

MASS CASUALTY INCIDENT MANAGEMENT:
THE VIRGINIA MODEL

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INTRODUCTION

Basic Questions

How we define a mass casualty incident determines how we manage it. Is a mass casualty incident a set number of patients, or is it more flexibly defined as more casualties than you have ambulances or hospital beds? Are there gradations of mass casualty incidents, some worse and some better than others? And does a mass casualty incident start when people are injured or does it start well before that? These fundamental questions determine how your response will operate.

A Working Definition

In the training programs established by the Virginia Office of Emergency Medical Services a mass casualty incident is defined as one which generates more patients than available resources can manage using routine procedures (Commonwealth of Virginia 2000). This definition has the advantage of being linked to two critical, interrelated components, system capacity and operational procedures. System capacity is variable based on, among other possible components:

- number of ambulances.
- minus the number of ambulances out of service or on other duties.
- number of available, qualified personnel.
- personnel efficiency.
- number of appropriate hospital beds.
- minus the number of beds occupied by patients.
- communications system capacity.

Operational procedures determine the efficiency of treatment of patients in terms of speed, resource commitment, and outcome. Normal patient care procedures for a single patient incident are relatively inefficient in terms of speed and resource commitment. If these same procedures are used in a mass casualty event, they result in unacceptably long times to clear all patients from the scene (Commonwealth of Virginia 1999). Therefore a mass casualty incident requires the use of emergency procedures, such as START triage, reduced provider to patient ratios, and loading of multiple patients in ambulances, for its successful management.

A SYSTEMS APPROACH

Given this definition we can describe a system for response to a mass casualty incident as needing to address both capacity and procedural issues throughout all phases of an incident. Conceptually, these phases may include:

- Preparedness.
- The mass casualty event.
- Response and characterization.
- Patient clearance.
- Transition to mass fatality incident if required.
- Short distance transport to definitive care.
- Long distance transport to definitive care.
- Patient discharge and return.

A successful approach to mass casualty incidents must address all of these phases, either directly through inclusion of new programs to improve performance, or indirectly through inclusion of existing capabilities in the mass casualty system

Figure 1. Virginia Mass Casualty Incident Management Training

| Module | Level | Length | Audience |
|--------|-----------------------------|-----------|---|
| I | Awareness | 1.5 hours | every certified EMS provider |
| II | Operations | 7 hours | experienced EMS providers and Supervisors who will serve as Unit Leaders |
| III | Supervisor | 16 hours | Medical Group Supervisors |
| IV | Emergency Operations Center | 8 hours | individuals who will represent the EMS function in jurisdiction Emergency Operations Centers |

THE VIRGINIA APPROACH

Virginia has developed a credible capability to respond to mass casualty incidents through a building block approach. Preparedness was first addressed as a training effort. In 1996 the Virginia Office of Emergency Medical Services published a 1.5 hour Mass Casualty Incident Management Awareness Level training program as part of a four module series (see Figure 1). This course was adopted as supplemental material to the Emergency Medical Technician-Basic

Course—every new emergency medical services provider is supposed to receive this training. In early 1997 the second module of this program, the Operations Level, was published to provide training to more experienced providers to qualify them to serve as Unit Leaders within a Medical Group.

The combination of Modules I and II had three important impacts on how response to a mass casualty event functioned. First, a standard set of initial actions, known as the 5 Ss, was taught to every responder (see Figure 2).

Figure 2. The Virginia 5 S Initial Action Set

| Letter - Key Word | Desired Action |
|-------------------|---|
| S - Safety | assess the safety of the scene to determine if emergency medical services resources can enter |
| S - Size-up | quickly assess the overall characteristics of the incident including size, area covered, severity, access routes, and additional resources needed |
| S - Send | advise dispatch and the command hospital of the size-up and request additional resources as appropriate |
| S - Set-up | take the first actions to assume command (if first on scene) or to establish the Medical Group |
| S - START | start performing START triage |

Source: Commonwealth of Virginia. Department of Health, Office of Emergency Medical Services, Mass Casualty Incident Management Awareness Level Instructor Manual, Richmond, VA, Virginia Office of Emergency Medical Services, 2000.

Second, the use of START triage was identified as the first step in actually determining the medical characteristics of the incident. START has been widely advocated as providing a very rapid means of assessing patients. If rapid assessment is tied to rapid reporting of the results to the Medical Group Supervisor, we have the earliest possible identification of the number and severity of patients. This data provides the basis for effective resource ordering.

Third, this training effectively established the organization of mass casualty response as a standardized Incident Command System Medical Group under the leadership of a Group Supervisor, with Unit Leaders for Extrication, Triage, Treatment, and Transportation. Training was supported by the publication of standard checklists (Commonwealth of Virginia 1997a) and tactical worksheets (Commonwealth of Virginia 1997b) for each duty position.

These actions put in place training to improve responder efficiency, an initial response protocol, an algorithm for assessment, and a standard field organization structure. The next component of mass casualty management, the hospital system presents a varied picture. At the simplest level of analysis Virginia has 12 Trauma Centers in a three level system. This number may increase as a result of Trauma Triage guidelines that require all trauma patients to be transferred from acute care hospitals to Trauma Centers for definitive care (Head 2000). However, regardless of their quality in caring for single badly injured patients, all Trauma Centers are not created equal in capacity, and only the five Level I Trauma Centers have the capability to accept large numbers of patients in a mass casualty incident.

Ability to accept large numbers of patients in a mass casualty incident depends on regional capability to direct patients to appropriate facilities with vacant beds. In Virginia, this has been addressed at a regional basis, with regional plans, patient and capacity tracking drills, and exercises providing some measure of readiness. As staffed beds in hospitals shrink in numbers and bed utilizations during periods of disease outbreaks approach 100 percent, the ability to manage patient distribution becomes more important. Of the twelve Emergency Medical Services Regional Councils, seven have established systems that have demonstrated the ability to effectively manage regional response.

In 1988 the Report of the Governor's Task Force on Emergency Medical Response Disaster Planning assigned responsibility for managing regional response to very large events to the five regional Level I Trauma Centers. This structure served as the basis for the development of a Plan for Coordination of Health and Medical Response to Catastrophic Casualty Events (Commonwealth of Virginia 1998), specifically designed to provide a framework for managing events that generate 500 or more patients. The catastrophic casualty plan envisions four basic cases (see Figure 3), based on the severity of the incident.

The catastrophic casualty plan was tested in MEDEX 98, a state level medical tabletop exercise. That exercise highlighted the need for a means of tracking individual patients as they move through the system. TRANSAID, a National Disaster Medical System patient tracking software developed by Ed Summerfield of the Castle Point Veterans Affairs Medical Center, was adopted as the application to be used in this role in the Emergency Support Center, the state Office of Emergency Medical Service's emergency operations center. Subsequently TRANSAID was tested in a 1999 patient tracking exercise conducted by Old Dominion Emergency Medical Services Alliance regional hospitals, successfully recording patient movements and status for 200 patients in a 45 minute period. As a result, at least one region (the Old Dominion Emergency Medical Services Alliance) has standardized TRANSAID as the patient tracking system for use for events that can be managed using the region's resources.

The final step in managing mass casualty incidents that Virginia has addressed is the course of action needed when patients exceed the statewide system capacity. The issue of statewide capacity is important due to the time required to mobilize and bring in out-of-state resources. In some cases cross-border capacity is also important as patients from some regions of Virginia are routinely moved to hospitals in other states, and one Virginia Trauma Center is actually located in Tennessee. If a patient can be transported to a bed 300 miles distant in

Virginia in 6 hours, that patient will reach definitive care far faster than waiting 8 to 24 hours for deployment of a Disaster Medical Assistance Team that can only provide entry level care not meeting trauma center standards. Similarly, waiting for National Disaster Medical System airlift as long as beds are available in Virginia makes no sense.

Figure 3. Virginia Catastrophic Casualty Plan Responses Based on Incident Severity

| Situation | Actions |
|---|--|
| Region capacity not exceeded | regional command hospital manages patient allocation |
| Region capacity is exceeded, but patients can be accommodated in the neighboring region | coordination between the two regions determines to where patients will be transported |
| Patients will have to be shared between more than two regions | Emergency Support Center coordinates patient allocation |
| Patient numbers exceed state bed capacity | patients transferred to airlift and hospital component of the National Disaster Medical System |

Note: The Emergency Support Center is the state health and medical function (ESF-8) emergency operations center located in the Office of Emergency Medical Services.

Source: Commonwealth of Virginia, Department of Health, Office of Emergency Medical Services, Virginia Health and Medical (ESF-8) Plan for Coordination of Health and Medical Response to Catastrophic Casualty Events. Richmond, VA: Virginia Office of Emergency Medical Services, 1998.

However, there are credible scenarios in which more patients would be generated than in-state beds could accommodate. As a result, state level mass casualty planning incorporates transfer of patients to the National Disaster Medical System. Virginia practiced receipt of patients in BRIGHT STAR 99, an airlift exercise coordinated by the Central Virginia Federal Coordinating Center in May 1999. However, there is a clear shortfall in outbound patient movement planning with no identifiable federal pre-planning with state health officials.

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