Development of a State Medical Surge Plan, Part II: Components of a Medical Surge Plan

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In 2003, the Utah State Department of Health received funding from the Health Resources and Services Administration to develop a medical surge plan to increase the number of available hospital beds in the state by 1250 beds, including 125 beds for burn or critical trauma patients. A prior article discussed the planning procedures and process. This article describes the major components of the plan, including analysis of threats, direction and control, activation and system response; communications; and critical issues.

In 2003 the Health Resources and Services Administration (HRSA) furnished funding to enable states to develop medical surge plans. The Utah plan was to provide additional hospital beds should a terrorism event, natural disaster, or accident produce a mass casualty incident (MCI). The number of additional beds required was based on the population of the state, with one additional bed for each 2000 residents. Use of the HRSA formula resulted in a requirement of 1250 additional hospital beds for the state of Utah, of which 125 beds were designated for patients with severe trauma or burns.

The Utah State Department of Health (UDOH) had overall responsibility for development of the plan. Members of UDOH and the University of Utah Health Sciences Center formed a coordinating group to manage development of the plan, and this group identified more than 40 additional stakeholders in cognizant agencies who participated in a series of planning meetings as members of the planning task force. A previously published article described the planning process,[1] and this article considers the content of the final plan.

The final work document, Utah Department of Health Medical Surge Capacity Plan, 28 September 2004, originally was based on the draft of the Washington State Department of Health's Regional Hospital Plan, May 2003.[2] UDOH members modified the format to add a threat analysis and an expanded discussion of critical issues. In addition, the Utah plan included a series of appendices that were prepared to provide more specific information regarding treatment and other aspects of the plan. It was decided to use appendices for the more detailed information, allowing the main portion of the plan to focus on operational aspects.

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Plan Composition

The major portions of the plan consisted of the following:

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This effort was supported by Health Resources and Services Administration FY2003 Grant No. U3RMC 00057-02-00 CFDA 93.003.

The contents of this article are the responsibility of the authors and do not necessarily reflect the official views of the Health Resources and Services Administration.

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Disaster Manage Response 2006;4:19-24.

1540-2487/$32.00

doi:10.1016/j.dmr.2005.11.001

Front Matter

The front matter included an acknowledgement section that recognized the efforts of Task Force members in reviewing information prior to the 4 planning meetings and providing input during and subsequent to the meetings. The Coordinating Committee specifically commended the Task Force members for their active involvement in the process. The Task Force members identified other persons to be invited, corrected errors and omissions, and provided expertise that helped the Coordinating Committee produce a comprehensive yet practical plan. Organizations represented are listed in a previously published article.[1]

The Executive Summary was structured to provide concise information to legislators, the media, and the public. It also delineated additional actions required by state agencies. The mission, purpose, and scope of the plan defined the actions needed to increase the number of available hospital beds in the state by the required 1250 beds, including 125 beds for burn or trauma patients. Additionally, triage and initial treatment guidelines were recommended.

Components of Final Plan

The major components of the plan included analysis of threats, direction and control, activation and system response; communications; and critical issues.

Threat analysis. The threat analysis section was subdivided into threats related to terrorism, that is, chemical, biologic, radiologic, nuclear, and explosives; natural disasters; accidents; and emerging infections. The terrorism overview included a listing of the 6 Category A biologic agents of the Centers for Disease Control and Prevention (CDC), a listing of the major chemical groups that could be used by terrorists, and a discussion of radiologic, nuclear, and explosive concerns.[3-6] The discussion of terrorism noted that "professional" terrorists are likely to strike at multiple sites, may use more than one category of agent, could target decision makers, and may strike at hospitals to disrupt provision of care. A benefit of planning for response to biologic terrorism could be resultant improvements in dealing with emerging infections, such as severe acute respiratory syndrome (SARS) and avian influenza.

The natural disaster section included considerations for responding to floods, earthquakes, mudslides, wildfires, and tornados.[7] The potential need to respond under extreme hot or cold conditions, during heavy rains, or in high winds also was discussed. Accident threats included those resulting from rail, airline, or highway transport problems. The major airports in the state are close to metropolitan areas, making an accident during takeoff or landing particularly dangerous. Major railroads and interstate highways pass directly through numerous metropolitan areas, and thus a transportation accident could produce an MCI or require significant evacuation.

Direction and control. The experience gained in multiple disasters, including that of September 11, 2001, demonstrated that effective command and control of first responders, hospitals, and local health departments were of critical importance.[8-13] In an MCI, the overall medical emergency management would be coordinated through the UDOH Emergency Coordination Center (ECC), which would work with the state Emergency Operation Center (EOC). The UDOH would send a representative to the state EOC to coordinate with other state response agencies. Certain designated UDOH personnel are members of the Utah State Emergency Response Team (SERT) and regularly participate as members of the EOC during exercises and actual emergency events. UDOH SERT members can speak directly to all local health departments in the state and also with hospital and fire personnel.

The UDOH also can serve as a dispatch center for ambulances and other emergency response capabilities through the state's OMNI-LINK communication system, using sites at the state EOC, the UDOH ECC, or at another UDOH location. Hospitals would initiate their Incident Command Systems to ensure an effective, coordinated response to the event.

System activation and response. The plan delineates response activities during the first 2, 24, and 48 hours after the onset of the MCI. Hospitals will provide status sheets to the ECC every 2 hours to facilitate management of the situation. According to the CDC, 50% to 80% of casualties arrive at medical facilities within the first 2 hours of an explosive event,[14] typically in an "upside down" pattern, with less seriously injured patients arriving first because they do not have to wait for planned transport. It has been reported that the 2 major limiting factors in providing patient care during a mass casualty trauma event will be the number of staffed operating rooms and the number of x-ray machines with necessary technician support.[15]

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Upon notification of an MCI, the UDOH will contact the commercial or metropolitan ambulance company that has been previously designated to function as the dispatch center during an emergency. In accordance with state statute, all licensed prehospital care ambulance providers, whether commercial or municipal, have established mutual or automatic aid agreements with other nearby ambulance providers. The dispatch center has authority to contact other

ambulance operators in the state to provide support as needed. Additional ambulances from outside the immediate area report to a staging area and are placed in a queue to be dispatched as required. While in the staging area, ambulance personnel are transferred as required to ensure that at least one person in each ambulance is familiar with the local area. In accordance with previously approved EMS protocols, patients will be transported to the closest, most appropriate facility. Particular needs of biologic events and all-hazard events are defined. This section also considers sustained response requirements for biologic incidents, incorporating the experience of hospitals during the SARS outbreaks.

Communications. Emergency communications between responders and with the general public also play a critical role during MCIs.[6-9,11-12,16] Because land-line and cellular systems have been rapidly overwhelmed in past events,[17] the Utah plan lists available emergency communication systems with indication of primary and alternate systems. Emergency communication capabilities include 800, 400, and 150 MHz radios, HAM (amateur) radios, Web-based incident management systems, and satellite phones. Persons using radios should be trained in radio discipline.

Special consideration and planning should address the media and public communication needs during an MCI. Hospitals should have a public information officer with documented responsibilities and training. The hospital public information officer can pre-identify appropriate media representatives and coordinate media releases with the State Joint Information Center during an MCI.

The public will need to be educated regarding their responsibilities during an MCI. They need to recognize that the standard of care during an MCI may not be the same as during normal health care activities. Hospitals and health departments need to develop plans to communicate with the "worried well" (ie, persons without injuries or abnormal examination findings who believe they have been exposed to a terrorism agent or otherwise placed at risk of injury) and with relatives of casualties.

Critical issues. The Utah plan looked at additional critical issues and provided greater planning detail. These included:

1. Hospital bed capacity, staffing, equipment
   a. Increasing hospital bed capacity

The obvious first step in finding space for new patients would be to start with identifying which patients could be removed from an institution. Depending on the nature of the MCI, hospitals in the region or throughout the state might have to cancel elective procedures and discharge patients awaiting elective procedures or with nonemergency problems. Hospitals may establish agreements with other nearby medical facilities, such as surgical centers and nursing homes, to accept certain categories of patients during an MCI. Task Force members emphasized the need to use a standardized triage system, such as the Simple Triage and Rapid Treatment (START) system, to control the admission of any new patients during an MCI.

   b. Burn injury and treatment

It was stressed that definitive care for burn patients could be delayed if receiving medical facilities initiated appropriate fluid resuscitation. The Intermountain Burn Center will be used for initial logging and triage of all burn patients, including those from outlying facilities. Direct contact between the treating physicians and the Intermountain Burn Center will be used to ascertain the number and status of burn patients. Patients with significant injuries who could not be cared for locally or at the Intermountain Burn Center are to be transported to one of the several burn centers in the Western United States. Referral to a burn center is to be coordinated and organized through the Intermountain Burn Center. Should that facility be lost, the UDOH would contact the American Burn Association to gain support from other national burn centers.

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   c. Space for additional beds

The UDOH can authorize a 20% increase in hospital bed capacity during emergency conditions, resulting in approval for 830 additional beds in the state. All hospitals are expected to have areas designated that can be used for patient care during an MCI, such as converting private rooms into multi-bed rooms. In 2003, UDOH used HRSA funds to provide state hospitals with decontamination/ isolation structures. Additionally, the UDOH has 50 anterooms that can turn designated areas into negative pressure high-efficiency particulate air filtered treatment areas.

UDOH has 8 tractor-trailers designated as Disaster Response Units.

UDOH has 8 tractor-trailers designated as Disaster Response Units, each of which contain 100 cots, linens, intravenous tubing, generators, lights, supplies, and 250 N-95 respirators. These can be dispatched to any facility as needed. Prototypes of alternate care facilities have been developed by manufacturers of theater stage sets that include heating, ventilation, air conditioning, water, and sewage and can be functioning within hours

of an event. After considerable discussion, Task Force members agreed that attempting to meet patient care needs during an MCI inside of a converted convention center or gymnasium would not be practicable and would severely compromise patient care.

d. Additional staffing needs

UDOH will develop a plan to recruit additional staff from staffing agencies and from retired personnel. This group will include professional staff and necessary support personnel. The department also will establish procedures for identification and credentialing of those working in other than their usual place of employment. If necessary, UDOH will request assistance from the National Nurse Response Team, a specialty Disaster Medical Assistance Team under the National Disaster Medical System. Each National Nurse Response Team consists of approximately 200 civilian nurses who can be mobilized in an emergency.

e. Hospital staffing shortages

It is recommended that each hospital use a 12-hour "on" and 12-hour "off" schedule for A and B teams during the initial days of a disaster. A "work-home quarantine system," as used during the SARS epidemic in Toronto, may be needed for hospital workers during a biologic or emerging infection situation.[18] This system required workers to be screened before entering the hospital and again before leaving. Food and sundries were brought into the hospital for purchase so that the workers did not have to go to stores in the community to purchase supplies. When the employees were in their homes, they were instructed to try to sleep in different rooms to avoid unnecessary contact with other family members.

f. Hospital smallpox response

All hospitals should be prepared to care for smallpox patients and should vaccinate a small number of hospital personnel so that they could act as a Smallpox Reaction Team. In the event of a confirmed smallpox patient, hospitals should identify a larger number of people for vaccination.

g. Equipment and supplies

Agreements should be developed on a regional and statewide basis for sharing of equipment and supplies. Hospitals will be responsible for tracking such exchanges so that reimbursement can be provided later. A form to facilitate tracking is provided in Appendix L of the Utah plan. In planning for biologic events, hospitals should stock at least two N-95 respirators per each staff member. UDOH currently is a member of the Mid-American Alliance, a regional mutual assistance group consisting of 10 states from Department of Health and Human Services Regions VII and VIII. Participants will provide assistance during a disaster through pre-established agreements.

2. Overcrowding

Health care providers are likely to encounter overcrowding during a MCI due to patients coming by transport and self-referral. The following aspects of overcrowding are considered:

a. Demand exceeds capacity to transport: When EMS services are overwhelmed, UDOH will request assistance from the Utah Department of Transportation and the Utah Transit Authority. The hospitals' status reports, submitted every 2 hours, will provide UDOH information to decide when patient transfers are required. The START triage system will be used to determine priorities for patient transport.

When EMS services are overwhelmed, UDOH will request assistance from the Utah Department of Transportation and the Utah Transit Authority.

b. Delivery and transfer of patients: Separate locations will be established by each hospital for patient drop-off and pick-up for transfer. Hospital security personnel must ensure that vehicles are directed to proper locations.

c. Additional beds in state: In addition to the 830 beds provided by the 20% increase in authorized beds, analysis of hospital daily census data indicate that an additional 1237 vacant beds would be available in the state. Thus, the 1250 target can be met through these 2 sources. However, the numbers reflect all beds in the state, so hospitals must be prepared to manage excess numbers until transportation can be arranged by UDOH.

3. Patient flow process

a. Transfer of patients

During an MCI, patients may have to be transferred to create additional available beds. If this action is necessary, UDOH will coordinate transfer of patients. Transferring hospitals should provide hard copies of radiologic studies, scans, or other studies rather than only the radiologists' reports. Paper copies of studies should accompany the patients.

b. Lines of communication

It is essential that all medical treatment facilities and health departments that will play a role in an MCI coordinate roles and responsibilities before the event and clearly define lines of communication. The coordination will require written Memoranda of Understanding or Memoranda of Agreement, with the latter being preferred as the former may be open to different interpretations. Additionally, as noted in Appendix A of the Surge Capacity Plan, statutory authority will be needed to protect providers and others involved in an MCI response.

4. Patient Tracking

During a biologic event, local health departments will report numbers of patients and contact tracing information to UDOH. UDOH will communicate event information to the CDC. During an all-hazards event, individual hospitals will report numbers of patients and requests for assistance, including the need for transportation of patients to other facilities, to UDOH. UDOH does not require names of patients in order to focus on appropriate response to the evolving situation.

5. Equipment

Staff must be identified, trained, and fit tested so that they can properly use personal protective equipment. All acute care hospitals in the state have received funding for personal protective equipment and decontamination showers. They must include use of these modalities in their response plans.

6. Pharmaceuticals

The UDOH has established several pharmaceutical stockpiles. These stockpiles are integrated into some of the largest pharmacies in the state so that medications in the caches will not expire. UDOH has pre-deployed 330,000 three day doses of prophylactic antibiotics for first responders in these caches. UDOH will access the Strategic National Stockpile as necessary.

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7. Hospital Security

Control of patients, family members and other visitors, and vehicle traffic will be a major challenge during an MCI. Normal hospital security will not be able to manage the rapid arrival of several hundred to more than 1000 patients, relatives, and "worried well," as previously described. Police likely will be involved directly in the MCI and will be unable to divert resources to maintain a hospital perimeter. Plans must be made to augment hospital security personnel with members of private security or other agencies to provide security. Assistance from the National Guard will require time, needs to be coordinated through UDOH and the State EOC, and may be unavailable because of other requirements, such as the present situation in Iraq. Statutory authority will be required to define identification procedures to permit persons responding to their usual workplace or other locations to pass police lines. Two forms of identification, one a state government picture ID and the other a photo ID from a hospital, health department, or other health organization, could be used as a standardized identification technique.

8. Medical Waste Disposal

Both the Joint Commission on Accreditation of Healthcare Organizations and the Department of Environmental Quality require hospitals to have plans to contain waste during decontamination or other medical activities. Assistance is also available at the Web site for the CDC at *www.cdc.gov*.

9. Overview of Terrorism Response Organization

An overview of the hospital organization to respond to an MCI was developed.

10. Appendices

The subjects of the appendices are listed in the previous article.[1] A summary discussion of each appendix can be found at *http://rocky.utah.edu* through the "Surge Capacity Appendices" link.

Conclusion

A statewide medical surge plan was developed through a large group planning effort. The major components of the plan include sections that acknowledge the participants, an executive summary, threat analysis, direction and control, system activation and response, communications, and critical issues. A full report with appendices is available from the Utah Department of Health.

Acknowledgments: We thank Mr Alex Kosyak, HRSA, for his continuous support throughout this effort. We also wish to recognize Linda K. Amos, EdD, RN, Associate Vice President for Health Sciences, for her support and encouragement, and Scott Williams, MD, MPH, Executive Director of the UDOH, for his support and efforts in personally inviting Task Force members to participate in the process.

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Key Points

First responders and public health authorities

1. A careful review of statewide assets can be used to identify additional beds for improving surge capacity, including increasing existing bed capacity by 20%.
2. A coordinated team plan can be used to move patients, equipment, and providers around the state as needed.
3. State resources can be used to assist with communications, patient tracking, and delivery of pharmaceuticals.

Emergency and critical care providers

1. A statewide plan can be used to develop response activities for 2, 14, and 48 hours after an MCI.
2. Definitive burn care can be delayed with appropriate fluid resuscitation.
3. Ensuring adequate staffing may require new schedules, including a "work-home quarantine system." Participating in statewide public health plans ensures that critical patient care issues can be addressed within capabilities of participating facilities.