprehensive Emergency Management into a series of sequential but overlapping stages. These stages are consistent across any type of incident. The following stages and their definitions are adapted from “Emergency Management Principles and Practices for Healthcare Systems”:

1. Incident Recognition
2. Initial Notification and Activation
3. Mobilization
4. Incident operations
5. Demobilization
6. Transition to recovery and return to readiness.

### Organizations Potentially Involved in a Large-Scale Medical and Public Health Incident

- City/county/state government elected offices
- 911 dispatch
- Public works/sanitation
- Mental health authority
- Social services agencies
- Occupational health agencies
- Home health care provider agencies
- Community health centers
- Hospitals and clinics
- Individual health care practitioners
- Local/state physician, nursing, pharmacy, respiratory therapy, and other associations
- Local/state veterinarian associations
- Pharmacies
- Medical examiners
- Coroners
- Education systems
- Emergency medical services/public and private ambulance services
- Police departments
- Fire departments
- Emergency management agencies
- Public transportation systems
- Utility control centers
- Local emergency planning committees
- Environmental protection agencies
- Local boards of health
- Community Service Boards or other mental health oversight
- Active duty military
- National Guard
- Military reserves
- Long term care and assisted living facilities
- Poison control centers
- Urgent medical care centers/freestanding clinics and surgical centers
- American Red Cross (local & state chapters)
- Salvation Army
- Other NGOs
- Faith-based and cultural community leaders

Figure 9-1

Throughout all stages of a response, the functional elements of the MaHIM System integrate and operate together to achieve the incident objectives. Incident objectives, established by command through the
incident action planning process, evolve as the incident progresses.

1. Incident Recognition

Incident recognition is the first stage of Response. Incident recognition is the process that identifies an “anomaly” (independently or through communication from others), develops a situational assessment of the anomaly and related details, and determines whether the situation constitutes an “incident” for the response organization. Since incident response is governed by the EOP, this stage focuses upon the decision to activate the organization’s EOP.

Hazards that cause most types of mass casualty or mass effect incidents are obvious at the outset, such as explosions, tornadoes, and transportation mishaps. With other types of hazards, the human, property, and business continuity 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. Initial indications for a subtle onset event can vary significantly and come from multiple sources. 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.

Even in an obvious and very large incident, the initial human, property, or business continuity impact may also be unclear. For example, 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” bomb components (i.e., radiation, chemical or biological debris).

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

- First: identifying that something 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 and reporting system that allows a robust monitoring of medical and public health parameters. For subtle onset events, early recognition may be reliably accomplished only by having a system that is very sensitive in detecting “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 and reporting 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 management architecture 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 Group, described in Chapter 7, fulfills these requirements. Early partial activation of the MaHIM EOP and mobilization of this Group allows the response system to leverage multiple data sources, delineated in the Incident Epidemiological Profiling Group (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 the Incident Epidemiological Profiling Group, 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 the MaHIM System is activated and resources are mobilized to begin response, the Incident Epidemiological Profiling Group 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 incident. 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 Group also has utility in providing the information to develop an appropriate time frame for demobilization of resources 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 pre-established decision support tool, with decisions based upon anomaly characteristics reaching activation thresholds.

### Anomaly Characteristics Indicating EOP Activation

- Credible threat with known or suspected ability to deliver threatened action.
- Evidence of terrorist or criminal intent on initial investigation.
- Potential “leading edge” with no solid indication that the incident is limited to current size & scope.
- Widely scattered initial cases with unknown etiology.
- Initial information indicates potential for a significant health impact.

Figure 9-3

2. Activation and Initial Notification

If conditions are present that support the “incident” decision, a series of notifications is required. “Activation” refers to the actions to initiate response as described in the enterprise’s EOP. These actions establish the incident management team (IMT), the temporary management cell within the enterprise that manages its “response organization” for addressing incident issues. The IMT reports through its “Incident Commander” to the “Agency Executive” or designee. An activation may be partial (stipulating only specific elements of the organization are activated) or full (stipulating activation of all organizational elements involved in the EOP).

“Initial notification” refers to the information and communication process that:

- Provides urgent information about an unusual occurrence or threat of occurrence.
- Conveys the activation decision.
- Commonly includes actionable information directing the notified entity on initial actions for mobilization, deployment, and/or response.
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 MaHIM System Incident Commander and Planning Section Chief would receive a partial activation notification, as would the surveillance resources that must report additional information above their baseline data. If a more robust activation is implemented, all functions in the MaHIM System are activated.

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 system-wide MaHIM 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 circumstances such as biological hoaxes.

---

**Example Notification Scheme**

**ADVISORY**
- Used when no system response is indicated but potential for response exists.
- Information is usually delivered to Management and General Staff but may be disseminated throughout the system for information purposes.
- No actions are indicated except relay of Advisory.
- May be used to convey information for public release as to why no response is yet required.

**ALERT**
- Used when response is likely or imminent to prompt readiness among response elements.
- Information is usually delivered to command and general staff (response required) plus may be disseminated to leaders of specific MaHIM elements.
- Exchange of information/some information required:
  - Management staff and Section Chiefs may choose to meet or teleconference.
  - Alternatively, hotline or web site may be established to answer questions posed by alerted responders.
- Limited mobilization of equipment and personnel may be requested and/or authorized.
- Some funding is designated for response readiness, whether or not the element is ultimately activated.

**ACTIVATION**
- Used when response is indicated.
- States if “full” activation or “partial” activation and if Partial, indicates the elements activated.
- Indicates when and where to deploy if a deployable Entity.
- Information is delivered to all personnel and entities within the activated MaHIM System.
- Confirmation of message receipt and current status is requested. For deployed entities, estimation of time to reach assigned location is also requested.

**Figure 9-4**

If the anomaly or an obvious incident 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 and sub-function, a request for a function/resource status report, and additional requests as indicated. This should be developed using a standard notification message template. See Figure 9-6 for a list of notification requirements.
3. Incident Mobilization

Mobilization refers to the group of activities and procedures carried out that ready a resource to perform incident operations according to the EOP. During the response phase of Comprehensive Emergency Management, mobilization is the stage that transitions functional elements from a state of inactivity or baseline operations to their designated response state. For some resources, this activity may actually occur well into the incident response phase, as additional resources are brought on line or as surge processes are instituted to meet demands.

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. 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 message and the selection of the notification resources).

While only the functional elements necessary to accomplish the response objectives may be activated during the initial incident response, all functions are notified and kept updated. For example, if initial incident parameters indicate the need for public health operations only, resources within other branches should still be notified of the MaHIM System activation and the current incident situation. The activation notification will describe a status of “alert” or “advisory” for the non-activated elements (e.g., “for all other response resources, this is an advisory notification only”).

All notified resources would be expected to confirm that the notification was received and report their status as part of the notification process (even if the report is “normal operations, no unusual activity encountered”). Follow-on status reports at designated time intervals may also be requested at the time of the initial notification. These status reports may be used by the MaHIM Planning Section Resource and Situation Units to understand the size and scope of the current hazard impact.

Each notified resource reacts to the notification according to instructions in the notification and its own 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 the MaHIM Command Staff aware of its functional capabilities at all times (assisted by the Resource Unit of the Planning Section). It also prepares all MaHIM resources to respond if called upon, and incident information may assist in keeping the resources usual operations intact.
Mobilization of resources may be indicated for maintaining healthcare system resiliency despite a hazard impact, for healthcare surge capacity or for very specialized healthcare surge capability to address incident patient needs.

4. Incident Operations

“Incident Operations” refers to all actions that address the incident objectives or that supports the incident management team addressing the incident objectives. These are all actions that follow the EOP activation, other than the mobilization and demobilization actions, until the recovery phase commences. Actions within this stage may be divided temporally into “Immediate” and “On-going.”

Depending upon the rate of evolution of the incident, incident operations could begin simultaneously with the onset of the mobilization phase, or it could occur sequentially. The actions in this stage are best described according to each of the MaHIM System functional areas.

5. Demobilization

Demobilization is the emergency response stage that addresses transition of resources, and eventually the IMT itself, from incident activities back to normal operations or to their baseline standby state. Demobilization commences as their operational objectives are attained and the incident resources are relieved of incident responsibilities.

6. Transition to Recovery and Return to Readiness

This stage encompasses actions that manage the organization’s early recovery activities until they transition to a full recovery management system and then to a management element of the everyday organization’s administrative system. For response organizations, this stage also includes actions that return the response system to a state of readiness for the next response. It is important to include this focus, since return to readiness must be addressed efficiently and with a sense of urgency.

MaHIM Concept of Operations during Incident Operations

For clarity, the concept of operations during incident operations is presented according to the MaHIM System function areas.

The activated MaHIM System is charged with the overall responsibility for the coordination of the public health and medical response of a community to any hazard impact. With the range of involved resources including private medical and health resources as well as public health and emergency medical services (EMS), the public-private interface must be carefully addressed. Most medical service delivery resources fall outside the public safety arena; many are nongovernmental and include both for-profit and not-for-profit ownership. No clear line of authority for response management may exist between public health and other jurisdictional authorities, and no direct line of authority for response management exists across the divide between the public sector and private resources. In healthcare response to major emergencies and disasters, a more comprehensive relationship between response authorities and healthcare organizations is needed than the simple contracting method found in other types of response such as debris removal.

Managing coordination can therefore be accomplished most effectively through established incident management processes that manage, rather than “command.” The primary methodology used by MaHIM System Command to execute its management role is through the establishment of incident objectives ("management by objective") and through adequate information. Both of these are accomplished through the MaHIM incident action planning process. The MaHIM System Incident Commander holds ultimate responsibility, while being heavily supported by the MaHIM Planning Section.

The MaHIM Management Process incorporates Incident Action Planning, which is defined as the process of establishing and disseminating the incident objectives, strategies (which includes priorities), and tactics through a formal incident action plan. During prolonged responses, the MaHIM Incident 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).
Incident Action Planning is imperative even during response to very short incidents, although the MaHIM Incident 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 the incident outset, thus establishing the timing of the planning cycle and the operational period.

Operational periods are usually established as 12-hour or 24-hour time intervals.

In addition, it is important to note that participating organizations in the MaHIM System may be conducting their own Incident Action Planning. It is therefore important to denote each specific organization’s IAP with qualifiers to distinguish them from one another. The processes utilized to develop these individual IAPs, however, should be coordinated such that the strategies and tactics are consistent across organizations.

To develop the MaHIM Incident 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 MaHIM System elements and participating organizations) 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 the EOC acts as support to the MaHIM System incident management team.

Experience has demonstrated that the two functions (the jurisdiction’s Incident Management Team (IMT) and the EOC) work best while being closely coordinated but remaining as distinct entities. For this purpose, Incident Management should establish and operate a defined Incident Command “Post” (consistent with standard ICS).

This should generally be in a safe proximity to any incident “scene.”

The management of each individual resource, 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. This interface is facilitated if each management structure is documented and contact methods aggregated and disseminated.

Safety for all involved in an incident response is an exceptionally important responsibility of the MaHIM Command Staff. Major incident plans and all activities are monitored to minimize danger, and the MaHIM Safety Officer also develops and maintains a comprehensive, up-to-date Health and Safety Plan (HSP) that is specific to the incident. The MaHIM 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 each HSP (this also promotes consistency across the response system). 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 MaHIM HSP should be dated, reviewed/revised as indicated for each operational period, and widely disseminated.

A safety message that summarizes the MaHIM HSP is also provided as a supporting document with each operational period’s action plan.

Regional MaHIM Coordination

Any hazard impact that causes a mass casualty or mass effect incident is likely to extend beyond the jurisdictional borders of a single community.

Even when there is only a focused incident scene, health and medical effects in many situations will spill over the borders of the affected jurisdiction and involve neighboring communities, since hospital 911-receiving areas and other patient catchment areas commonly overlap and cross jurisdictional borders.
Mechanisms must therefore exist for coordinating the response efforts of contiguous communities that comprise a region.\textsuperscript{53}

A Regional Management Coordination Function could provide this coordination through formal mechanisms of information sharing between communities and through coordination of each individual jurisdiction’s incident objectives. For coordination of local jurisdictions within a State, the State commonly has authority to manage this activity unless home rule dictates otherwise. Given the variety of response methodologies around the US, this management coordination may be accomplished through one of several mechanisms consistent with NIMS:

- **EOC to EOC**: Coordination between the jurisdictional emergency operations centers (EOCs) in the region.

- **MaHIM IMT to MaHIM IMT**: Direct interaction between MaHIM System liaisons in the jurisdictions.

- **Area Command**: This ICS-based entity provides coordination between IMTs and establishes priority distribution of resources.

NIMS defines Area Command as: “Area Command is an organization to oversee the management of multiple incidents that are each being handled by a separate ICS organization or to oversee the management of a very large or evolving incident that has multiple incident management teams engaged. An agency administrator/executive or other public official with jurisdictional responsibility for the incident usually makes the decision to establish an Area Command” (NIMS 2008). The responsibilities of the Area Command, as presented in the NIMS 2008, are listed in Figure 9-7.

Area Command requires an authority that supersedes the authorities of the affected jurisdictions that are subsumed under Area Command. If the jurisdictions that are coordinating under Area Command are at the “State” level, Area Command can only effectively occur if the involved States acquiesce to this arrangement.

### Area Command Responsibilities*
(underlined bullets correspond with the Regional MaHIM Coordination concepts)

For incidents under its authority, an Area Command has the following responsibilities:

- develop broad objectives for the impacted area(s);
- coordinate the development of individual incident objectives and strategies;
- allocate/reallocate resources as the established priorities change;
- ensure that incidents are properly managed;
- ensure effective communications;
- ensure that incident management objectives are met and do not conflict with each other or with agency policies;
- identify critical resource needs and report them to the established EOC/MAC Groups; and
- ensure that short-term “emergency” recovery is coordinated to assist in the transition to full recovery operations.

* NIMS 2008

Area Command requires an authority that supersedes the authorities of the affected jurisdictions that are subsumed under Area Command. If the jurisdictions that are coordinating under Area Command are at the “State” level, Area Command can only effectively occur if the involved States acquiesce to this arrangement.

Since authority for Area Command is not assured in a mass casualty or medical mass effect incident, the MaHIM System model describes only functional regional management whose primary function is those responsibilities highlighted in Figure 9-8. It is referred to simply as a “Management Coordination Function” and can be performed with any of the above-mentioned coordination options.

---

\textsuperscript{53} In some incidents, 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.
The primary objectives of MaHIM Regional Management Coordination are:

- Common situational awareness through effective information exchange.
- Coordination of strategic objectives and major tactics across the affected areas.
- Optimal resource distribution through mutual aid, cooperative assistance and other sharing methods.

The activation of the Regional Management Coordination Function, whichever method is selected, must occur at the first sign of a possible incident and a formal process for regional management meetings and briefings must be defined. A regional management “meeting” is only intended to provide a brief report from each jurisdiction (possibly by using a summary of each community’s IAP) 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 management meeting and then report back (i.e., include in the next management meeting or any briefing that has coordinated the information between the participating jurisdictions).

The regional management meetings do not directly develop the incident objectives and strategy in each member community but instead provides a coordination mechanism for the region’s Incident Action Plans. It serves as activity that can identify and resolve any unintended planned conflicting actions through information sharing and discussion. An alternative to these separate meetings might be having other jurisdictions participate (through their senior liaison) in the Planning Meeting and Operations Briefing of the more affected jurisdiction’s MaHIM System.

Any “product” of regional management coordination 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 any Regional Incident Action Plan, which defines an inter-jurisdictional coordination strategy for each operational period. For short duration events, there may be only one Regional Incident Action Plan developed.

Regional management meetings are “attended” by each jurisdiction’s MaHIM System IC or designee. Others participating could include local 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 commanders. Observers, such as media personnel, should be avoided: they may be disruptive or their presence may inhibit the full disclosure of issues by individual jurisdictional participants.

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. They should 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 meeting 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 incident will be complex and time intensive. It is therefore important that regional management coordination is structured in a format that promotes time efficiency.

Typical regional meetings and briefings should last less than 30 minutes. The discussion should be almost exclusively related to strategic regional issues and not devoted to answering multiple questions on incident characteristics.

Unless an Area Command or EOC function will be performing the regional coordination tasks, it should by a conducted by a jurisdictional MaHIM Planning Section. Planning duties could also rotate among the involved jurisdictions or could be performed by the primarily involved community. The reports for the management briefings (including each of the jurisdiction’s Incident Action Plans) are coordinated by individual jurisdictional Planning Sections, ideally prior to the briefing (i.e., distribution precedes the
briefings by enough time that the information is read by attendees prior to the briefing).

**MaHIM Incident Commander and Command Staff**

The MaHIM Incident Commander (IC) manages the MaHIM Incident Management Team (IMT). “Management by objectives” is used, with a focus upon achieving the defined goal and objectives for the incident for which the IMT is activated. The specific incident objectives, and strategies for achieving those objectives, may be patterned after the MaHIM System guidance (Figure 9-9).

The MaHIM IC also has the responsibility of keeping the agency executive informed of progress and any significant problems. He/she also establishes the conduit for obtaining policy and strategic direction from the agency executive as indicated.

Much of the MaHIM IC role is overseeing the Incident Action Planning Process (Figure 9-10). This involves decision-making accomplished through a series of meetings and related production of documents.

**The MaHIM IC’s role in the Management Meeting:**

- Determine the level of activation according to the EOP and incident circumstances.

- Determine the initially staffed IMT positions and configuration (ideally from a pre-plan for the specific incident type).

- Ensure the continuity of operations for health and medical organizations (i.e. organizational resiliency).

- Promote optimal healthcare surge capacity and capability across the affected area through situational awareness, resources support, and management coordination.

- Manage the integration of the varying health and medical resources with each other and with the broader response community.

From a medical perspective, the overarching strategies for achieving these MaHIM System objectives are:

1. **Reduce hazard exposure.** Avoid or minimize hazard exposure to responders, patients and the general populations after hazard “release.” This includes addressing safety issues for response organizations and reducing organizational hazard exposure to promote business continuity.

2. **Increase hazard resistance:** Maximize patient, population, and organizational resistance to the hazard impact after exposure.

3. **Promote/achieve healing from hazard effects:** Maximize the rate and degree of patient, population, and organizational “healing” from the effects of the hazard impact. Human “healing” includes both physical and psychological dimensions, with interventions directed at both the individual and population levels. Organizational “healing” includes restoration of essential services, recovery to baseline status, and return to readiness for its response elements.

**MaHIM System Goal, Incident Objectives & Strategy**

The goal of the MaHIM System is to provide a single, comprehensive management system that effectively manages response to mass casualty and mass effect incidents at the jurisdictional and regional levels.

The incident objectives that achieve this MaHIM System Goal are to effectively:

- Provide for the safety of personnel and organizations involved with response

- Limit morbidity (injury or illness) and mortality (deaths) in a population exposed to a major hazard.

- Determine the personnel for the key IMT assignments, which initially will be Command and General Staff positions).

- Determine the incident objectives (i.e., overarching objectives) as well as those for the immediate operational period.

- Determine if formal incident action planning will be conducted.

- Determine the timing of the incident’s operational periods so that the incident action planning cycle can be set.

**The MaHIM IC’s role in the Planning Meeting and Operations Briefing:**

- Be available to answer questions, make decisions that are strategic in nature, and to monitor the conduct of incident action planning and other ICS activities for effectiveness and efficiency.

- As indicated, provide context and encouragement to the management personnel and responders.
MaHIM Operations Section

The MaHIM Operations Section directly addresses the general incident medical objectives (set by management) in any incident. The MaHIM Operations Section is described in Chapter 7. While each branch has discrete objectives and missions, they must operate in a coordinated and interdependent manner.

Regular reporting of incident parameters and resource status must occur through each of the Operations Section's individual sub-functions. For example, the Incident Epidemiological Profiling Group reports throughout the incident at regular intervals. The Patient Surveillance and Tracking Task Force reports current patient counts and locations. Information from this Group is especially important for the MaHIM Planning Section to develop accurate Situation Reports and for the other MaHIM Operations Section elements to anticipate near and long-range response needs. The Operations Section information node collects the information from each MaHIM Operations Branch. Received information is applied at the level of the Operations Section as indicated and is also forwarded to the Planning Section for processing and use in incident action planning. Similarly, bulletins and updates that come from Management and Planning can be transmitted to an Operations Section information node for dissemination within the Operations Section. The timing of reports must be established to fit within the incident action planning cycle.

MaHIM Planning Section

The MaHIM Planning Section addresses two critical roles related to the MaHIM Management Process: 1) the process for developing the Incident Action Plan and 2) information processing.

Incident Action Planning: The MaHIM Planning Section maintains the processes necessary for the development of the MaHIM System’s Incident Action Plan and provides support to management for completion of the Incident Action Planning process.

A role of the Planning Section is to set the meetings and briefings (Figure 9-11) that drive the planning cycle and to assure that all action planning tasks are completed in a timely manner.

The Planning Section Chief facilitates the Management Meeting. As stated earlier, a primary goal of incident action planning within the MaHIM management process is to develop incident and operational period objectives that guide the medical incident response (i.e., “management by objective”). The MaHIM IC or UC is responsible for this task, with significant input and judgment provided by the leadership of the MaHIM Planning and Operations Section Chiefs. Commonly, the Planning Section Chief develops draft incident objectives for the IC to edit and approve. Operational period objectives are established with more input from the Operations Section leadership. Strategies for achieving the objectives are outlined also. The remaining issues described in MaHIM IC section above are then addressed.

The Planning Section personnel then conduct various tactics meetings and other tasks in support of the Operations Section Chief to prepare for the Planning Meeting. General tactics are developed so that resource assignments can be established and so the Logistics Section can anticipate support needs. It is the responsibility of the Operations Section Chief or designee to decide general and specific tactics for achieving the designated objectives. The specific tactics may change during the operational work cycle, and this maintains response flexibility. Subsequent Incident Action Planning cycles develop new or revised objectives as indicated. The Logistics Section is also consulted to develop the logistical support plans for the next operational period.

To provide comprehensive, achievable, and measurable guidance, incident action planning involves multiple additional processes. The outputs of these actions are captured in supporting plans and other documents that become attachments to the relevant Incident Action Plan. In a large complex incident, these could include a Medical Plan, Safety Plan (or Health and Safety Plan), Communication Plan, Transportation Plan and others.

The Planning Meeting is then conducted to finalize the objectives, assignments, and supporting plans. The Incident Action Plan for the next operational period is then completed and prepared for dissemination, which occurs during or immediately prior to the Operations Briefing, which is facilitated by the Planning Section Chief and follows a defined format and agenda.

Planning activities that assist with the IAP include developing projections for incident needs (Incident 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.

Incident Action Planning is therefore complex and requires dedicated personnel, a defined standard operating procedure and a recurring action time line (i.e., recurring each operational period).

The initial response period in a complex incident can be relatively disorganized due to incident circumstances, and a formal completely organized 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 Incident Action Planning becomes established. As the response structure organizes, planning should rapidly become proactive and “objectives driven” (Figure 9-10).

Initial assessment and response in the reactive period are developed using basic information that has been provided to incident commanders under stress, and only very broad, urgent, lifesaving objectives are established. As incident information gathering evolves, incident objectives are refined and developed into an Incident Action Plan. For short events, the Incident Action Planning Process may end with the development of one formal Incident Action Plan. For longer events, formal Incident Action Planning must be initiated as soon as possible, so reactive management is limited to the first operational period.
Incident Action Planning becomes a repetitive “planning cycle” for each follow-on operational period. It remains proactive with incident objectives, strategy, tactics and assignments identified through the defined series of meetings and actions. The meetings themselves must be focused and without outside interruptions, and they must be brief.

This grouping of meetings is the same as those described in the revised NIMS (NIMS 2008) but the “management meeting” has a different title in NIMS, and doesn’t describe the comprehensive MaHIM System list of activities. A crosswalk of meeting titles and activities conducted in each meeting is provided (Figure 9-12).

**Figure 9-11**

**Incident Action Planning**

**Key Meetings & Briefings**

- **The Management Meeting** develops, evaluates, and revises incident objectives. The Command Staff and selected leadership of the MaHIM Sections participate. They rapidly review all pertinent incident information, conform or revise the incident objectives, and then establish the objectives for the operational period. The MaHIM IMT organization is then assessed to determine if change is indicated to support the incident and operational period objectives.

- **The Planning Meeting** develops incident strategy and major tactics to accomplish the incident objectives. Participants include Management Meeting members, and IMT Section Leaders and selected leadership of key branches and other elements. In a complex incident, additional meetings may be necessary to develop the strategy, tactics, and assignments and resource allocations that will be decided upon at the Planning Meeting. These meetings, called “Tactics Meetings” in the NIMS (August 2008) have also been called “pre-planning meetings” in other versions of ICS. The consensus developed in these meetings is brought forward to the Planning Meeting for a decision. The MaHIM Incident Action Plan for that operational period is then completed.

- **The Operations Briefing** presents the current Incident Action Plan to the leadership of the MaHIM System elements and to liaisons from important “outside” response organizations participating in response. This commonly is timed for just prior to change of shifts with oncoming and off-going leaders in attendance. This promotes smooth transition of information and management roles. Meeting members are given a brief opportunity to comment on the Incident Action Plan and tactics.

<table>
<thead>
<tr>
<th>MaHIM Titles</th>
<th>NIMS/ICS Titles</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Meeting</td>
<td>IC/UC Develop/Update Objectives Meeting</td>
<td>Objectives established and broad strategy are defined</td>
</tr>
<tr>
<td>Planning Meeting</td>
<td>Planning Meeting</td>
<td>Specific broad tactics are established; assignment of resources; consideration of safety issues</td>
</tr>
<tr>
<td>Operations Briefing</td>
<td>Operations Briefing</td>
<td>IAP briefed out to sections &amp; stakeholders</td>
</tr>
</tbody>
</table>

**Figure 9-12**

Only one overall “Incident Action Plan” is developed for an incident. Subservient Action Plans (such as those of hospitals) should be carefully designated as Hospital X Action Plan or Healthcare Coalition Action Plan. Alternatively, the subservient plans may be designated according to their primary position within the MaHIM System IMT. For example, the hospital’s action plan could be more specifically called a Hospital X Operations Plan since it functions within the MaHIM Operations Section. 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 Incident Action Plans for each operational period.

The Situation and Resource Units of the MaHIM Planning Section provide input to both management and planning meetings. Community health surveillance, patient tracking, general emergency response information, technical expert information, and functional area situation and resource 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 Incident 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 Incident Action Plan. Incident objectives and major
strategy, however, should still be established and disseminated.

A comprehensive Incident Action Plan includes:

- Overall incident objectives and priorities, plus the operational period objectives.
- 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 of the Operations Section, which can be organized geographically and/or functionally.
- Organization of supporting sections (Planning, Logistics, Finance/ Administration Sections).
- Communications Plan, Medical Plan & other Supporting Plans.
- Safety message (reflecting all important elements of the more comprehensive Health and Safety Plan).
- Supporting documentation including:
  - Maps of impacted area
  - Time line of events
  - Time line of meetings
  - Traffic plans
  - Weather reports.

The MaHIM Planning Section also provides support to Command and the Operations Section 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 management is the second major role of the Planning Section, assuring that information systems are established and functioning to meet the information needs of the MaHIM IMT. This occurs mainly through the Situation Unit, Resource Unit and, to some extent, the Documentation Unit in conjunction with the Operations Section elements that feed data and information to them. In many regards, information management can be considered the foundation for effective mass casualty and mass effect incident responses, and it is therefore critical to address the information processes carefully.

To achieve effective situational awareness in a large-scale incident, particularly one that crosses jurisdictional boundaries and response disciplines, many complex and interrelated tasks must be accomplished rapidly. Coordinated actions are necessary to conduct information acquisition, analysis, and dissemination. Development of critical information documents that captures the results is also supported by the Planning Section.

The information itself is complex and time sensitive. For responders, reliable information is needed about the hazard impact itself, the disease processes involved, unusual specifics regarding treatment of patients, responder protection, and healthcare surge. 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 population 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 primary focus.

The Planning Section elements provide this focus. They receive designated reports at defined intervals from the Operations, Logistics, and Finance and Administration Sections, analyze the reports, and present refined information in an organized format to incident managers and its other MaHIM System elements.

The Planning Section receives its data and information from reports generated throughout the MaHIM System (see Figure 9-13). The reporting is transmitted along the management architecture of the MaHIM System, and collected and processed by the Situation and Resource Units.
Effective information management requires that elements within the MaHIM System report regularly to their supervisory positions, which then pass the relevant information up the MaHIM System. This distributed information system requires efficient methods for capturing and passing on data and information.

- Defined and efficient reporting mechanism back to MaHIM System supervisory element.
- Methods should include:
  - Date & time-stamped
  - Format for reporting back that allows rapid aggregation of data.
  - Real-time transmission with confirmation of delivery.
  - Must be available 24/7.
- Time intervals and what to report is element-specific, but generally includes:
  - Status 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).
  - Progress in meeting its assigned response objectives, with quantities of patients or other measures as indicated. For example, Types of patients to report, if any (defined by a case definition that becomes more specific as the epidemiological investigation progresses).
  - Unanticipated resource needs
  - Problems encountered and status (resolved, pending resolution, etc.).

Figure 9-13

Liaisons with major organizations outside the local Incident Management System (such as federal HHS officials) obtain appropriate information from these sources. The MaHIM Incident Action Plan can include attachments with many of these standardized reports (and a summary of others). The standardized reports included in the MaHIM IAP annexes are product driven, i.e., the format and content are developed to meet the information needs of key MaHIM functions.

The MaHIM IAP for each defined operational period, therefore, becomes the primary comprehensive communication from management that is disseminated throughout the MaHIM System.

Within this structured information architecture, any entity within the MaHIM 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 IAP.

MaHIM System Information Management Responsibilities: This second focus of the MaHIM Planning Section informs the incident action planning process as well as most other activities of the MaHIM System. This is a critical function in any type of public health or medical emergency or disaster, and each “community” should establish medical information systems to meet this responsibility for the health and safety of the citizens residing within the jurisdiction.

The State’s public health responsibility should promote linkage between all local jurisdictional information functions (see below) to provide a comprehensive state information system.

Ideally, these medical and health information capabilities operate at a baseline capacity and capability 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 Mental Hygiene54) and facilitates response to natural outbreaks of disease or assists health personnel in the evaluation of specific injury or illness patterns (e.g., pedestrian accidents, product tampering).

These entities then can be surged into the information system for the MaHIM response organization very rapidly at the beginning of an incident, rather than operating in a less reliable “off-on” manner.

Information must be analyzed and collated by the MaHIM Planning Section for multiple purposes in addition to formal action planning. Examples of specific information requirements include:

- Logistics Section: geographic depiction of data to delineate the areas of MaHIM System activity so that the MaHIM medical resources can be efficiently supported by the Logistics Section.

- Safety and other Command Staff: 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 decision-makers. These geographic information system based reports may subsequently be forwarded to responders, political leaders, the media and the public.

- Operations Section: return of information, processed into an aggregated format, to the Operations Section’s reporting sources that provide the individual data sets. The aggregated information and other reports assist these operational elements in meetings their assigned objectives. This also promotes better participation by the reporting sources.

- Liaison officer: for efficient exchange of accurate information with the outside entities.

- Acute care medical community: regular posting of incident information, epidemiological and specific medical information, ideally through timed public health advisories or alerts that are regularly updated. Information and process that could promote consistent and adequate healthcare interventions include the following areas.

  ✓ 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.

  ✓ Unanticipated change in information may require an interim posting, with notification of this update provided through the Healthcare Coalition Task Force, the Information Officer, and other MaHIM elements. A method should also be established for practitioners to check for new information or a sudden change in public health recommendations occurring between the scheduled releases. A regularly updated Health Alert Network (HAN) may provide this service across the jurisdiction, if it is managed by the MaHIM System with wide access for healthcare providers (beyond hospitals).

  ✓ The reporting of all relevant data (including environmental sampling that finds nothing dangerous) upon which the public health recommendations are based, updated at least daily during an active incident. In some situations that involve unusual lab studies, this may include sensitivities and specificities of testing methodology.

  ✓ A situational report providing a comprehensive presentation of the current public health and medical actions, the locations/times of operation of incident health services, the numbers of patients treated, and a composite of the above information above.

MaHIM Logistics Section

The MaHIM Logistics Section provides support to Management and the Operations Section pertaining to personnel (processing, food/hydration, billeting, transportation, preventive medicine, and medical/mental health care as indicated, etc.), equipment and supplies, and technical capabilities.

Individual elements within a large-scale incident response (such as hospitals or Disaster Medical Assistance Teams) have their own internal Logistics Section that meets this need during response to anticipated hazard types, size and longevity. The internal logistics function continues to function throughout an incident, providing this “internal” support, and may be a point of contact that interacts with the MaHIM System’s Logistics Section.

In addition to responding to specific support requests, the MaHIM Logistics Section works to anticipate logistical needs (through information from the Operations and Planning Sections, Incident Action Plans, etc.). For example, a single hospital may task its Logistics Section 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 MaHIM Logistics Section may be establishing a capability to obtain batteries and portable lighting for all healthcare facilities in the jurisdiction because it is anticipating the need.

The MaHIM Logistics Section must have very reliable communications with all functional areas to receive and confirm requests. Formal requests for logistics support must follow the Incident Management architecture and established documentation, similar to the information node arrangement for data reporting, so that effective span of control (for requests) is maintained. The confirmation that a request was received should also provide information relating to the availability and time frame for supplying the resources. The formal
request process and routing should be very efficient, but also allow functional area 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 MaHIM Logistics Section). Finally, the request architecture should allow the Logistics Section Chief to anticipate when his/her logistical capacity may require assistance from outside or “higher” response tiers (State, interstate region, or Federal) so that delay in obtaining assistance is minimized.

MaHIM Logistics also coordinates closely with the Finance/Administration Section, since much of the support that is provided (goods and services) must come through a purchase arrangement.

MaHIM Finance/Administration Section

The financial cost of both short- and long-term healthcare incident can be significant impact on a community’s public health and healthcare services 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, “non-medical” interventions such as patient decontamination and money spent for facility and equipment rehabilitation are all factors that contribute to costs that are normally unrecoverable through everyday medical billing categories.

The MaHIM System should devote an element, the Costs Unit, to the tracking and analysis of these response costs for healthcare organization participating in the MaHIM System response. 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 the MaHIM System for this purpose. Aggregating these expenses, providing guidance and audit services to assure proper documentation of the expenses, and other services by the jurisdictional authorities may assist in obtaining compensation from State and Federal sources. For example, 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). The MaHIM Financial Administration Section would act in support of the individual institutions to track costs and support reimbursement.

Finally, the Finance and Administration Section can assist in addressing regulatory and other compliance issues. Administrative support must be provided across the MaHIM System because of the extensive regulatory, liability and administrative burden that healthcare administration carries. Challenges can be presented by licensing and certification regulations for additional practitioners brought in to assist, in using pharmaceuticals or medical equipment for non-approved indications, for variance from capacity regulations, or for interpretations of a community’s public health law. The Finance and Administration Section can respond to direct requests for assistance from the Operations Section and Logistics Section (Supply Unit). This function should monitor all MaHIM activities to assist with compliance issues. It may draw upon technical experts from the Planning Section cadre for these difficult issues.

Demobilization

Demobilization is the response stage that transitions the response system back to normal operations or to its baseline standby state. Individual resources may be demobilized as their operational objectives are attained. Demobilization transition includes the organized and formal transfer of continuing incident responsibility to another incident resource or the formal phase-out of the demobilizing resource’s activities. Demobilizing includes the assessment and processing of the function’s resources (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.

All functional areas in the MaHIM System (Command, Operations, Planning, and Logistics, Finance and Administration) should work to demobilize resources at the earliest indicated time, since almost all healthcare resources will have suspended important everyday services in order to participate in the response. This will limit financial costs, limit impact on the resources themselves (personnel and equipment), on their usual constituents (by returning them to their primary professional activity), and will hasten the process of resource recovery to baseline response readiness. For
example, 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 readiness concerns for a secondary hazard situation or another, unrelated mass casualty incident. It will also promote the return of the community to normalcy.

A key function of the MaHIM Planning Section, 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 of specific resources while the incident is still ongoing may be perceived negatively by the general public and by responders (example: returning FDNY resources to their stations and decreasing recovery resources at the World Trade Center site in the weeks after 9/11). Demobilization decisions must be supported by a strong response community and public message that defines why resources are being demobilized (e.g., that incident response objectives for that element have been met and that incident recovery objectives are under way).

The MaHIM Logistics Section Units are also closely involved in the demobilization phase. Transportation of personnel and equipment, equipment return and rehabilitation, and equipment and stock re-supply are key elements of the demobilization process. Responder support activities and other MaHIM Logistics Units are also affected.

**Transition to Recovery and Return to Readiness**

Transition to recovery focuses upon returning organizations and community to their baseline levels of functioning, and therefore denotes the initial period that extends from demobilization, return to readiness of response resources, and continuing to manage incident activities until a recovery organization is activated, deployed and ready to assume responsibility for remaining MaHIM System tasks as well as for recovery activities.

Return to readiness of response resources includes the rehabilitation of personnel and equipment, re-supply and reorganization of equipment and supplies return to a baseline readiness state, and financial recovery of costs for the response actions.

Recovery activities that commence during the demobilization process includes an “after-action report (AAR) process” that consists of collection and objective analysis of pertinent response documents, other information, and feedback from MaHIM management, MaHIM System responders, and representatives from collaborating agencies who may provide objective feedback for the AAR. The information for the AAR is captured in an objective process that delineates issues, background to the issues and recommendations. This is analyzed and recommendations are accepted, modified and accepted, or rejected with explanation. The accepted recommendations are then incorporated into an improvement plan that guides the revision of procedures, assignments, equipment, training, and personnel to attain true “organizational learning.” Otherwise, “lessons learned” are quickly forgotten and, with the next incident response, become “lessons re-experienced.”

**Management Concepts Relevant across the MaHIM System Response**

Certain concepts are relevant to all aspects of the MaHIM System response.

Resiliency and the concept of “Engineered Failure: Functional capabilities are generally designed and developed to meet a projected capacity. System design also should address processes to maintain operations despite hazard impact, and to rapidly recover any mission critical functionality that has been interrupted. Consideration must also be given to designing the system or processes so that when capacity is exceeded or critical support resources are compromised, the system or process “fails” in a controlled (i.e., “engineered”) fashion rather than randomly or catastrophically. The engineering assures that mission critical functions are preserved while less important functions are allowed to fail. 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. Decisions can then

Develop processes to augment resources as they reach capacity. This strategy can be applied to personnel, facilities, equipment, and even medications. If preplanned, this strategy could include defining a point where resources with lesser proficiency or less satisfactory attributes could be recruited or deployed to increase system capacity. Examples include using the cafeteria for an additional patient ward when bed capacity is problematic, granting increased patient responsibility to medical and nursing students, running additional hoses to the decontamination area so victims waiting in the "decon" line can at least wash off exposed surfaces. This strategy should be addressed by contingency and alternate strategy planners in the MaHIM Planning Section. Pre-planning will assure the best possible patient outcome from processes designed to prevent system failure.

Prioritize system components for survival. MaHIM Management may identify key functions that must retain adequate capacity. Recruiting resources from less-critical functions and therefore allowing managed degradation of those system components may preserve critical operations. An example is using personnel from the hospitals coding and billing department as patient transporters or other support personnel for the clinical areas during mass casualty incidents. The MaHIM System Command must continually reassess and adjust priorities as the incident evolves.

Develop “fallback” actions and procedures to accomplish an orderly systems degradation and/or shutdown. If capacity of an individual resource is exceeded, pre-established 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 resource, 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.

Processes for addressing both Surge Capacity and Surge 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 MaHIM Planning Section, 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). Summarized strategy and tactics for medical surge capacity and capability are presented in Figure 9-14.

Overall system surge capacity depends first upon each individual resource maximizing its capacity. This should be addressed in each resource’s emergency operation plan. The next level of assistance for surge capacity comes from the system’s ability to provide adequate logistical, planning (information), and administrative/financial support locally to individual resources. The third level of assistance for surge capacity employs the mutual aid concept, using pre-established formal instruments and relationships with local, regional, and possibly state resources with similar capabilities. The mutual aid instruments should stipulate the parameters for when (triggering mechanisms) and how (where to report, proper credentialing, types of assignments, etc.) neighboring resources assist each other in times of need.

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 National Response Framework (NRF).
Strategies & Tactics for Maximizing Medical “Surge Capacity”

General Strategies:

1. Optimal distribution of patients to available healthcare resources.
   - EMS distribution: EMS system initiates distribution of patients based upon known hospital capacity and specialty capability. The MaHIM System rapidly obtains current information on individual facility’s available surge capacity. MaHIM System maintains a dynamic mapping of available hospital capacity and capability in an aggregated report from all hospitals. This is regularly updated for EMS guidance for ongoing patient distribution.
   - Distribution of medical resources: In mass casualty incidents, greater than 50% of patients get to healthcare facilities independent of EMS (via self-referrals or bystander assistance). Their destinations may be influenced by effectively disseminating public information about appropriate medical destinations where care is currently available. The methods used by traffic reporters to convey 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 capacity of individual response resources through the use of reserves and emergency augmentation per the resource’s EOP.
   - Individual entities (hospital, labs, etc.) initiate emergency operations procedures for surge.
   - Immediate support is obtained to increase the individual resource’s capacity (for example, local chapter of American Red Cross deployed to provide feeding and billeting of volunteer workers).
   - Coordination of strategy and tactics between all entities performing the same or related functions within a jurisdiction (for example, standardized evaluation of patients after a chemical or radiation exposure).
   - Controlled (planned and monitored) degradation of services when maximum capacity is exceeded (engineered failure).

3. Optimally distribute immediately available health and medical resources to meet patient needs (historically, the most overlooked strategy).
   - Healthcare and support personnel, equipment, and supplies provided through mutual aid and cooperative assistance: first local, then regional, state, and national resources. In severe catastrophic events or ones with unique aspects, consider the acceptance of international mutual aid.

- Provision of expert information that improves efficiency of operations. Examples include:
  - Information that guides the treatment of patients in healthcare locations that don’t normally treat their medical problem (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 to bring the information to the patient, not the patient to the specialist.
  - Outreach to the public with guidance that positively influences population behavior to limit morbidity and mortality.
  - Specialist outreach to the 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 (i.e., 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.

Figure 9-14

While driven at the tactical level, the mutual aid arrangements should be consistent with the local and regional strategic pre-plan for mutual aid. For resources to rapidly become coordinated and directed from the strategic level, the MaHIM Planning Section 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 example, after a large explosion, mutual aid resources are expected to respond based upon prearranged agreements and in accordance with specific preplanned parameters (where, when to report, communication channels, etc.). Once the response system has moved into a “management-by-objectives” mode, the MaHIM Planning Section 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.

Support to the health and medical community by “outside,” non-jurisdictional resources may be warranted for incidents of sufficient magnitude or incidents requiring specialty assistance. Specific procedures must be delineated for the acquisition and management of these resources. If federal or state resources 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 and/or health department. Resources 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 resources). Local public health departments are commonly supported by state departments of health with personnel augmentation, specialty lab capabilities, and other resources. 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 resources to consider.

- Health and medical assets available through the National Response Framework (NRF) generally fall under Emergency Support Function (ESF) #8 – Health and Medical Support (Figure 9-11). Examples are provided in Figure 9-15. Requests for Federal assets are made by Incident Management through the local 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 response needs rather than ask for a specific resource, since Federal response managers are required to determine the best asset (based upon capability, availability and proximity) to fill the request for assistance.

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.

56 Information describing these teams is available at the Center for Defense Information, accessed December 17, 2007 at http://www.cdi.org/terrorism/wmdcst.cfm

---

**Examples of Federal Institutions That May Provide Health & Medical Assistance**

- Department of Health and Human Services (DHHS)
  - National Disaster Medical System (NDMS)
  - Disaster Medical Assistance Teams (DMATs)
  - National Medical Response Teams (NMRTs)
  - Disaster Mortuary Operational Response Teams (DMORTs)
  - Veterinary Medical Assistance Teams (VMATs)
  - Commissioned Corp Readiness Force (CCRF)

- Centers for Disease Control and Prevention (CDC)
  - Strategic National Stockpile (SNS)
  - Specialized laboratory capabilities
  - Rapid response epidemiology teams
  - Agency for Toxic Substances and Disease Registry (ATSDR)

- Department of Defense (DoD):
  - United Stated Army Medical Research Institute of Infectious Diseases (USAMRIID)
  - DoD Reserve Medical Units

- Department of Energy (DoE):
  - Radiation Emergency Assistance Center/Training Site (REAC/TS)

- Veterans Administration (VA)
  - Personnel and resources

- Federal Emergency Management Agency (FEMA)
- Environmental Protection Agency (EPA)
  - Hazardous materials experts

**Figure 9-15**

All outside resources should be provided with specific instructions at the time they at the time they are committed to the response. For example, responding resources should be provided with information on where to report (mobilization center/staging), whom to report to (designated by management position), and what to bring (self/unit support, operational support, qualifications documents).

- Management of the Federal and other “outside” resources should occur within or under a jurisdiction’s functional oversight authority, unless specifically arranged otherwise (such as FBI operations). Once assigned to a specific task, “outside” resources are no longer a primary
MaHIM Logistics Section oversight; they become an element of the MaHIM section in which they are assigned.

Security Processes: Security is a vital area of focus at all levels of MaHIM System response and throughout all phases. Adequate attention to security requirements promotes safety for responders and patients and allows for optimal response efforts.

Facility security by healthcare providers must be particularly addressed. A hazard vulnerability analysis conducted by each healthcare organization should define security concerns that can be improved through mitigation and preparedness. Procedures should be also be established to address the risk that healthcare facilities create by their on-site hazardous materials, including radiation sources and specimens of infectious agents.

Terrorism should be a particular concern for healthcare organizations. It must be recognized that healthcare facilities may be a primary or sequential target of terrorists. During any terrorism incident response, medical entities should consider themselves as probable targets for attack. Risk is also generated by the possibility of injured perpetrators being admitted to healthcare facilities along with victims. Security therefore has multiple elements for a healthcare organization and each must be addressed.

- **Perimeter management**: To maintain a secure and effective medical surge environment within a healthcare organization, access to the facilities must be carefully managed (see figure 9-12). The following issues should be addressed:
  - Crowd control (i.e., capabilities to deal with crowds seeking care or news of love ones).
  - Access privileges, with procedures for allowing entry and access only to appropriate personnel, patients, and concerned family members, with restricted access for others as indicated.
  - Media management: methodology for managing the media should be established. The maintenance of patient confidentiality and the prevention of interference with facility response are crucial.
  - Effective interface with law enforcement in augmenting security and in facilitating any investigation.
  - Perimeter and premises “sweep” for possible threats in a terrorism incident.

- **Personnel Security**: This must be addressed in multiple areas, including those away from the healthcare facility premises.
  - Transportation to and from facilities to prevent delays in staffing response resources. This includes expedited passage through security lines, assuring safe passage through insecure areas, etc.
  - Assuring that perpetrators arriving as patients cause no harm to healthcare staff. Security personnel should be available to screen “victims” and identify perpetrators presenting as patients.

- **Patient security**: Procedures should be established to protect patients from perpetrators, the media, and exposure to hazards brought by other patients (chemicals, radioactive debris, infectious disease, etc.).

- **Medication, supplies and equipment security**: Procedures should be established to protect supplies from tampering and from diversion during periods of short supply.

- **Technology and information security**: Procedures are required to ensure security of information and access to information systems. Patient confidentiality as well as institutional proprietary considerations must be taken into account.
Project Findings and Conclusions

The MaHIM System project became a process of intensive study and focus upon systems development for health and medical response. This effort led the investigators to multiple findings and conclusions.

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

• Medical and Health emergency management, as well as incident management, is most effective if the same principles and concepts used in Comprehensive Emergency Management are applied. Effective development of healthcare response capacity, capability and system resiliency 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 should continue their restructuring such that they promote this community-based approach to enhance preparedness. This equates to providing functional guidance (models) that assist’s the locals themselves in defining management and response capability.

• Response systems must be defined and developed before any meaningful training to an operational level of proficiency can occur (i.e., operational training can only be effective if the participants are using a defined response system). Otherwise, training proficiency can be considered “awareness level” only.

• Effective medical surge capacity and capability must be structured stressing maximum efficiency of individual response elements, 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 mass casualty and mass effect incidents.

The MaHIM System promotes this approach, emphasizing the importance of supporting healthcare response elements with resources and information. 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 researching and developing the MaHIM System, it was noted that effective analogies can be drawn from the experience in the non-medical response communities. Though consideration must be given to the specific parameters involved in 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-incident 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 interfere with the processes necessary for adequate compensation. Financial incentives for medical resources should be the same as those for other public safety disciplines: contractual payment in exchange for
developing and maintaining a defined response capacity.

Fortunately, since the publication of the first MaHIM System in 2002, Federal funding has been provided to healthcare organizations to prepare. The Hospital Preparedness Program and Urban Area Security Initiative are two programs that have provided preparedness funding.

Efforts should continue to establish systems and processes, preferably using public safety processes, to address financial remuneration for both healthcare preparedness and response activities.

- For mass casualty preparedness to be most effective, measurable requirements must be developed so that program evaluation metrics can be established. The healthcare resources can then be contractually obligated to develop and maintain the capacities described in this report.

- Regular “exercises” 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 preparedness phase of comprehensive emergency management.

These regional management coordination sessions during the system implementation and other preparedness activities should be conducted using response-style meetings and 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 incident.

- When adapting this MaHIM System 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 resource may be tasked with multiple sub-functions or functions.

- To be a truly effective tool, the MaHIM System model 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 System model. It was beyond the scope of this project to provide the educational, training, and implementation guidelines that could assist local and State jurisdictions in establishing the MaHIM System in their locales.

The original MaHIM System model has been customized and implemented in multiple local and State level jurisdictions across the U.S. Formal study of these pilot implementations of the MaHIM System were outside the boundaries of this project. Informal feedback from those who used the MaHIM System has been positive, even though a fully completed implementation tool requires detailed position descriptions, operational checklists for those positions, and other details that were beyond the scope and time interval for this project.
Appendix A: References and Bibliography

The original references for the Medical and Health Incident Management System were retained in this reference list, although many of the web addresses are no longer valid.


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 (April 23, 2001). American College of Emergency Physicians, Dallas TX.


Association for Professionals in Infection Control and Epidemiology (APIC). Bioterrorism Readiness Plan, A Template for Health Care Facilities. Available at: http://www.apic.org/educ/readinow.html


California Emergency Medical Services Authority. Hospital Emergency Incident Command System (California EMS). Available at: http://www.emsa.ca.gov/Dms2/heics3.htm

California Governor’s Office of Emergency Services. SEMS-Standardized Emergency Management System. Available at: http://www.oes.ca.gov/


Centers for Disease Control and Prevention: Update: Outbreak of Hantavirus Infection – Southwestern


Eckstein M. The Medical Response to Modern Terrorism: Why the “Rules of Engagement” Have Changed.[editorial]


Eckstein M. The Medical Response to Modern Terrorism: Why the “Rules of Engagement” Have Changed.[editorial]


Fernandez LS, Byard D, Lin CC, Benson S, Barbera, JD. Frail Elderly as Disaster Victims: Emergency


ICDRM Emergency Management (EM) Glossary of Terms (December 3, 2007 version), accessed December 18, 2007 at www.gwu.edu/~icdrm

Inglesby T. Lessons from TOPOFF. Presented at: Second National Symposium on Medical and Public Health Response to Bioterrorism; November 28, 2000; Washington, DC.


Kolavic S et al. An Outbreak of Shigella Dysenteriae Type 2 Among Laboratory Workers Due to Intentional Food Contamination. JAMA Aug 1997;278(5):396-98.


MSCC 2007. Medical Surge Capacity and Capability: A Management System for Integrating Medical and Health Resources During Large-Scale Emergencies. By the CNA corporation (Barbera J, Macintyre A authors, Trabert E editor) for the Assistant Secretary for Preparedness and Response (ASPR), US Department of Health and Human Services (DHHS). 2007


OSHA Standards Interpretation and Compliance Letters 03/10/1999 - Emergency response training necessary for hospital physicians/nurses that may treat contaminated patients. Available at: http://www.osha-slc.gov/OshDoc/Interp_data/199990310.html


United States Coast Guard. U.S. Coast Guard Incident Management Handbook, COMDTPUB.


<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBRNE</td>
<td>chemical, biological, radiological, nuclear, and (high) explosive</td>
</tr>
<tr>
<td>COOP</td>
<td>Continuity of Operations Plans</td>
</tr>
<tr>
<td>DCHA</td>
<td>District of Columbia Hospital Association</td>
</tr>
<tr>
<td>DHHS</td>
<td>Department of Health and Human Services</td>
</tr>
<tr>
<td>DHS</td>
<td>Department of Homeland Security</td>
</tr>
<tr>
<td>DMORT</td>
<td>Disaster Mortician Teams (U.S. Public Health Service)</td>
</tr>
<tr>
<td>EMAC</td>
<td>Emergency Management Assistance Compact</td>
</tr>
<tr>
<td>EMS</td>
<td>emergency medical service</td>
</tr>
<tr>
<td>EMTALA</td>
<td>Emergency Medicine Treatment and Active Labor Act</td>
</tr>
<tr>
<td>EOC</td>
<td>emergency operations center</td>
</tr>
<tr>
<td>EOP</td>
<td>emergency operations plan</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>ESF</td>
<td>Emergency Support Function</td>
</tr>
<tr>
<td>FBI</td>
<td>Federal Bureau of Investigation</td>
</tr>
<tr>
<td>FEMA</td>
<td>Federal Emergency Management Agency</td>
</tr>
<tr>
<td>FRP</td>
<td>Federal Response Plan</td>
</tr>
<tr>
<td>GIS</td>
<td>geographic information system</td>
</tr>
<tr>
<td>HAZWOPER</td>
<td>Hazardous Waste Operations and Emergency Response Standard</td>
</tr>
<tr>
<td>HCFA</td>
<td>Healthcare Financing Administration</td>
</tr>
<tr>
<td>HEICS</td>
<td>Hospital Emergency Incident Command System</td>
</tr>
<tr>
<td>HICS</td>
<td>Hospital Incident Command System</td>
</tr>
<tr>
<td>HIPAA</td>
<td>Healthcare Insurance Portability and Accounting Act</td>
</tr>
<tr>
<td>HMARS</td>
<td>Hospital Mutual Aid Radio System</td>
</tr>
<tr>
<td>HMRU</td>
<td>Hazardous Materials Response Unit (FBI)</td>
</tr>
<tr>
<td>HSP</td>
<td>Health and Safety Plan</td>
</tr>
<tr>
<td>IAP</td>
<td>Incident Action Plan</td>
</tr>
<tr>
<td>ICDRM</td>
<td>Institute for Crisis, Disaster and Risk Management (George Washington University)</td>
</tr>
<tr>
<td>ICP</td>
<td>Incident Command Post ICS - Incident Command System</td>
</tr>
<tr>
<td>ICS</td>
<td>Incident Command System</td>
</tr>
<tr>
<td>JCAHO</td>
<td>Joint Commission on Accreditation of Healthcare Organizations</td>
</tr>
<tr>
<td>JIC</td>
<td>Joint Information Center</td>
</tr>
<tr>
<td>JOC</td>
<td>Joint Operations Center</td>
</tr>
<tr>
<td>LRN</td>
<td>Laboratory Response Network</td>
</tr>
<tr>
<td>MaHIM</td>
<td>Medical and Health Incident Management</td>
</tr>
<tr>
<td>MMRS</td>
<td>Metropolitan Medical Response System</td>
</tr>
<tr>
<td>NDMS</td>
<td>National Disaster Medical System</td>
</tr>
<tr>
<td>NTSB</td>
<td>National Transportation Safety Board</td>
</tr>
</tbody>
</table>
OSHA - Occupational Safety and Health Administration

PPE - personal protective equipment

PSAT - Patient Surveillance and Tracking

RMB - regional management briefing

SEMS - Standardized Emergency Management System

SNS – Strategic National Stockpile

SWAT - Special Weapons and Tactics

UC – unified command

US&R - urban search and rescue

WMD-CS - Weapons of Mass Destruction – Civil Support (National Guard)

WTC - World Trade Center