

# Hospital Disaster Preparedness in the United States: New issues, New Challenges

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## Abstract

Disasters are typically viewed as low probability yet high impact events. Although various definitions have been used, a disaster is frequently viewed as a situation in which the number of patients presenting to the medical facility within a given time period exceed the ability of the hospital to provide care without external assistance. As such, the definition is institution specific, and therefore preparedness must be likewise institution specific. The same event may represent a disaster for a 30 bed hospital and simply tax the capacity of an 1800 bed institution.

## INTRODUCTION

Disasters are typically viewed as low probability yet high impact events. Although various definitions have been used, a disaster is frequently viewed as a situation in which the number of patients presenting to the medical facility within a given time period exceed the ability of the hospital to provide care without external assistance. As such, the definition is institution specific, and therefore preparedness must be likewise institution specific. The same event may represent a disaster for a 30 bed hospital and simply tax the capacity of an 1800 bed institution.

The term “hospital preparedness” is a catch-all phrase, covering a multitude of inter-related areas of medical and non-medical disaster management. Although the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) mandates specific standards for hospital preparedness, in many institutions these standards never extend beyond the written page [1]. Prior to September 11 2001, hospital preparedness focused on either natural or unintentional man-made mass casualty events accidents, including earthquakes, tornadoes, commercial building collapse, airline and school bus accidents. In contrast to Israel and European countries, and despite such events as the 1993 World Trade Center bombing and the 1995 Oklahoma City bombing, the spectre of terrorism was remote from hospital disaster planning. Since September 11, 2001, the reality of U.S. vulnerability to domestic terrorism has translated into an increased sense of urgency to prepare for potential terrorist acts.

While each institution is mandated by JCAHO to develop a specific and unique disaster plan, certain elements of the plan are universally applicable. The purpose of the current paper is to review selected specific aspects of hospital disaster preparedness in the new era of United States terrorism awareness.

## 1. HOSPITAL STAFFING

One of the principal concerns in hospital preparedness is the determination of adequate staffing capabilities. The current health care situation is marked by lack of surge capacity and general nursing shortages, all of which are expected to worsen over the next decade [2,3,4,5,6]. Inter-hospital cooperation is hindered in part by fears of “poaching” of scarce nursing resources. Nursing shift “call-offs” are a routine event at many institutions, with the subsequent result of under-staffing during daily operations. Concern exists at many levels regarding staffing patterns during times of disaster hospital operations.

The Canadian experience with SARS provides some insight into management during a biological disaster. Ontario Ministry of Health Guidelines to manage and mitigate the outbreak commented specifically on adequate hospital staffing [7]. The Ontario Health Coalition report submitted to the SARS commission specifically noted inadequate hospital capacity and understaffed facilities [8]. The SARS epidemic resulted in significant psychological stress for hospital staff, as noted by a survey of the hospital staff of a tertiary care facility [9]. Two thirds of respondents expressed concern

regarding their own or their family's health and well-being. While 29% of staff overall met criteria for probable emotional distress, the rate amongst nurses was 45%. The four factors which most correlated with degree of concern for family and personal well-being were perception of a greater risk of death from SARS, living in a household with children, personal or family lifestyle affected by SARS outbreak, and most interestingly, being treated differently by individuals simply because of working in a hospital.

Much of the attention has been focused upon nursing issues. However, attention should also be placed upon ancillary staff and management. The former is required for the hospital to function [10]. Without trained housekeeping and maintenance staff, there is the potential for nosocomial spread as well as potential delay in the disposition and rooming of admitted patients. Despite the critical role of these individuals in hospital functioning, these ancillary staff may be more vulnerable to absenteeism during a disaster event due to a lack of medical awareness regarding actual versus perceived personnel risks. The importance of the latter cannot be stressed. Institutions which led by example appeared to engender to support and trust of their staff [11]. During the second Toronto SARS epidemic, nurses complained that hospital administrators ignored nursing concerns regarding a possible re-emergence of the disease [12]. A librarian sued a Toronto hospital, claiming she was forced to quit her job after refusing to continue work as a SARS screener [13]. At one institution, daily meetings between management and staff occurred, and frequent hospital forums were held by the hospital president to answer staff questions [10]. Such a pro-active response should be the model for future disasters, especially those presenting a potential threat to health care workers.

While not always a part of hospital staffing, some hospitals utilize paramedics both in the pre-hospital environment and as extenders within the emergency department [14]. During the two Toronto SARS outbreaks, 5 probable and 3 suspect SARS cases occurred amongst 920 paramedics. At the peak of the SARS outbreak, 292 paramedics were quarantined a total of 1637 quarantine days.

Health care workers do not live within an insular system, and may be directly and personally affected by the disaster. Adequate staff contingency planning should take this reality into account. Health care workers may be amongst the victims, as may their families. The provincial health department of the Banda Aceh region reported that only 80

of 400 workers had been accounted for after the 2004 Tsunami, and approximately 150 physicians remained unaccounted for [15]. After a disaster that significantly affects the local infrastructure, it may be necessary to provide safe shelter and food to the families of affected staff members. Without providing this, there will be little incentive for those staff members to report to work.

Modern health staffing is also convoluted. Individuals may be employed simultaneously by several hospitals, EMS agencies, and disaster teams. In the setting of a disaster, the presence of such individuals at any one institution cannot be assumed, and should be accounted for. Canadian Association of Emergency Physician guidelines specifically address staffing contingency issues, although specific answers are not provided [16].

Lastly, the nature of the disaster may impact staffing issues. In one survey, the willingness of staff to respond to a disaster was placed in the context of whether the disaster was an airplane crash scenario, a radioactive "dirty" bomb, or a biological agent scenario [17]. The number of staff willing to work extra hours to care for disaster victims varied depending upon the circumstances, with 98% willing to help after an airline disaster, 76.4% willing to help after a radionuclide event, and 60.9% willing to work after a infectious agent scenario. Gender, but not parental status, was an important factor in staffing.

## **2. HOSPITAL PHARMACEUTICAL SERVICES**

Hospital disaster preparedness can only be achieved by the active participation of all key medical services providers within a multidisciplinary team. Pharmaceutical services represent one of the most important and yet under-recognized services in mass casualty care and disaster medical services. Proper integration of pharmaceutical services can represent the difference between a successful operation and a chaotic one.

Integration of pharmaceutical services is an important element in any hospital-specific, local and national disaster preparedness plan. The American Society of Health-System Pharmacists has described the importance of an active pharmaceutical services participation in disaster planning and has highlighted the top five advisory roles of the health-system pharmacist in disaster preparedness (Table 1) [18]. The Agency for Healthcare Quality and Research (AHQR) has developed a computer-based simulation for mass pharmaceutical distribution and mass vaccination in the disaster setting.

Table 1: Advisory roles of the health-system pharmacist in disaster preparedness.

- Advice to Hospital and Health-system Pharmacy Directors
- Advice to Hospital and Health-system Pharmacists
- Advice to Hospital and Health-system Administrators
- Advice to Emergency Preparedness Planners
- Advice to State Societies of Health-system Pharmacists

At the present time disaster medical experts have expressed concerns about the immediate availability of specific antidotes, vaccines and prophylactic agents in the event of a large-scale disaster. In 1999, the Congress of the United States directed the Department of Health and Human Services (DHHS) and the Centers for Disease Control and Prevention (CDC) to establish the National Pharmaceutical Stockpile (NPS). The mission of the NPS was to provide a “re-supply” of large quantities of essential medical material to affected communities during an emergency. On 1 March 2003, the NPS was re-designated the Strategic National Stockpile (SNS, Figures 1, 2), jointly managed by the Department of Homeland Security (DHS) and DHHS.

The SNS push-packs contain both therapeutic and prophylactic medications as well as other supplies needed [referenced in the HHS data sheet 17 Critical Benchmarks for Bioterrorism Preparedness) as benchmark number seven: “Develop an interim plan to receive and manage items from the National Pharmaceutical Stockpile, including mass distribution of antibiotics, vaccines and medical material.” [19]. However, the federal responsibility ceases at the delivery of the push-packs to state-designated airports. It is then the responsibility of the state to break down and transport the components of the push-pack to the affected community. It is also at the state’s discretion where push-pack material is distributed in the event of multiple events. As such, individual communities may not receive supplies at the expense of other affected areas. Moreover, although the federal government has set a 12-hour limit on push-pack deployment, it is predicted that up to 48 hours will be required to deliver the push-pack supplies to the affected areas.

As such, it has been suggested that prudent all-hazards

planning requires some supplies be maintained in-hospital for immediate needs. The federal Metropolitan Medical Response Systems (MMRS) guidelines required MMRS communities be self-sufficient for 48 hours.

A deficiency of immediately available agent-specific antidotes has been noted in previous terrorist events. During the 20 March 1995 sarin attack on the Tokyo subway system, twelve people were killed and more than 5000 individuals sought medical care [20]. Post-event analysis indicated that antidote stockpiling was deficient [20,21]. 74% of hospitals surveyed after the event reported that they did not stock the specific nerve agent antidote, pralidoxime chloride (2-PAM [20]. The most common explanation for this perceived deficiency was the cost burden placed upon hospital pharmacies in stocking rarely used pharmaceuticals.

Whether preparing for mass antidote administration or the development of mass antibiotic prophylactic stations, hospitals in the post 9/11 environment must develop hospital- and community-specific plans including the provision of adequate pharmaceutical stockpiling. This may require the formation of hospital pharmacy consortiums or vendor agreements, providing the ability to rapidly obtain and distribute needed pharmaceutical supplies during a disaster.

**3. THE EMERGENCY DEPARTMENT AND PUBLIC HEALTH SYNDROMIC SURVEILLANCE**

Recent studies and pilot programs have validated the utility of emergency department patient contact data as a tool for developing and implementing public health syndromic surveillance tools [22, 25]. The Department of Health and Human Services specifically focuses upon syndromic surveillance as a critical benchmark for bioterrorism response planning [19]. The concept of emergency department syndromic surveillance proposes using either emergency department chief complaint or discharge diagnosis as tools for detecting a worrisome increase in infectious disease phenomena, which may represent potential cases of biochemical terrorism or a biological epidemic [23,24,25,26]. Most models utilize computer-based approaches that integrate retrospective hospital-specific and calendar/seasonal-specific data with the current incidence of cases. An increase from the expected or estimated number of syndrome specific cases results in an alert.

The proposed syndromes under surveillance are typically the CDC Class A bioagent threats [24]. In our time, syndromic surveillance is an important emerging tool that should be

evaluated for incorporation into the day-to-day operations of any hospital emergency department. Only through validation and routine utilization can this tool truly mitigate a potential disaster through the benefit of early detection, early notification and activation of appropriate hospital-specific, local and federal authorities.

### Figure 1

Figure 1 & 2: CDC's Strategic National Stockpile. Source: Centers for Disease Control  
<http://www.bt.cdc.gov/stockpile/>



### CONCLUSIONS

Recent world events have demonstrated that health care facilities are not exempt from the devastation of a disaster. Proper disaster response requires proper preparedness. Each disaster is unique and each hospital is unique, and exists within a unique community environment. However, certain elements are universal, and should be considered in any post-9/11 hospital preparedness plan. The purpose of this article was to review selected elements of modern hospital disaster preparedness, and to address real-world issues related to these topics.

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