Disaster Preparedness and Response for the Burn Mass Casualty Incident in the Twenty-first Century

Randy D. Kearns, DHA, MSA, CEM[a],*,
David E. Marcozzi, MD, MHS-CL[b,c], Noran Barry, MD[d],
Lewis Rubinson, MD, PhD[e], C. Scott Hultman, MD, MBA[f],
Preston B. Rich, MD, MBA[g]

KEYWORDS

KEY POINTS

- Managing the Burn Mass Casualty Incident requires planning and a unique knowledge of where the resources are located.
- More resources are available (trauma services) when the disaster includes only burn injured patients (nightclub fire versus industrial plant explosion).
- If the disaster includes infrastructure damage such as an earthquake or a terrorist explosion, it may hinder patients coming to you or being able to transfer them to other facilities.
- The first line of defense is what you have at your facility to include what you can create by adapted spaces and reverse triage in the hospital with the aim of discharging those who can go home.
- Housekeeping staff play a vital role getting rooms cleaned if rapid discharge decisions need to be made to create more space. Involve them in the planning process.

INTRODUCTION

Due to their unpredictability and indiscriminate impact on either unprepared and seemingly risk-free populations or military populations, disasters of even local magnitude tend to be large-scale media events, and the associated responses to them are subject to intense media scrutiny. As a result, society's exposure to mass casualty incidents (MCIs) and their associated management are commonly measured through a sensational and incomplete lens of media outlets. This skewed, remote, and occasionally distanced perspective can often lead to harsh unproductive critiques of observed actions viewed out of context, focused praise of certain isolated high-profile efforts, or harsh judgment of perceived failures with little science to judge operations, outcomes, or perspectives offered.

In contrast, the perspective of health care responders who become engulfed in the actual

[a] Management Services Division, Tillman School of Business, University of Mount Olive, Mount Olive, NC, USA; [b] The University of Maryland School of Medicine, 620 West Lexington Street, Baltimore, MD 21201, USA; [c] USAR, US Army Special Operations Command, Ft. Bragg, NC, USA; [d] Acute Care Surgery, Department of Surgery, Duke University Medical Center, 2301 Erwin Road, Durham, NC 27710, USA; [e] Critical Care Resuscitation Unit, R. Adams Cowley Shock Trauma Center, The University of Maryland School of Medicine, Baltimore, MD, USA; [f] Plastic and Reconstructive Surgery, NC Jaycee Burn Center, The University of North Carolina School of Medicine, Chapel Hill, NC, USA; [g] Acute Care Surgery, Department of Surgery, NDMS, US Department of Health and Human Services, The University of North Carolina School of Medicine, Chapel Hill, NC, USA
* Corresponding author.
E-mail address: randy.kearns@earthlink.net

chaos of an unfolding disaster is real, dynamic, complicated, and inherently linked to emotion. The scope and scale of a given disaster, the quantity or quality of available resources, or the geopolitical implications of a particular event can vary widely. Each disaster response can be universally reduced to the aggregate actions of individuals who are called on to make complex, immediate, and high-stake decisions that ultimately contribute to the outcome. Although the process always begins with first responders, it systematically evolves and expands throughout the entire health care system, inclusive of 9-1-1 call systems, emergency medical systems (EMS), triage centers, initial receiving hospitals, and definitive care and postacute facilities, extending well into available rehabilitation and psychosocial support infrastructure. Disasters are fundamentally local community events that commonly grow to involve regions, nations, and sometimes even manifest global impact.

Disasters are local events. Therefore, sound community MCI planning is critical to effecting excellent patient outcomes. Capacity and capability are inherently resource-based. This requires the development and implementation of thoughtful, carefully crafted, and individually designed emergency plans that match potential needs with a progressive echelon of available or potentially available response assets.[1]

Although first-responder personnel commonly consist of local EMS, fire, hazardous materials (HAZMAT), or rescue assets, training and available equipment often vary significantly between jurisdictions. Furthermore, the initial facilities that receive the first wave of patients may range from major regional referral medical centers to minimally staffed critical access hospitals and may even consist of temporary mobile shelters.

Given these known and anticipated variabilities in available resources, pre-incident planning is crucial. This planning contributes to the provision of consistent care delivered through the rational coordination of integrated system-level care networks.[2–4] When disaster strikes, the first calls for help are funneled to the local 9-1-1 center (although 9-1-1 is the number used primarily in the United States and other countries, this number varies in other countries to include 9-9-9 and 1-1-2 being several of the more common).

Once the call is placed to the emergency communications center, the trigger point for all disasters with a medical component will rest on the shoulders of the local EMS system. Thus, the first wave of patients will be managed by EMS personnel (the *First Responders*) and the emergency department physicians and nurses (the *First Receivers*). It should be noted that casualty evacuation may take on many forms, including the use of privately owned and law enforcement vehicles. Nevertheless, a vast majority of patients are initially managed by first responders and all those with serious injuries are managed by the first receivers.

TYPES OF MEDICAL DISASTERS

Burn injuries are one of the most challenging medical disaster scenarios. Burn MCI (BMCI) typically can be linked to 1 of 3 broad scenarios: a mass gathering, such as a theater, dinner, or nightclub with a sudden fire; natural disaster, such as wildfire or earthquake; or purposeful hostilities, such as terrorism, bomb blast, or an act of war.[5] As an event becomes more complex, the variety of wounds and concomitant injuries will require a more diverse response. If there is concurrent damage to infrastructure that limits hospital care or limits transportation access, the problems and limitations may grow exponentially.

Despite the infrequent nature of medical disasters, their initial management and the subsequent surge in capacity that necessarily follows, quickly becomes the greatest challenge, and potential threat to a given hospital, health care system, or region.[3,6] Learning from these events, whether civilian or military, offers opportunities for improvement in approach to trauma delivery across the nation and around the world.[7] The purpose of this article was to review the basics of disaster planning, preparedness, response, and recovery in the aftermath of a medical disaster. Although the primary focus is BMCI, illustrative examples include natural disaster and infectious disease principles.

CONTENT: WHY BURN INJURIES?

Patients with significant burn injuries represent a small subset of patients; however, due to their complexity and injury severity, they impose a disproportionate impact on health care systems. A recent survey revealed that even seasoned practitioners, including experienced physicians, nurses, and paramedics, stated they were "uncomfortable with their knowledge, skills, and ability to care for a burn-injured patient."[8]

The capability to effectively manage and care for BMCI is a critical determinant of desirable outcomes in the care of patients with burn injuries.[9–12] Given the scarcity of resources and the infrequency of BMCI events, it is reasonable to consider and plan for these events as worst-case scenarios in modern health care systems.