Lessons Learned from Burn Disasters in the Post-9/11 Era

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KEYWORDS

• Burns • Disasters • Mass casualty

KEY POINTS

- Burns units will be called upon to respond to a variety of disaster scenarios. Although every event is unique, several lessons have been learned in recent years by programs responding to industrial accidents, terrorist incidents, and natural disasters. The burn program should fit within the existing disaster command structure and scene security should precede patient processing.
- On-scene triage by experienced personnel is more effective than moving patients to a central area for triage. Minor injuries should be managed outside the hospital environment. Enteral resuscitation can be effective for many moderate injuries.
- A variety of injures can be expected. Patient categories are delayed, expectant, and immediate, but patients can move between categories as individual status and available resources change.
- Simple protocols, just-in-time training, and real-time expert consultation can effectively expand the number of capable initial burn care providers.
- Less seriously injured patients can consume significant resources later. Secondary long-distance triage is an important strategy for these patients.

INTRODUCTION

Providing care for unexpected, large numbers of burn patients is never easy or neat. Unfortunately, it is sometimes necessary. As burn care has become a defined surgical specialty, practitioners have had to work alongside their emergency and trauma colleagues in addressing these situations. Although every scenario is unique, certain themes have emerged repeatedly and are the foundations of lessons that can be useful to those faced with future burn disasters. These lessons, detailed in later discussion, are loosely organized to follow the flow of a major burn event (**Box 1**).

LESSON: THE BURN PROGRAM SHOULD FIT WITHIN THE EXISTING DISASTER COMMAND STRUCTURE

One of the most essential components of disaster planning is clear delineation of responsibility and communication. Without these essentials, rescue and recovery operations become ineffective and dangerous. Actions at the disaster site and triage stations must be orchestrated with those of transportation vehicles and treatment centers. Examples abound in which disaster responses were impeded by poor coordination and enhanced by strong command and control operations.

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Box 1
Important disaster planning points for burn programs

1. The burn program should fit within the existing disaster command structure.
2. Scene security should precede patient processing.
3. On-scene triage by experienced personnel is essential and much preferable to moving patients to a central area for triage.
4. Minor injuries should be managed outside the hospital environment.
5. There will be a variety and complexity of mixed injuries.
6. Major patient categories are delayed, expectant, and immediate. Patients can move between categories as individual status and available resources change.
7. Use simple protocols.
8. Have real-time expert consultation available.
9. Push forward with just-in-time training.
10. Consider enteral resuscitation.
11. Less seriously injured patients can consume significant resources later.
12. Long-term patient needs are very significant, long transcending the acute event.
13. Use secondary long-distance triage windows creatively.
14. Maintain relationships with regional and national units to facilitate distribution of patients.

During the response to the 1970 natural gas pipeline explosion in Osaka, Japan, the response team lacked a chain of command; the lack of central command and control made triage and transfer exceedingly difficult.[1,2] During the response to the 1980 fire in the MGM Grand Hotel in Las Vegas, Nevada, the initial triage post was overrun with patients. Good communication spurred the quick establishment of 2 more stations whose activity was coordinated by a central command post. This prompt response allowed 3000 people to be triaged in 3.5 hours after the fire initially broke out.[3] After the 2002 Bali bombings, where 3 separate bombs were detonated in popular tourist locations, better communication might have allowed available resources to have been delegated much more effectively.[4] In the first hours after the 2003 Station Nightclub fire in Rhode Island, limited communication between the triage sites and local and regional burn centers was a major issue.[5] Hospitals did not know when or where emergency vehicles were arriving, complicating preparation.[6]

All disaster responders, but especially specialist programs such as burn units, must ensure that they are embedded within a larger response program if they wish to provide the right services to the right patients. With burn patients, who have long and complex aftercare needs, this respect for the overarching response organization remains important long after the initial event.

LESSON: SCENE SECURITY SHOULD PRECEDE PATIENT PROCESSING

Scene safety and security must be reasonably established before care is provided. Safety and security will be provided by the larger command structure and includes such things as reasonable protection from secondary terosit attack and structural integrity of buildings. During the early hours of the response to the 1998 discotheque fire in Gothenburg, Sweden, first responders had trouble with triage due to a lack of crowd control. One provider was physically attacked, while family members of the injured took medical supplies for their own use, impairing triage efforts by the rescuers.[1,7]

LESSON: ON-SCENE TRIAGE BY EXPERIENCED PERSONNEL IS ESSENTIAL AND MUCH PREFERABLE TO MOVING PATIENTS TO A CENTRAL AREA FOR TRIAGE

Focusing the limited skilled personnel and equipment on patients who both need the care and are salvageable is essential. Efficient care is greatly facilitated by triaging as far forward as can be safely done. Given the subtleties of burn wound interpretation and the frequent presence of concomitant nonburn trauma in disaster scenarios, forward triage is ideally assigned to very experienced providers. The goal of triage is to sort patients into 3 rough categories: (1) Patients likely to survive with minimal or delayed care ("delayed patients"); (2) Patients unlikely to live regardless of care ("expectant patients"); and (3) Patients in whom immediate care is likely to improve their probability of survival ("immediate patients"). Individual patient categorization will vary with a host of factors, including burn injury severity, concomitant injury, patient age and preexisting conditions, disaster scene location, scene security, transport and regional resources, and available medical resources. Individual patient categorization will also change with time, as more resources are brought to bear on the situation. Initial patient categorization requires mature