INTERIM PLANNING GUIDANCE FOR

Preparedness and Response to a Mass Casualty Event Resulting from Terrorist Use of Explosives

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Interim Planning Guidance for Preparedness and Response to a Mass Casualty Event Resulting from Terrorist Use of Explosives

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TABLE OF CONTENTS

Executive Summary **2**

CHAPTER ONE: Introduction **4**
Purpose 4
Primary Objectives 4
Background and Structure 5
Nature of Explosions 6
Nature of Injuries 6
Terrorism Explosions and Health Care Facilities 7
Expected Health Systems Challenges 7
- Leadership 7
- Prehospital care 8
- Patient transport and distribution 8
- Hospital care 8
- Community and media relations 8

CHAPTER TWO: Principles for Health Systems' Preparedness in Emergencies **9**
Provide Meta-Leadership 9
Decide Who is in Charge 10
Be Proactive and Expect the Unexpected 11
Learn From Others 11
Exercise Mass Casualty Event Response Plans 11
Involve the Public 11
Work Effectively with the Media 12
Develop Connected Emergency Plans 12
Communicate During a Mass Casualty Event 12
Be Prepared for Legal and Ethical Issues 13
Alter Standards of Care 13
Develop Resilient Medical Surge 13

CHAPTER THREE: Prehospital Care **14**
Introduction 14
Basic Principles for Prehospital Care During a Terrorist Use of Explosives-Mass Casualty Event 14
- Maximize availability of emergency medical services personnel and resources 14
- Assess the situation and care required 15
- Protect on-scene personnel 15
- Stage and triage patients 16
- Provide appropriate transportation and distribution of patients 16
- Manage fatalities 16

CHAPTER FOUR: Patient Distribution **17**
Introduction 17
Levels of Patient Distribution 17
Effective and Controlled Distribution 18

CHAPTER FIVE: Surge Capacities and Capabilities for Hospitals **19**
Introduction 19
Common Challenges for Hospitals in Terrorist Bombing Aftermath 19
Predicting patient inflow 19
Delays in declaring a mass casualty event 20
Time constraints 20
Limited health care workforce 20
Poor triage
Management of Patient Surge: Overview 21
Planning 21
Surge capacity and capability map 21
Exercises and drills 22
Redundant systems 22
Triage and level of care 22
Hospital Incident Command System 24
Mass casualty event sites 24
Security 25
Recovery: Ending the emergency status 25
Management of Patient Surge: Resources 25
Staff capacity 25
Medical supplies 26
Blood bank 26
Management of Patient Surge: Mass Casualty Events 26
Receiving casualties 26
Space capacity 26
Victim tracking 27
Hospital decompression 27
Patient identification 28
Public Information 28

Conclusion **29**

References **30**

Acknowledgements **31**

Executive Summary

Explosive devices are the most common weapons used by terrorists. The damage inflicted in recent events in India, Pakistan, Spain, Israel, and the United Kingdom demonstrates the impact of detonating explosives in densely populated civilian areas. Explosions can produce instantaneous havoc, resulting in numerous patients with complex, technically challenging injuries not commonly seen after natural disasters. Because many patients self-evacuate after a terrorist attack, prehospital care may be difficult to coordinate and hospitals near the scene can expect to receive a large influx, or surge, of patients after a terrorist strike.

The threat of terrorism exists at a time when hospitals in the United States are already struggling to care for patients who present during routine operations each day. Hospitals and emergency health care systems are stressed and face enormous challenges. With the occurrence of a mass casualty event (MCE), health systems would be expected to confront these issues in organization and leadership, personnel, infrastructure and capacity, communication, triage and transportation, logistics, and legal and ethical challenges.

The purpose of this interim guidance is to provide information and insight to assist public policy and health system leaders in preparing for and responding to an MCE caused by terrorist use of explosives (TUE). This document provides practical information to promote comprehensive mass casualty care in the event of a TUE event and focuses on two areas:

1. leadership in preparing for and responding to a TUE event, and

2. effective care of patients in the prehospital and hospital environments during a TUE event.

This guidance recognizes the critical role that strategic leadership can have on the success or failure of preparing for and responding to a terrorist bombing. It outlines important leadership strategies for successfully preparing for and managing a TUE mass casualty event, including the concept of meta-leadership. Effective meta-leaders employ influence over authority and activate change above and beyond established lines of their decision-making and control. They are driven by a purpose broader than that prescribed by their formal roles. Therefore, they are motivated and act in ways that transcend usual organizational confines, enabling them to successfully confront challenges and barriers in communication, organization and response, standards of care, and surge capacity.

The successful medical response to an MCE depends on effectively coordinating three critical areas of patient care: 1) prehospital care, 2) casualty distribution, and 3) hospital care. Critical steps must be taken throughout the response to ensure rapid and efficient patient triage, effective and appropriate distribution of patients to available hospitals and health care facilities, and proper management of the surge of patients at receiving hospitals.

CHAPTER ONE

Introduction

Purpose

The purpose of this interim planning guidance is to provide valuable information and insight to help public policy and health system leaders at all levels prepare for and respond to a mass casualty event (MCE) caused by terrorist use of explosives (TUE). Medical preparations for an MCE have traditionally focused on the scene and prehospital sectors. Comprehensive mass casualty care, from a health systems perspective, has received far less attention and has evolved separately from the rest of the emergency response community. This document provides practical information to promote comprehensive mass casualty care in the event of a TUE. It is not intended to reflect U.S. Department of Health and Human Services (DHHS) policy but, rather, to provide public policy and health systems leaders with options to consider when planning their response to an MCE. This document is a collaboration between the Centers for Disease Control and Prevention (CDC) and the National Preparedness Leadership Initiative of Harvard University. CDC provides additional specific mass casualty and blast-injury related material that complements this document. These materials include "Blast Injuries: Fact Sheets for Professionals,[1]" "In a Moment's Notice: Surge Capacity for Terrorist Bombings: Challenges and Proposed Solutions,[2]" and the "Bombings: Injury Patterns and Care"[3] course.

Primary Objectives

The ultimate aims of this guidance document are to:

1. improve decision making during TUE-MCE events, strengthen system and clinical responses, and reduce morbidity and mortality;
2. identify leadership strategies that improve preparedness for and response to TUE-MCE events;
3. promote connectivity, coordination, integration, and consistency between the medical response community and emergency management;
4. encourage health system resilience and maximize the ability to provide adequate medical services during an MCE;
5. enhance the quality of existing MCE preparedness and response programs used by medical response entities; and
6. provide a resource tool that could be applied during exercises and lower intensity emergency events.

Background and Structure

Terrorists worldwide have repeatedly shown their willingness and ability to use explosives to inflict significant death, destruction, and fear. A sudden and unpredictable bombing-related MCE requires an immediate response; disrupts communication systems; interrupts transportation of casualties, medical personnel, and supplies; and may overwhelm the capacity of responding agencies.

Even though explosives are the primary weapons used by terrorists, the U.S. health care system has minimal experience in treating patients with explosion-related injuries. Detonating devices in crowded public places results in complex, technically challenging injuries not commonly seen after natural disasters. Deficiencies in response capability could result in increased morbidity and mortality as well as stress and fear in the community.

Because of the injuries sustained by large numbers of people, explosions produce unique management challenges for health providers, beginning with an immediate surge of patients into surrounding health care facilities. The potential for large numbers of patients arriving within a few hours may stress and limit the ability of emergency medical services (EMS) systems, hospitals, and other health care facilities to care for critically injured victims.[4–6]

The ongoing and increasing threat of terrorist activities, combined with documented evidence of decreasing emergency care capacity within the U.S. health care system,[7–14] requires proactively preparing for these situations. Health care and public health systems, individual hospitals, and health care personnel must collaborate to ensure that strategies are in place to address these key challenges:

- receive, evaluate, and treat large numbers of injured patients,
- rapidly identify and stabilize the most critically injured,
- evaluate response efforts, and
- conduct exercises and strategic planning for future events.

This document focuses on the main issues and challenges in medical preparedness and response across the three care settings related to an MCE:

1. field care and patient triage,
2. transportation and distribution, and
3. hospital-based acute care.

The guidance is organized by using terminology and concepts of the U.S. Department of Homeland Security's National Planning Scenario #1 (explosives attack) and National Response Framework and DHHS' "Medical Surge Capacity and Capability Handbook." This document is based on international experience for preparedness and response to mass casualty terrorism events.

Nature of Explosions

An explosion is caused by the sudden chemical conversion of a solid or liquid into a gas with resultant energy release. Explosive devices are categorized as either high-order explosives (HE, such as C4 and TNT) or low-order explosives (LE, such as pipe bombs, gunpowder, and Molotov cocktails). HE detonation involves supersonic, instantaneous transformation of the solid or liquid into a gas occupying the same physical space under extremely high pressure. These high-pressure gases rapidly expand outward in all directions from their point of formation as an overpressure blast wave. The extent and pattern of injuries produced by an explosion are determined by several factors:

- amount and composition of the explosive material,
- delivery method,
- distance between the victim and the blast,
- setting (open vs. closed space, structural collapse, intervening barriers), and
- other accompanying environmental hazards.

Nature of Injuries

Blast injuries are categorized as primary, secondary, tertiary, or quaternary. Primary blast injuries result from HE detonations and the impact of the blast wave on the victim's body. Damage occurs primarily in gas-containing organ systems (e.g., lungs, ears, gastrointestinal tract) at the air-fluid interface. Also, increasing evidence shows primary blast injury to the brain. Secondary blast injuries result from penetrating and blunt trauma caused by fragments and flying objects striking the victim. Tertiary blast injuries include blunt and penetrating trauma caused by displacement of the victim (e.g., being thrown against a wall). Quaternary (formerly miscellaneous) blast injuries are other injuries resulting from detonation of an explosive device and exacerbation of chronic diseases resulting from the blast. These injuries include burns caused by the thermal effect of the explosion or consequent fires, crush injuries caused by structural collapse, and toxic inhalations from a component of the explosive device or the resultant spillage of hazardous materials.

The location of an HE detonation affects the types of injuries encountered. Explosions in confined spaces (e.g., bus, subway, building) cause the blast wave to be reflected by the containing surfaces, resulting in increasing wave pressures affecting casualties. This phenomenon places victims of

enclosed-space detonations at increased risk for primary blast injuries. For more information on diagnosing, treating, and managing blast injuries, visit ***http://emergency.cdc.gov/masscasualties/blastinjuryfacts.asp***.

Terrorism Explosions and Health Care Facilities

The chaos generated at the scene of a TUE-MCE is subsequently shifted throughout all phases of the system response. This chaos often leads to disruption of communication systems and interruption of transporting patients, medical personnel, and supplies and can overwhelm the capacities of responding agencies. With prior planning and practice, receiving facilities can minimize the disarray and confusion associated with receiving large numbers of patients in a short period of time. Planning for the bombing aftermath requires new thinking in several areas, including leadership, prehospital and hospital surge capacities and capabilities, distribution of patients, crowd control, and media relations.

During an MCE, health care systems will be confronted with increased demands and decreased availability of resources. Regional health care systems best understand their own needs and resources and must, therefore, develop specific disaster medical surge capacity and capability plans.

The medical response to an MCE consists of two distinct but interrelated spheres of emergency medical management and care: 1) the explosion scene and 2) the receiving hospitals. These spheres should be linked by a process of EMS effectively distributing patients.

Expected Health Systems Challenges

Emergency departments (EDs) routinely operate above capacity, with prehospital personnel occasionally forced to wait for extended periods before transferring patient care to hospital staff. Patients are frequently evaluated and treated in ED hallways, where they may remain for hours or days awaiting a hospital bed. The 113.9 million visits to EDs in the United States in 2003 represented a 26% increase from 1993. During this same period, the number of EDs decreased by 14%[8] and hospitals eliminated more than 10,000 staffed inpatient medical surgical beds and 7,800 intensive care unit beds.[9] In addition, although about 75% of U.S. hospitals' disaster plans address explosives, only about 20% of hospitals have conducted at least one drill or exercise involving use of explosives.[15] The overburdened health system will be further strained by a rapid patient surge associated with a TUE-MCE.

Key Health System Challenges

1. Leadership
2. Prehospital care
3. Patient transport and distribution
4. Hospital care
5. Community and media relations

Leadership

Effective preparedness and response demand an established, functional leadership structure with clear organizational responsibilities. In many instances, particularly at a local operational level, such preparation has not occurred. Confusion over roles and responsibilities may occur and increases the potential for redundant efforts or gaps in decision-making and response.

Responding to terrorist bombings requires meta-leadership. Meta-leaders are vital in preparing for and responding to bombings, and their roles extend far beyond hospitals and emergency services. Detailed information about meta-leadership and planning needs in this area is provided in Chapter 2.

Prehospital care

Prehospital care of bombing victims may strain emergency personnel. Key factors to include in planning, which are covered in Chapter 3, are minimizing dispatch times for first responder arrival at the scene; rapidly assessing the situation and appropriate care needed; protecting on-scene personnel, including awareness of potential secondary explosive devices; preventing further injuries through prompt removal of victims; and implementing patient triage, initiating lifesaving interventions, and appropriately transporting and distributing patients.

Patient transport and distribution

Many planning scenarios adequately address prehospital and hospital clinical care, but few consider the potential problems of casualty distribution. As in any emergency, distribution involves matching the medical needs of victims to available transportation and medical facilities. Because of the unusual nature of injuries found in bombing casualties and the large numbers of simultaneously injured persons, a coordinated plan for distributing casualties must be a key component of preparedness plans. Factors to consider when developing plans for patient distribution are discussed in Chapter 4.

Hospital care

In responding to a terrorist bombing, hospitals must prepare to address large numbers of patients in a short period of time. Such preparedness will affect not only emergency and trauma services but also other medical, paramedical, administrative, logistical, and security functions. Decisions and policies developed in advance of a bombing should reflect state and local regulations and guidance. A full exploration of the many aspects of hospital care relevant in a bombing aftermath is contained in Chapter 5.

Community and media relations

The community targeted by a bombing suffers the most extensive physical and psychological effects and should be part of preparedness planning. Involving community organizations, religious institutions, and local businesses in planning and response efforts can help to calm fears and prepare people should a bombing occur. Another critical partner in this education effort is the local media. Guidance for communication and information sharing is included throughout this document.

CHAPTER TWO

Principles for Health Systems' Preparedness in Emergencies

To prepare for a terrorist use of explosives-mass casualty event (MCE), health systems leaders must focus on 12 principles.

Provide Meta-Leadership

Managing a bombing crisis requires more than good leadership; it requires meta-leadership. The prefix meta has many meanings, including a more comprehensive form of a process (e.g., meta-analysis) and the designation of a new but related discipline. Both of these meanings are relevant, as meta-leadership is a new kind of leadership for new kinds of challenges.

Meta-leadership is defined as overarching leadership that connects purposes and works of different organizations or organizational units.[16] In many organizations, individuals take on roles and responsibilities outside of their official position descriptions and use various abilities to augment the overall operation of the organization. This ability to assume additional responsibilities is typical of people who are capable of being meta-leaders. In addition, with training and practice, managers or other team members can become meta-leaders and assume formal roles for making necessary connections within their own organizations and across organizations.

Principles of Preparedness

1. Provide meta-leadership
2. Decide who is in charge
3. Be proactive and expect the unexpected
4. Learn from others
5. Exercise MCE response plans
6. Involve the public
7. Work effectively with the media
8. Develop connected emergency plans
9. Communicate during an MCE
10. Be prepared for legal and ethical issues
11. Alter standards of care
12. Develop resilient medical surge

Meta-leaders possess unique mindsets and skills, often going beyond the scope of their experiences. They are also able to build strong alliances with a diverse array of leaders before an event occurs.

The five dimensions of a meta-leader, which must be used with flexibility and adaptability, are

- **The Person of the Meta-Leader:** Meta-leaders lead themselves and others out of the "basement" to higher levels of thinking and functioning.
- **Situational Awareness:** A problem, change, or crisis compels the meta-leader to respond.
- **Leading the Silo:** The meta-leader triggers and models confidence, inspiring others to excellence.
- **Leading Up:** The meta-leader leads up the chain of command and guides political, business, and community leaders.
- **Leading Cross-System Connectivity:** Meta-leaders strategically and intentionally devise cross-silo linkages that leverage expertise, resources, and information.

Meta-leaders build and maintain relationships and establish clear channels of communication.

Effective meta-leaders initiate change outside of their previously established lines of decision-making and control. They are driven by a purpose broader than that prescribed by their formal roles and are motivated and capable of actions that transcend usual organizational confines. In this way, meta-leaders successfully confront challenges and barriers in communication, organizational response, standards of care, and surge capacity.

Meta-leaders build and maintain relationships and establish clear channels of communication. They encourage connectivity, which is built during preparedness and examined during crisis. This connectivity is important because each emergency response discipline brings unique and valuable expertise that contributes importantly to MCE readiness in the community. However, the multitudes of medical and nonmedical responders who have a critical piece of responsibility in saving lives typically have different plans, emergency terminology, standards, operational methods, and classifications. Many do not have a good understanding of one another's roles and responsibilities in an MCE. Vertical and horizontal integration of existing medical resources in a timely and efficient manner is a major tool for saving lives during an MCE.

Decide Who is in Charge

Clarifying the response process for leadership, the chain of command, responsibilities, and coordination is critical—especially during a crisis. The MCE response should be led and coordinated by two main levels of operation centers: 1) the unified crisis command center for the local area, which brings together all relevant responding agencies; and 2) the medical command and control center, which coordinates all medical aspects of the MCE. These operation centers can exchange information, develop a common picture of the event and available resources, direct capabilities and resources, coordinate the flow of casualties, maintain mutual communication and understanding, and lead the public messages.

Be Proactive and Expect the Unexpected

Preparedness must be undertaken ahead of time. Crisis situations are bad times for planning. No matter how carefully developed a response plan, unexpected events are likely to occur. Recognizing the likelihood of unexpected events will allow for appropriate preparation during the response effort. Crisis leaders should expect that planning will be imperfect and learn to expect the unexpected.

Learn From Others

Many useful lessons can be learned and adapted from real health system responses to civilian terrorist bombings in the United States and abroad (e.g., Israel, the United Kingdom, Spain, India, Pakistan, Turkey). The body of literature in disaster medical preparedness is growing, much of it related to the response to terrorist bombings. A review of this literature, interviews with individuals involved, and site visits to locations of previous bombing incidents provide many useful lessons that can be adapted for bombing terrorism preparedness and response in the United States. This effort can provide information on both clinical care and systems issues and highlight effective strategies, bottlenecks, challenges, and lessons learned.

Exercise Mass Casualty Event Response Plans

Simply drafting preparedness plans can give a false impression of being prepared. Instead of relying on paper preparedness, mounting an effective response following a bombing requires regularly exercising the plan and building organizational and individual resilience. Drills and tabletop exercises are major tools for improving interfaces and connectivity by allowing potential event response personnel to put disaster preparedness into practice.

All health system providers must understand, practice, and implement specialty-appropriate preparedness. Exercises should include the types of patients expected, simulating both actual patients and the worried well, and involve all emergency response stakeholders from public, private, community, and governmental agencies.

Involve the Public

Community residents are often the first preventers of and responders to an MCE. They should be integrated into bombing terrorism preparedness and response. Planning a medical response to an MCE must be comprehensive and community based, and clear communication with the public is essential before, during, and after an MCE. Appropriate education and training efforts should include the public.

Work Effectively With the Media

A strategy for clear, reliable, and contiguous messages should be established to inform the public continuously about the progress of the event. Effective pre-event planning and coordination, including all authoritative agencies articulating a clear and consistent message, is critical. Leaders have a great deal of influence over the expectations, understanding, and responses of both individuals and communities to an MCE. The management of the acute situation sets the tone for the community's response. The accurate description of ongoing efforts and successful forecasting of predictable events will enhance the credibility of authorities and diminish negative outcomes. Informing the public in a timely manner can decrease the flow of worried well patients and lessen demands on the health care system. This communication planning should be a joint effort of key stakeholders.

Informing the public in a timely manner can decrease the flow of worried well patients and lessen demands on the health care system.

Develop Connected Emergency Plans

Preparedness and response plans should build upon each other and be based on existing federal and state plans using standard protocols, processes, tools, and terminology.

Communicate During a Mass Casualty Event

Maintaining continuous communications among all emergency participants is crucial during a response. Emergency responders must be able to communicate effectively with one another in real time, using a common terminology and resilient communication networks. Timely and accurate data gathering and analysis must be coupled with effective and rapid dissemination of such information to responders.

- **Internal Communications:** Hospitals should have sufficient communication modalities so that failure of one mode does not cripple all communications. Important telephone numbers and staff contact information must be readily available and regularly updated.
- **External Communications:** Effective external communication during a bombing response is essential. Telephone (cellular and landlines) should be the main mode of communication; radio communication, e-mail, and text messaging may be effective backups. Phone numbers should be checked and updated regularly.

Be Prepared for Legal and Ethical Issues

Preparedness should include consideration of all potential legal and ethical problems that could be related to mass casualty response. Ethical considerations should be explicit during preparedness so that critical decisions made during crises can be based on the spirit of the ethical judgments that guided the planning process.

The rationale for modifying standards of care in an emergency is that more patients will survive a terrorist attack.

Alter Standards of Care

The system should be refocused during crisis response to accomplish the greatest good for the community (i.e., save the most victims). The rationale for modifying standards of care in an emergency is that more patients will survive a terrorist attack if key lifesaving interventions are provided to the greatest number of casualties likely to benefit from care. Hospitals and emergency medical services systems above surge capacity will require autonomy to alter regular standards of care and shift to emergency critical care practices. However, no universally accepted methodology for this adjustment exists, and the process is associated with potential ethical, societal, medical, and legal issues.

A protocol is needed to determine when and how to deviate from the norm without repercussions for the health care provider or facility. An altered protocol would improve the management of assessment, treatment, flow, and outcomes for the greatest number of patients. Changing standards of care will require a formal process in each community to determine when and how to transition from standard operating procedures to an altered standard of care. In August 2004, the Agency for Healthcare Research and Quality at the U.S. Department of Health and Human Services convened a panel of experts to examine the complex issues surrounding alterations in clinical care. The panel's findings are published in the monograph Altered Standards of Care in Mass Casualty Events.[17]

Develop Resilient Medical Surge

Medical surge is the ability of the health care system to expand capacities and capabilities beyond normal services quickly to meet an increased demand for medical care. Medical surge has two components:

1. **Medical Surge Capacity:** the ability to respond to a markedly increased number or volume of patients; and
2. **Medical Surge Capability:** the ability to manage patients requiring unusual or very specialized medical evaluation and care (e.g., pediatric care, neurosurgery, chest surgery, angiography, and magnetic resonance imaging [MRI]).

CHAPTER THREE

Prehospital Care

Introduction

During a mass casualty event (MCE), the emergency medical services (EMS) systems are responsible for first responder rescue, casualty collection, triage, initial treatment, and transportation to the appropriate medical facilities. In the United States, EMS is provided through a complex system of multiple and variable organizational structures. No single oversight agency is responsible for ensuring consistency and integration in preparing for and responding to a crisis.

Basic Principles for Prehospital Care During a Terrorist Use of Explosives-Mass Casualty Event

- Maximize availability of emergency medical services personnel and resources
- Assess the situation and care required
- Protect on-scene personnel
- Stage and triage patients
- Provide appropriate transportation and distribution of patients
- Manage fatalities

Basic Principles for Prehospital Care During a Terrorist Use of Explosives-mass Casualty Event

Planning for prehospital surge capacities and capabilities should include the following components.

Maximize availability of emergency medical services personnel and resources

- Modify and extend shifts, bring personnel from home, and recruit medical and nonmedical volunteers as appropriate.
- Prepare for excessive strain on EMS answering points and dispatch.
- Concentrate on preserving the communication system among EMS, other emergency responders, and hospitals and design contingencies for alternative communication.

- Institute call-screening strategies to determine the level of urgency required to address calls, including preset recommendations for various call scenarios from the anxious public, survivors, families of missing persons, and potential volunteers.
- Maximize the efficiency of available vehicles, coordinate all ambulance services, bring ambulances to full capacity, deploy alternative vehicles, and consider air transportation for primary distribution (from the field to the hospital) and for secondary distribution (relocation from one hospital to another).

Assess the situation and care required

- Observe the nature and characteristics of the explosion to anticipate likely complex presentations, including penetrating, blunt, and thermal injuries. Consider where the explosion occurred, whether it was in an open space or confined area, how many explosions occurred, and where victims were in relation to the blast. These and other bomb-related factors could influence the patterns of injuries and the methods of response.
- Manage terrorist use of explosives (TUE) EMS information to maintain maximum capability while minimizing confusion. Report the situation status early in the response and include such information as a description of the incident, on-scene hazards and challenges, casualty estimates, access routes and availability, resource status, and anticipated needs.
- Institute an EMS on-scene staging process for effective use of arriving resources by scene managers. As assets arrive on the scene, register and deploy them immediately to the on-scene manager. Ensure that willingness to assist does not complicate operations or compromise safety.

Protect on-scene personnel

- Recognize that first responders may represent a number of disciplines in addition to EMS, including bomb squads, firefighters, search and rescue, hazardous materials responders, media, volunteers, and law enforcement providing scene security, investigation, and traffic control.
- Before searching for casualties, receive permission from the incident commander to ensure that the area is safe for first responders to enter and that the threat of secondary device detonation has been evaluated.
- Protect EMS personnel and other first responders from exposure to environmental and infectious pathogens.

Stage and triage patients

- Remove victims from direct hazard impact areas and stage them into the EMS system for triage and distribution to definitive care.
- Establish patient holding areas to prepare for formal triage and treatment protocols. Depending on the situation, patients may move through the defined holding areas or go directly into rapid triage and distribution to hospitals.
- Shift health care priorities to those critically injured patients who are most likely to survive.
- Focus treatment of casualties in the field on basic medical care primarily directed toward stabilizing life-threatening medical conditions.

Provide appropriate transportation and distribution of patients

- Provide adequate transportation and be prepared to balance distribution to appropriate medical facilities.
- Do not assume that casualties will be distributed to appropriate facilities. Chapter 4 discusses factors to consider in planning for most effectively distributing casualties after a TUE.

Manage fatalities

- Prior to a bombing event, address such issues as cataloging of bodies; availability of body bags and refrigerator trucks; and return of bodies, human remains, and personal belongings to authorized persons.
- Following a TUE-MCE, avoid transporting bodies and remains from the scene to hospital treatment areas.
- Pay attention to and be respectful of varying religious beliefs when handling bodies and remains.
- Consider designating alternate sites outside of hospitals for managing and storing human remains.
- If possible, document the identity of the dead, human remains, and associated personal belongings. As soon as possible after the crisis, begin to identify human remains using scientific means (e.g., dental records, pathology, anthropology, fingerprints, DNA samples).

Dealing with fatalities can have profound and long-lasting consequences for survivors. It is one of the most difficult features of crisis management. Coordination and planning with local community and law enforcement agencies, which typically handle identification and disposal of human remains, are important aspects of managing an MCE.

CHAPTER FOUR

Patient Distribution

Introduction

The successful medical response to a mass casualty event (MCE) depends on effectively coordinating three areas: 1) prehospital care, 2) patient distribution, and 3) hospital care. Although the prehospital and hospital areas are reasonably well established, patient distribution is often neglected—particularly in countries with limited experience with terrorist bombings. Patient distribution relies on appropriately matching patient needs with transportation assets and availability and capabilities of medical facilities. Appropriate patient distribution is necessary to prevent movement of chaos from the field to hospitals.

Levels of Patient Distribution

- Primary distribution
  - Controlled primary distribution
  - Semi-controlled primary distribution
  - Spontaneous primary distribution
- Secondary distribution

Levels of Patient Distribution

The two levels of patient distribution are *primary* and *secondary*.

Primary distribution refers to moving patients from the scene to the hospital. The three methods currently in use for primary distribution, ranked from most to least desirable, are

- **Controlled Primary Distribution:** This method, controlled by the medical command and control center (MCCC), is the best method for primary distribution of casualties. The MCCC should use an information system that provides ongoing updates of hospital capacities and capabilities and helps emergency medical services (EMS) determine the optimal destination for each casualty.
- **Semi-Controlled Primary Distribution:** In the absence of a functioning MCCC, this method can promote equitable distribution of casualties. Rather than trying to match the specialized needs of each victim to the appropriate hospital, the event commander distributes equal numbers of casualties to each regional hospital on a rotating basis.
- **Spontaneous Primary Distribution:** Although the least desirable, this distribution method is the most common. Ambulances and other vehicles transport victims to the closest hospital, with no connectivity, control, or coordination.

Secondary distribution refers to moving patients from the first receiving hospital to a second medical facility to receive either a higher or more specialized level of care or less specialized care. By practicing this secondary distribution, casualties can be redistributed from overloaded hospitals and care sites to less affected ones. All hospitals must develop formal and practical relationships with designated trauma and specialty centers to ensure that, when necessary, casualties will have access to appropriate levels of care.

Effective and Controlled Distribution

Controlled distribution of casualties during the response to a terrorist bombing is critical for matching needs to resources and minimizing hospital overload.

- In matching patients to hospitals, take patient needs and hospital capabilities into account. The vast majority of survivors of a bombing event will have minor injuries and will likely be discharged after evaluation and treatment in an emergency department.
- Centralize coordination of patient transport and distribution to minimize hospital overloading and maximize use of all available medical facilities including hospitals and clinics.

All hospitals must develop formal and practical relationships with designated trauma and specialty centers to ensure that, when necessary, casualties will have access to appropriate levels of care.

CHAPTER FIVE

Surge Capacities and Capabilities for Hospitals

Introduction

The major challenges that hospitals will face in a mass casualty event (MCE) include surge capacity and capability issues in emergency and trauma services, as well as medical, paramedical, administrative, logistical, and security challenges. Difficult decisions will have to be made regarding the allocation of available resources. These decisions should reflect state and local regulations and be developed before an MCE.

Common Challenges for Hospitals in Terrorist Bombing Aftermath

Terrorist use of explosives (TUE) often creates four distinct types of mass events: 1) mass casualty events, 2) mass fatality events, 3) mass anxiety events, and 4) mass onlooker events (e.g., families, media, curiosity seekers, volunteers, politicians, public officials). Hospital emergency leaders should consider these events and be prepared for their simultaneous occurrence.

Predicting patient inflow

Within a few hours of a bombing event, most acutely injured patients are likely to have arrived at the closest medical facilities. A number of patients may be affected by factors such as transportation difficulties and delays, security issues at the event site, multiple explosions, and secondary effects of the bombing (e.g., building collapse). Stress and anxiety caused by time urgency and large numbers of victims contribute to overtriage and failure to alter the balance between quantity of patients and standard of care.

Common Challenges for Hospitals

- Predicting patient inflow
- Delays in declaring a mass casualty event
- Time constraints
- Limited health care workforce
- Poor triage

Hospitals should formulate contingency plans to deal with the initial surge of walking wounded patients. Less severely injured patients, including the walking wounded and worried well, often self-transport from the scene to the nearest hospital immediately after the event. These patients may

- not have been triaged by emergency medical services (EMS),
- arrive at the hospital before the more severely injured and may continue to arrive for several hours, and
- overwhelm the receiving hospital and delay treatment of more critically injured patients.

Delays in declaring a mass casualty event

The three common delays in declaring an MCE that may complicate hospital surge capacity are

- **Late Incident Recognition:** Incident recognition is the point in time at which hospital leadership becomes aware that a significant event is evolving. Limited or ineffective situational awareness is the main factor preventing adequate response.
- **Delayed Notification and Activation:** Delays in delivering lifesaving interventions and definitive care are caused by taking a reactive approach (partial, gradual, and linear activation of emergency systems). A proactive approach, which involves full and simultaneous activation of all emergency systems followed by gradual withdrawal based on gathered information, helps avoid delay.
- **Linear Mobilization of Resources:** Linear transition (a form of reactive approach) from normal operations to appropriate response level causes delays. The transition should be proactive, simultaneous, and nonlinear in scale and scope. Extensive discussion and planning support linear activation and should be reserved until after the response.

Time constraints

The response to a TUE-MCE requires rapid intervention and should be based primarily at the local level. Local emergency operation plans that are routinely exercised and integrated into regular operations will function effectively.

Limited health care workforce

Health care workers may not report during an emergency, either because they cannot reach the facility or are concerned for their safety or that of family members. To minimize staffing shortages, planning must include provisions for the security of health care workers and their families. Not adequately addressing their concerns may lower the motivation for personnel to report to work.

Poor triage

Commonly, the triage process will not function as expected because of stress that contributes to overtriage and failure to alter the balance between quantity of patients and quality of care.

Management of Patient Surge: Overview

Components of Patient Surge Management

- Planning
- Surge capacity and capability map
- Exercises and drills
- Redundant systems
- Triage and level of care
- Hospital Incident Command System
- Mass casualty event sites
- Security
- Recovery: Ending the emergency status

Planning

Every hospital should have a collaborated and coordinated crisis plan. Plans, protocols, checklists, and signs facilitate hospital management and minimize chaos during emergencies. Managing by standardized procedures reduces confusion among individuals under severe stress. In a disaster, people have difficulty making good decisions, which is the rationale for implementing and using prepared crisis protocols. Too often, leaders are told to think outside the box during a massive crisis. However, in an MCE, hospital personnel must first go into the box, be fully aware of the protocols, and implement them immediately. Only after working inside the box is there space for going out of the box to close gaps, adapt responses, and innovate if and as necessary.

Protocols should be simple, short, realistic, workable, and practical. They should cover interaction with other key agencies; be evaluated continuously (threats, lessons learned, experiences); enable functioning as an integrated and unified system during emergency; be easily compiled into binders, color-coded by type of incident; be located in an easily accessible place; and be revised as soon as new information compels a change in the plan and on predetermined revision dates.

Surge capacity and capability map

Hospitals should develop a planning framework (surge capacity and capability map) that presents all available and relevant internal and external resources. This framework should be transparent, updated, and shared with key disaster response participants, both during preparedness and response. The surge CC map should describe potential resources and the appropriate contact information. The resource assessment of any health care facility should be part of the internal disaster plan. Before an MCE, the responsiveness and depth of each health care facility in a given region should be established clearly and be part of the surge CC map.

Exercises and drills

Prior to a TUE-MCE, mandatory regular exercises with executive officers, meta-leaders, community representatives, and all relevant agencies should be conducted. These drills should include annual, unannounced limited-scale exercises and the use of smart casualties (people posing as casualties). Four levels of drills are valuable:

1. focal (vertical) exercise for tasks specific to mass casualty events,
2. table-top (horizontal) exercises for senior personnel,
3. functional exercises for all personnel in charge, and
4. full-scale real-time drills with full participation of hospital staff.

Performance in drills and exercises should be methodically evaluated with input from other hospitals, health care systems, and response agencies. Identified concerns should be addressed prior to the next exercise.

Redundant systems

Failures of equipment, communication, and infrastructure may occur during an emergency. To minimize disruptions in surge management, redundant systems reserved for contingencies should be established. Hospitals should have contingency plans for electrical power backup, protection of communication and computer infrastructure, and evacuation and shelter procedures. In addition, hospital design should minimize potential hazards and improve work flow during an emergency.

Triage and level of care

To provide care for the greatest number of patients, physicians may need to alter standards of triage and individual-level care to maximize the number of lives saved and minimize the consequences of nonfatal injuries. A simple model of triage for victims classifies patients as either *walking* or *non-walking*. The *walking* do not typically require emergency medical treatment and include the worried well who are noninjured individuals exposed to the event. The *non-walking* are those patients who should receive immediate emergency treatment or are too injured to survive.

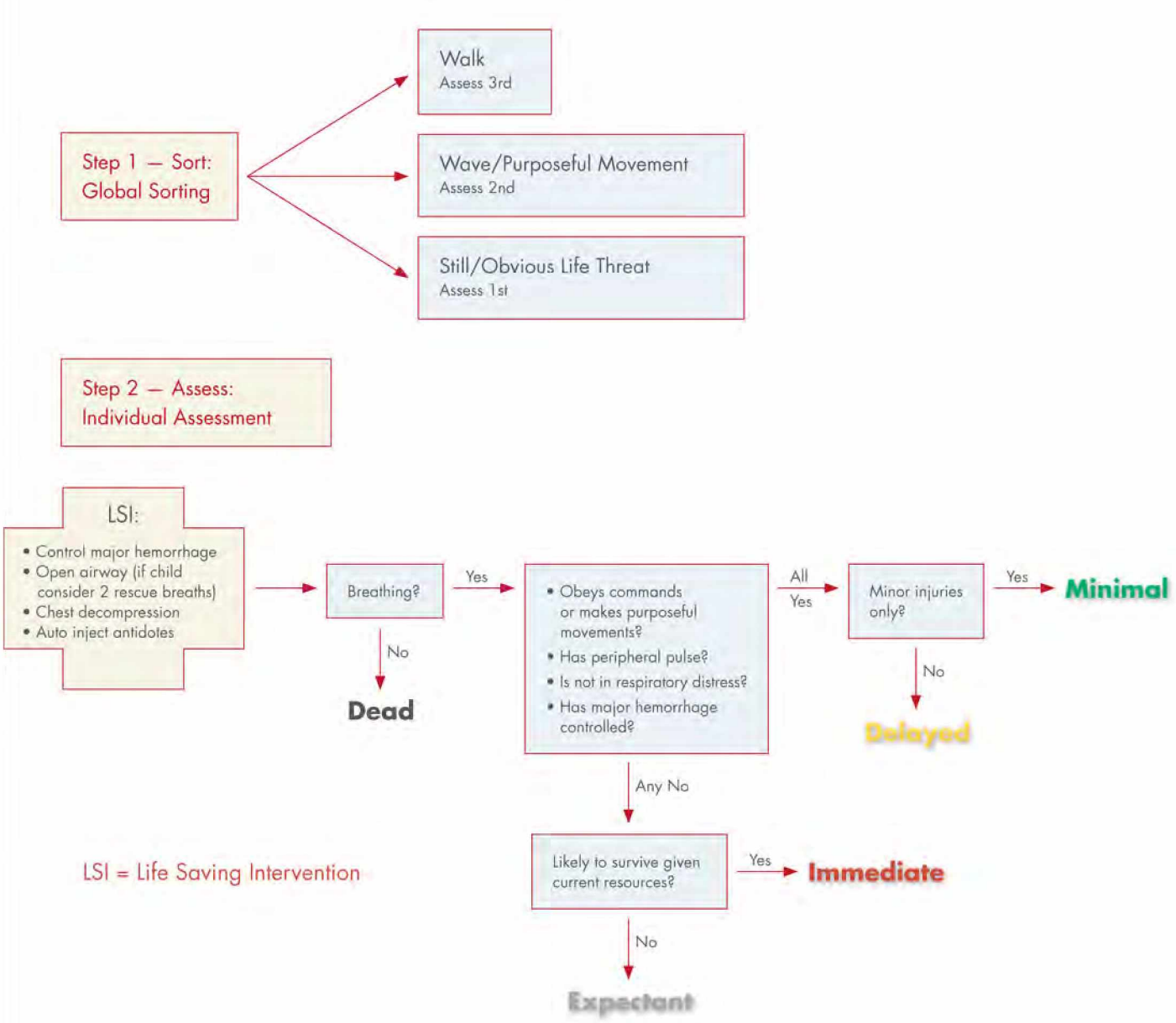
A triage officer should be assigned to manage the hospital's medical response and should ideally be an emergency physician or a surgeon experienced in trauma care. The initial triage site should be located at or near the ED entrance. A secondary triage site may be necessary if the original triage site becomes overwhelmed by an influx of casualties.

The following principles should be incorporated into protocols:

- Develop flexible triage protocols based on uniform criteria for mass casualty triage[18] (see Figure 1) and strive for systems that are:
  - simple, easy to remember, and amenable to quick memory aids;
  - applicable to all ages and patient populations; and
  - easily modified for changes in resource availability and patient conditions.

- Develop a color-coded patient (LSI) prioritization protocol: red (immediate), yellow (delayed), green (minimal), grey (expectant), and black (deceased).
- Consider lifesaving interventions for each patient when:
  - equipment is readily available,
  - intervention is within provider's scope of practice,
  - procedure can be quickly performed, and
  - continuing post-procedure care does not require provider's presence at bedside.
- Reserve the use of imaging and lab testing for clinical conditions based on flexible triage protocols.
- Reduce provider documentation and other administrative responsibilities.

Figure 1: Model Uniform Core Criteria



Hospital Incident Command System

As an incident unfolds and details begin to emerge, the hospital management team should quickly transition from reactive to proactive management. To respond to the bombing aftermath, hospital directors should develop an integrated and coordinated Hospital Incident Command System (HICS). The HICS should define responsibilities, prioritize responses based on a predictable chain of management, and develop clear reporting channels and common nomenclature to facilitate communications.

To respond to the bombing aftermath, hospital directors should develop an integrated and coordinated Hospital Incident Command System (HICS).

The HICS requires the following main components:

- **Incident Commander:** the individual who assumes overall authority and responsibility for the hospital preparedness and response to a mass casualty event. This individual is also responsible for activating the emergency plan.
- **Command Center:** the location from which the hospital's response to the emergency will be coordinated. This facility should be equipped with multiple alternative means of internal and external communication, stable power source, and security.
- **Operations Officer:** the individual who gathers and builds an overall picture of the event and records any actions taken by the HICS.
- **Liason Officer:** the individual responsible for communicating with external relevant agencies, including EMS, other health facilities, law enforcement, fire, search and rescue, public health, local office of emergency preparedness, and military.
- **Public Information:** the organizational hub for contact with the media and coordinated communication between the hospital and the public. Prepared consistent messaging should be available through the HICS.

Mass casualty event sites

Primary emergency response areas must be identified to handle the crisis. Specifically, these areas include

- hospital command center,
- triage sites: main and alternative,
- immediate treatment,
- delayed treatment,
- minor injuries,
- decontamination, and
- fatality management site.

Designated areas should also be named for the worried well, media, family, and visitors. A relative center can be used as a resource for individuals searching for information about their missing relatives. These centers can include water, food, mental health professionals, clergy, and simple pharmacy needs.

Security

Hospitals should maintain control and security within their boundaries as law enforcement resources may be severely taxed. Hospitals may be targets for bombing attacks, and security officials should maintain increased vigilance. Strategies may include

- increasing uniformed security presence,
- ensuring security for hospital personnel, supplies, and assets,
- enhancing monitoring of sensitive entry points and hospital surroundings,
- addressing crowd control and handling the influx of individuals looking for missing relatives, and
- preventing terrorists from targeting hospital facilities.

Recovery: Ending the emergency status

Just as preparing for rapidly transitioning from normal to emergency status is critical, preparing to quickly return to routine activities is also important. Debriefing of personnel can reduce event-related mental health effects and obtain input on lessons learned for use in future crises.

Management of Patient Surge: Resources

Resource Challenges for Hospitals Managing a Patient Surge

- Staff capacity
- Medical supplies
- Blood bank

Staff capacity

The capacity to mobilize adequate numbers of qualified personnel (particularly trauma teams) to care for victims is essential. The kinds of expertise required include emergency medicine, trauma surgery, intensive care, hospitalists, anesthesiology, otolaryngology, mental health, pharmacy, blood bank, radiology, pediatrics, nursing, administration, and support. Consider the following issues:

- **Continuing Education and Trauma Training:** This education should be a mandatory component of disaster management training for all physicians, health care workers, and health professions students. Physicians and nurses must have up-to-date knowledge of the potential types of injuries encountered and the treatments required after bomb blasts.
- **Leadership:** Hospital administrators and senior leaders should lead drills and be an integral part of the training exercises for response to a bombing event.
- **Workforce and Human Resource Needs:** These issues should be anticipated, and policies should be outlined to
  - address personal safety and family concerns,
  - compensate for extra hours and injuries,
  - use licensed professionals outside their normal scopes of practice or license geography,
  - call in off-duty hospital staff and arrange transportation,

- prepare to manage health professional volunteers and other untrained individuals who appear spontaneously,
- change staff scheduling as needed, and
- make mental health professionals available for first responders and staff counseling.

Medical supplies

To increase access to supplies, pre-arranged contracts with commercial vendors should be activated. Pre-equipped mobile carts reserved for disaster contingencies and critical equipment should be transported to specific MCE sites.

Blood bank

Hospitals should ensure immediate availability of blood and blood products. The existing resource supply chain of resources should be able to manufacture, test, store, and distribute these products.

Management of Patient Surge: Mass Casualty Events

Challenges for Hospitals Managing Mass Casualty Events

- Receiving casualties
- Space capacity
- Hospital decompression
- Patient identification
- Victim tracking

Receiving casualties

The process of receiving casualties involves four stages:

1. **Activating the System:** At the initial stage, hospital staff are called in and reverse-triage is ensured (i.e., ability to care for mass numbers of casualties).
2. **Casualties Arriving:** The incident is evolving, and the ultimate scope of the incident is still unknown. At this stage, trauma care provided to noncritical casualties should be minimal. The leader should conserve key trauma-related resources for the yet unknown number of critically injured casualties.
3. **Casualties No Longer Arriving:** The patient load is well defined, and hospital resources are still mobilized. This stage continues until definitive care is provided to all casualties.
4. **Recovery:** The response period ends, and the hospital returns to normal capacities while remaining ready for another TUE-MCE.

Space capacity

To care for a patient surge, hospitals must augment care space dramatically. Admission capacity will be determined by the number of available beds and hospital personnel. Specific considerations may include

- **Facilitating Inflow:** During an emergency event, the hospital experiences a massive inflow of individuals in a very short period of time.

- **Space Availability:** Hospital plans should be designed specifically to receive a massive inflow and distribute patients along predetermined routes to specified sites. Plans should consider the following areas:
  - Diversion: Divert additional patients to less-crowded facilities.
  - Emergency department: Discharge ED patients who can continue their care at home or another medical facility (reverse triage).
  - Intensive care unit (ICU): Move ICU patients who can safely be managed to other care units.
  - Hospital beds: Identify and discharge inpatients who may continue their care at home or another medical facility.
  - Operating rooms (ORs): Determine availability of ORs, cancel elective surgeries and procedures, and prepare multiple ORs for emergent procedures.
- **Alternative Care Sites:** Use pre-designated alternative care sites to increase space capacity, and add beds and supplementary equipment.
- **Mass Mortuary Site:** Establish a space to store bodies of patients who die; this space should be in or near the hospital but away from the ED.

Victim tracking

In an MCE, hospitals are overwhelmed with a sudden influx of casualties and fatalities. Using a casualty tracking data system that is coordinated across all medical facilities is essential. The system should be capable of registering, documenting, and tracking victims to help make families' search for missing relatives as efficient as possible.

Hospital decompression

Large numbers of casualties from a terrorist incident commonly self-refer or self-transport to hospitals in the immediate vicinity of the event. Three main approaches enable hospital facilities to prevent system collapse through decompression:

1. **Outside Diversion:** Additional casualties and other patients should be directed to other facilities that have sufficient capacity.
2. **Secondary Relocation (Inter-Facility Transfer):** Each hospital should carefully consider its facility limitations and casualty thresholds and be prepared to give advance warning to the medical command and control center (MCCC) before reaching capacity. The overloaded hospital may need to transfer patients to another hospital; such arrangements should be organized in advance.

3. **Triage Hospital:** After capacity is reached, the affected facility should be designated a triage hospital, where only lifesaving procedures are performed prior to transfer to other hospitals. The MCCC should send transportation, including ground ambulances and helicopters, for immediate evacuation from a triage hospital. An EMS officer should be deployed to the triage hospital to determine the types of transportation required.

The management of the acute situation sets the tone for the ways society will respond.

Patient identification

In an MCE, hospitals are overwhelmed with a sudden influx of patients and fatalities. Data systems, coordinated across all medical facilities, can help hospitals register, document, and track victims. Through this system, citizens can call any hospital throughout the region to locate family members. The system could include the following features:

- digital photographs of each incoming victim with altered mental status upon arrival to the hospital;
- input of digital pictures and any descriptions of victims and their personal belongings into a computerized database;
- placement of each patient's belongings in a prepared sack that accompanies the patient at all times, and
- personnel or trained volunteers to staff telephones and assist with victim identification and family liaison.

Public Information

- Leaders have much influence over the expectations, understanding, and responses of both individuals and communities to an MCE. The management of the acute situation sets the tone for the ways society will respond. Accurately describing ongoing efforts and successfully forecasting predictable events will enhance the credibility of authorities and diminish negative outcomes. Informing the public in a timely manner can decrease the flow of worried well patients and lessen demands on the health care system. This communications campaign should be a joint effort by EMS, hospitals, and other health care facilities.

Conclusion

The purpose of this document is to prepare policy planners to respond to terrorist bombings and mass casualty events. The majority of the information focuses on first responders, hospital administrators, and hospital staff, as they are most likely to be affected.

The document discusses the concept of meta-leadership, which draws on natural leaders who work in various settings and use their skills to help direct both their own organizations' responses and the inter-organizational responses that will be critical to a successful response. This document offers these leaders interim guidance for developing plans to meet the needs of specific facilities and locations. Effective preparation will help maintain critical systems and can improve both the clinical and psychological outcomes of the people affected by terrorist bombings and mass casualty events.

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