INTRODUCTION

Twice in 12 years communities have faced the potential for large numbers of military personnel injured in war to arrive at the doors of their hospitals for treatment. Three times in 17 years we have seen major terrorist events resulting in mass casualty and mass fatality events that could have generated more patients than could be accommodated in the impact jurisdictions medical system. And every day we face the prospect of a major natural disaster devastating our increasingly densely populated metropoles. At the same time individual hospital capacities have been shrinking, creating real doubts as to the adequacy of surge capacities in a crisis (Shriver 2003).

THE NATIONAL DISASTER MEDICAL SYSTEM

The issue of expanding capacity in a catastrophic event has been addressed nationally through the National Disaster Medical System, a partnership of the Department of Defense, Department of Veterans Affairs, United States Public Health Service, and Department of Homeland Security. From the view of this paper two components of the National Disaster Medical System are critical, the participating hospitals (military, veterans, and civilian) and the military airlift capability for medical evacuation. Although there are significant functional and administrative differences in how this system works for military wartime casualties and peacetime disaster victims, for the state and locality that receives patients, the process is similar (United States National Disaster Medical System 2002a, 2002b):

- A casualty producing event occurs.
- The National Disaster Medical System is activated.
- Regional Federal Coordinating Centers start a bed census of the hospitals participating in the National Disaster Medical System in their regions. These are pledged beds, not the entire hospital open bed capacity.
- Based on bed availability, patient needs, and the military medical patient regulating process, patients are dispatched by military airlift to receiving Patient Reception Areas at airports centrally located for each region.
- Patients are then moved by local resources to destination hospitals for definitive care.

CHARACTERISTICS OF EVENTS

An event of sufficient magnitude to trigger a full scale National Disaster Medical System activation is by nature catastrophic, with very large numbers of patients exceeding the surge capacity of local, regional, and even state (in those states which have planned for state level distribution of patients) hospital systems. However, for the region receiving patients through National Disaster Medical System airlift, the problem is a different, and not necessarily simpler, one. The first medical evacuation aircraft touching down at the local airport initiates a series of what are essentially mass casualty events that continue until regional capacity to accept National
Disaster Medical System patients is met. That series may extend over days – conceptually a bus accident every 6 to 12 hours. And, unlike the local bus accident, each event deposits patients that are not from the local area, who have transited through several patient tracking systems, and whose relatives may be searching for them in a global way (see, for example, the problems encountered in managing inquires at the Moorgate tube disaster (Fisher 1980) or after the World Trade Center collapse (Barbash 2003)).

The model of a mass casualty incident is key to thinking about the process of response. A load of from 40 to 87 patients per aircraft (United States. National Disaster Medical System 2002), generates what most emergency medical services systems would identify as a mass casualty incident. Like such an incident, all of the patients arrive at one time. And like such an incident, it is reasonable to expect a wide range of trauma types. However, because it is unlikely that unstable patients will be moved by air, the majority of patients will fit within commonly accepted GREEN (minimal treatment required) and YELLOW (treatment can be delayed) triage categories (Old Dominion Emergency Medical Services Alliance 2003).

**MANAGEMENT REQUIREMENTS**

This suggests that the normal requirements for responding to a mass casualty incident should be in place:

- a command hospital system capable of distributing patients based on care requirements, capacities, and transit time
- an effective communications system that links all of the participating agencies
- a commonly understood and routinely implemented incident command system
- trained personnel at all levels of job responsibility
- adequate vehicles and equipment

In addition, the scenario of aircraft arriving in a sequence over time drives added requirements:

- an incident command structure with continuity over time (closer to the wildland firefighting model than to the normal emergency medical services response)
- crews trained in unloading large medical evacuation aircraft
- adequate facilities on the airfield for processing patients
- an airfield traffic plan that deconflicts aircraft, vehicles, and people
- absolutely accurate patient tracking systems
- support services on the airfield to sustain crews
- emergency medical transport capacity that can surge on a scheduled basis and yet maintain normal service for the region

**DEVELOPING CAPACITY - THE VIRGINIA EXPERIENCE**

Development of a capability to operate an airhead in Virginia depended on an integrated state and federal approach to managing these incidents. In 1995 the Virginia Office of Emergency Medical Services took the first key step by publishing a standard mass casualty incident training program for all emergency medical services personnel in the state. Modules I and II of this
training prepared individual providers to take initial on scene actions and to use triage principles and senior providers to establish and manage a Medical Group (Green 1999) as part of a National Fire Protection Association Standard 1561 compliant Incident Command System.

The next key step in the process was the development of a series of state level tabletop medical exercises that explored response actions in natural disasters in 1995, conventional explosive and chemical terrorism in 1996, and nuclear terrorism in 1997. These identified key planning needs, tested organizational relationships, and set the stage for eventual full scale exercises (Commonwealth of Virginia. Department of Health. Office of Emergency Medical Services. 1995).

In 1996, the Virginia Office of Emergency Medical Services took the first steps toward the development of a system of deployable state resources. Based on preliminary concepts developed through the Central United States Earthquake Consortium, this system established standard organizational units -- Disaster Task Forces, Strike Teams, and Coordination Teams -- as permanent operational entities. Standard operating procedures, standard equipment requirements, and state standard training ensured interoperability among the units (Commonwealth of Virginia. Department of Health. Office of Emergency Medical Services. 1998). In 2003 Virginia can now field 15 Task Forces of 4 emergency medical vehicles, 2 Physician Strike Teams, 2 Critical Incident Stress Management Strike Teams, 2 Massage Therapy Strike Teams, 1 Dog Therapy Strike Team, and 3 Coordination Teams, coordinated from a medical Emergency Support Center with support from an online facility, The Virtual Emergency Operations Center.

In 1998, the Virginia Office of Emergency Medical Services published a catastrophic casualty plan that for the first time directly integrated National Disaster Medical Service air medical evacuation in state response planning. Not only did this plan envision outward movement of patients from a disaster in Virginia, but its Level C, Case 3 option identified an out of state disaster that resulted in patient flow into Virginia as an event requiring state level response (Commonwealth of Virginia. Department of Health. Office of Emergency Medical Services. 1998).

And in 1999 in conjunction with the Central Virginia National Disaster Medical System Federal Coordinating Center, the first actual patient movement exercise was conducted at Chesterfield Airport. In 2002 a second exercise, Brightstar 2002 (Commonwealth of Virginia. Department of Health. Office of Emergency Medical Services. 2002), validated lessons learned from the first one and continued what is planned to be a routine two year exercise cycle (Green 2002).

One of the lessons learned in this development process is that a successful program draws interest and that interest is turned into action by critical events. In planning for Brightstar 2002 the Medical College of Virginia Hospitals advocated that their emergency physicians should be on site as a command element to direct operations at the airhead. This was consistent in their view with their facility’s role as the regional command hospital (Greater Richmond Area Hospital Disaster Plan, 1988). Their inclusion was written into the appropriate Operations Plan (United States. Department of Veterans Affairs. 2002). However, the credibility of this group
must be subject to question – in spite of their interest in being in command in the Plan, they did not participate in the 2002 exercise.

The possible initiation of combat operations in Iraq brought more players to the table. Chesterfield County’s Fire Department identified the need for their agency to be in command at the airhead in their jurisdiction (Chesterfield County 2003), and Henrico County’s Fire Department did the same for operations at Richmond International Airport. The Old Dominion Emergency Medical Services Alliance determined that they, as the regional emergency medical services council responsible for mass casualty incident planning (Old Dominion Emergency Medical Services Alliance 1999), should be involved in managing patient transport (Old Dominion Emergency Medical Services Alliance 2003). Such interest was highly commendable and resulted in much effective planning by these agencies. However, all had been invited to be part of the process in 1998 through 2002, and had chosen not to take an active role. Given the previous experience of ramping up and ramping down for the first Gulf War in 1991-1992, the challenge will be for these agencies to retain the level of interest needed to retain real capability for an unexpected disaster.

THE RESULTING SYSTEM

Should patients be airborne inbound to Central Virginia today, an evolving system is in place to meet them, and there is high confidence that this system will provide effective patient reception services, over a prolonged period of days if needed. First choice for the receiving airhead, based on facilities and airport traffic loading, is Chesterfield County Airport. Activation of the airhead should be based on approximately 12 hours of warning from the Global Patient Movement Regulating Center at Scott Air Force Base (United States. Department of Veterans Affairs 2003). This will trigger immediate mobilization of state Emergency Medical Services Disaster Task Forces and Coordination Teams to provide a state standard Medical Group on the airfield (with a Medical Group Supervisor and Patient Off-Loading, Triage, and Treatment Units) under the direction of a Chesterfield County Fire Battalion Chief as Incident Commander drawn from a County special team. The state resources provide standard units, trained in the procedures of operating the Patient Reception Area, and able to remain on site for at least 72 hours, with reserve capacity to staff for longer periods.

Arriving resources report to the Virginia Office of Emergency Medical Services Coordination Team trailer for credentials verification and event specific badging. Because the state teams are permanent units, members’ information is already on file, and a computer generated badge can be issued rapidly for most personnel. These badges serve as a combined security credential and accountability tool. Task Force resources are staged on the airport; local ambulance transportation resources are staged off the airport.

When the medical evacuation aircraft lands, it will be directed immediately to the taxiway that parallels the runway, and halted midway on that taxiway. The taxiway is used for unloading patients due to footprint limitations on the parking aprons of the airport. The arriving aircraft is met by the Patient Off-Loading Unit. Members of this team have been trained in unloading patients from military aircraft and in controlling vehicle movement in vicinity of the aircraft in
conjunction with the aircraft loadmaster. An airport crash fire rescue unit stationed at the aircraft provides emergency response capability in the event of any accident.

Patients are then shuttled to the Civil Air Patrol’s hanger on the field by ambulance. These ambulances are drawn from the Task Force assets, and are only committed to transport on the airfield. A standard flow pattern is marked by traffic cones to provide separation for vehicles moving to the aircraft from those returning to the hanger.

When patients arrive at the hanger, they are met by the Triage Unit which confirms their triage status, adds a Commonwealth of Virginia triage tag to their military triage tag, and directs liter bearers to place the patients on appropriate cots on the hanger floor. A team from the Veterans Affairs Medical Center immediately enters updated patient details in the Transportation Command Regulating and Command and Control Evacuation System (TRAC²ES) system. Any required stabilizing treatment can be provided by the paramedic personnel of the Treatment Unit, under the medical direction of a Physician Strike Team of state certified operational medical directors.

Patients ready for transport are then moved to area hospitals as directed by the Virginia Commonwealth University Medical Center (offsite command hospital) and coordinated by the onsite Chesterfield Fire Department Transportation Officer using local and mutual aid ambulance resources (Chesterfield County (Virginia). Chesterfield Fire & EMS. 2003) (Old Dominion Emergency Medical Services Alliance 2003) (Greater Richmond Area Hospital Disaster Plan, 1988) (Commonwealth of Virginia. Department of Health. Office of Emergency Medical Services. 2003).

Because this is viewed as a sustained operation, the response includes significant support services. State massage therapy and dog therapy teams have proven to be very important to stress and fatigue management and are included in the response package. In addition, mass feeding capability is provided under agreements with the Southern Baptists for use of their disaster mobile kitchens (Green 2002). And backup computer communications and data management are provided by a team from the American Disaster Reserve (Commonwealth of Virginia. Department of Health. Office of Emergency Medical Services. 2003).

WORKS CITED


Greater Richmond Area Hospital Disaster Plan. Richmond, Virginia: Medical College of Virginia Hospitals, 1988.


