Chapter IX
EMERGENCY MEDICAL SERVICES RESPONSE

The tragic scenes that occurred at Virginia Tech are the worst that most emergency medical service (EMS) providers will ever see. Images of so many students and faculty murdered or seriously injured in such a violent manner and the subsequent rescue efforts can only be described by those who were there. This chapter discusses the emergency medical response on April 16 to victims including their pre-hospital treatment, transport, and care in hospitals.

Interviews were conducted with first responders, emergency managers, and hospital personnel (physicians, nurses, and administrators) to determine:

- The on-scene EMS response.
- Implementation of hospital multi-casualty plans and incident command systems.
- Pre-hospital and in-hospital initial patient stabilization.
- Compliance with the National Incident Management System (NIMS).
- Communications systems used.
- Coordination of the emergency medical care with police and EMS providers.

Evaluating patient care subsequent to the initial pre-hospital and hospital interventions was beyond the scope of this investigation. Fire department personnel were not interviewed because there were no reports of their involvement in patient care activities

Although there is always opportunity for improvement, the overall EMS response was excellent and the lives of many were saved. The challenges of systematic response, scene and provider safety, and on-scene and hospital patient care were effectively met. Responders are to be commended. The results in terms of patient care are a testimony to their medical education and training for mass casualty events, dedication, and ability to perform at a high level in the face of the disaster that struck so many people.

The Virginia Tech Rescue Squad and Blacksburg Volunteer Rescue Squad were the primary agencies responsible for incident command, triage, treatment, and transportation. Many other regional agencies responded and functioned under the Incident Command System (ICS). The Blacksburg Volunteer Rescue Squad (BVRS) personnel and equipment response was timely and strong. Virginia Tech Rescue Squad (VTRS), the lead EMS agency in this incident, is located on the Virginia Tech campus and is the oldest collegiate rescue squad of its kind nationwide. It is a volunteer, student-run organization with 38 members.[1] Their actions on April 16 were heroic and demonstrated courage and fortitude.

WEST AMBLER JOHNSTON INITIAL RESPONSE

The first EMS response was to the West Ambler Johnston (WAJ) residence hall incident. At 7:21 a.m., VTRS was dispatched to 4040 WAJ for the report of a patient who had fallen from a loft. In 3 minutes, at 7:24 a.m., VT Rescue 3 was en route. While en route, dispatch advised that a resident assistant reported a victim lying against a dormitory room door and that bloody footprints and a pool of blood were seen on the floor. VT Rescue 3 arrived on scene at 7:26 a.m., 5 minutes from the time of dispatch. This response time falls within the nationally accepted range.[2]

[1] VTRS. (2007). *April 16, 2007: EMS Response.* Presentation to the Virginia Tech Review Panel. May 21, 2007, The Inn at Virginia Tech.

[2] NFPA (2004). NFPA 1710: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.* National Fire Protection Association: Battery March Park, MA.

At 7:29 a.m., Rescue 3 accessed the dorm room to find two victims with gunshot wounds, both obviously in critical condition. At 7:31 a.m., it requested a second advanced life support (ALS) unit and ordered activation of the all-call tone requesting all available Virginia Tech rescue personnel to respond to the scene. The "all-call" request is a normal procedure for VTRS to respond to an incident with multiple patients. Personnel from BVRS responded to WAJ as well.

At 7:48 a.m., VT Rescue 3 requested that Carilion Life-Guard helicopter be dispatched and was informed that its estimated time of arrival was 40 minutes. It was decided to dispatch the helicopter to Montgomery Regional Hospital (MRH). Carilion Life-Guard then advised that they were grounded due to weather and never began the mission.

One of the victims in 4040 WAJ was a 22-year-old male with a gunshot wound to the head. He was in cardiopulmonary arrest. CPR was initiated, and he was immobilized using an extrication collar and a long spine board. VT Rescue 3 transported him to MRH. During communications with the MRH online physician, CPR was ordered to be discontinued. He arrived at the hospital DOA.[3]

The second victim was an 18-year-old female with a gunshot wound to the head. She was treated with high-flow oxygen via mask, two IVs were established, and cardiac monitoring was initiated. She was immobilized with an extrication collar and placed on a long spine board. At 7:44 a.m., she was transported by VT Rescue 2 to MRH. During transport, her level of consciousness began to deteriorate and her radial pulse was no longer palpable.[4] Upon arrival at MRH, endotracheal intubation was performed. At 8:30 a.m., she was transferred by ground ALS unit to Carilion Roanoke Memorial Hospital (CRMH), a Level I trauma center in Roanoke, Virginia.[5]

[3] EMS Patient Care Report Q0669603.

[4] EMS Patient Care Report Q0669604.

[5] Turner, K. N., and Davis, J. (2007). *Public Safety Timeline for April 16, 2007*. Unpublished Report. Montgomery County Department of Emergency Services, p. 4.

Following CPR that occurred en route she was pronounced dead at CRMH.[6]

Based on the facts known, the triage, treatment, and transportation of both WAJ victims appeared appropriate. The availability of helicopter transport likely would not have affected patient outcomes. Their injuries were incompatible with survival.

NORRIS HALL INITIAL RESPONSE

At 9:02 a.m., VT Rescue 3 returned to service following the WAJ incident. VT Rescue 2 continued equipment cleanup at MRH when the call for the Norris Hall shootings came in. At approximately 9:42 a.m., VTRS personnel at their station overheard a call on the police radio advising of an active shooter at Norris Hall. Many EMS providers were about to respond to the worst mass shooting event on a United States college campus.

Upon hearing the police dispatch of a shooting at Norris Hall, the VTRS officer serving as EMS commander immediately activated the VTRS Incident Action Plan and established an incident command post at the VTRS building. VT Rescue 3, staffed with an ALS crew, stood by at their station. At about 9:42 a.m., VTRS requested the Montgomery County emergency services coordinator to place all county EMS units on standby and for him to respond to the VTRS Command Post. "Standby" means that all agency units should be staffed and ready to respond. Each agency officer in charge is supposed to notify the appropriate dispatcher when the units are staffed.

The Montgomery County Communications Center immediately paged out an "all call" alert (9:42 a.m.) advising all units to respond to the scene at Norris Hall.

The EMS responses to West Ambler Johnston and Norris halls occurred in a timely manner. However, for the shootings at Norris Hall, all EMS units were dispatched to respond to the

[6] EMS Patient Care Report Q0019057.

scene at once contrary to the request. Subsequently, the Montgomery County emergency services coordinator requested dispatch to correct the message in time to allow for most of the incoming squads to proceed to the secondary staging area at the BVRS station.

At 9:46 a.m., VTRS was dispatched by police to Norris Hall for multiple shootings—4 minutes after VTRS monitored the incident (9:42 a.m.) on the police radio. The VTRS EMS commander advised VT dispatch that the VTRS units would stand by at the primary staging site until police secured the shooting area. At 9:48 a.m., the EMS commander also requested the VT police dispatcher to notify all responding EMS units from outside Virginia Tech to proceed to the secondary staging area at BVRS instead of responding directly to Norris Hall.

The VTPD and the Montgomery County Communications Center issued separate dispatches for EMS units, which led to some confusion in the EMS response.

EMS INCIDENT COMMAND SYSTEM

At the national level, Homeland Security Presidential Directives (HSPDs) 5 and 8 require all federal, state, regional, local, and tribal governments, including EMS agencies, to adopt the NIMS, including a uniform ICS.[7] The Incident Management System is defined by Western Virginia EMS Council in their Mass Casualty Incident (MCI) Plan as:

> A written plan, adopted and utilized by all participating emergency response agencies, that helps control, direct and coordinate emergency personnel, equipment and other resources from the scene of an MCI or evacuation, to the transportation of patients to definitive care, to the conclusion of the incident.[8]

Overall, the structure of the EMS ICS was effective. The ICS as implemented during the incident is compared in Figure 13 and Figure 14 to NIMS ICS guidelines. Figure 13 shows the Virginia Tech EMS ICS structure as implemented in the incident.[9] Although it did not strictly follow NIMS guidelines, it included most of the necessary organization. Figure 14 shows the Model ICS structure based on the NIMS guidelines.

EMS Command – An EMS command post was established at VTRS. The BVRS officer-in-charge who arrived at Norris Hall reportedly was unable to determine if an EMS ICS was in place. Since each agency has its own radio frequency, the potential for miscommunication of critical information regarding incident command is possible. To enhance communications, EMS command reportedly switched from the VTRS to the BVRS radio frequency. In addition, to shift routine communications from the main VT frequency, EMS command requested units to switch to alternate frequency, VTAC 1. Some units were confused by the term VTAC 1. Eventually, all units switched to the Montgomery County Mutual Aid frequency.

The fact that BVRS was initially unaware that VTRS had already established an EMS command post could have caused a duplication of efforts and further organizational challenges. Participants interviewed stated that once a BVRS officer reported to the EMS command post, communications between EMS providers on the scene improved. The Montgomery County emergency management coordinator was on the scene and served as a liaison between the police tactical command post and the EMS incident command post, which also helped with communications.

Because BVRS and VTRS are on separate primary radio frequencies, BVRS reportedly did not know where to stage their units. In addition, BVRS units reportedly did not know when the police cleared the building for entry.

[7] Bush, G. W. (2003). December 17, 2003 Homeland Security Presidential Directive/HSPD–8.

[8] WVEMS. (2006). *Mass Casualty Incident Plan: EMS Mutual Aid Response Guide*: Western Virginia EMS Council, Section 2.1.7, p. 2.

[9] VTRS. (2007). *April 16, 2007: EMS Response.* Presentation to the Virginia Tech Review Panel. May 21, 2007, The Inn at Virginia Tech.

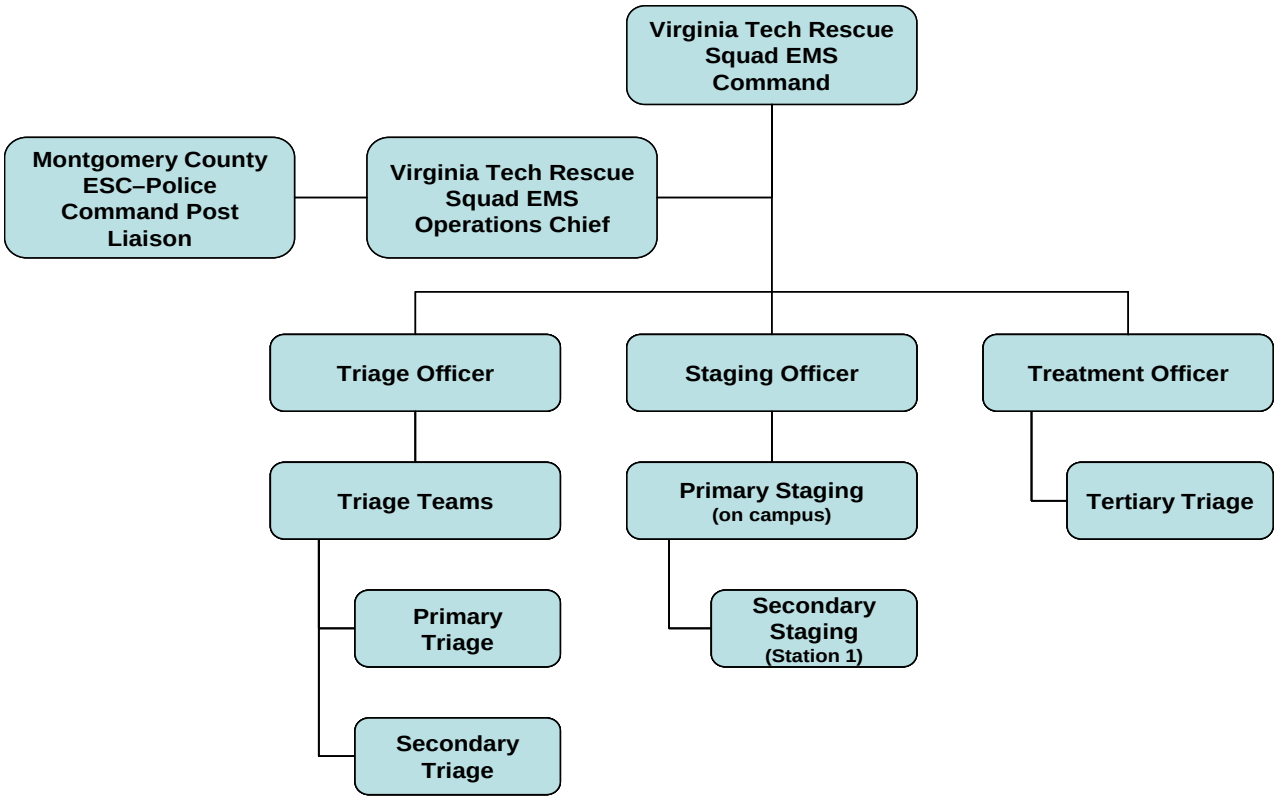


Figure 13. Virginia Tech EMS ICS as Implemented in the Incident

Another issue concerned the staging of units and personnel. EMS command correctly advised dispatch that assignments and staging would be handled by EMS command.[10]

Triage – The VTPD arrived at Norris Hall at 9:45 a.m. At 9:50 a.m., the VTPD and Blacksburg police emergency response teams (ERTs) arrived at Norris Hall, each with a tactical medic. At 9:50 a.m., two ERT medics entered Norris Hall where they were held for about 2 minutes inside the stairwell before being allowed to proceed. At 9:52 a.m., the two medics, one from VTRS and one from BVRS, began triage. Medics initially triaged those victims brought to the stairwells while police were moving them out of the building. As victims exited the building, some walked and some were carried out and transported by police SUV's and other mobile units to the safer EMS treatment areas.

The triage by ERT medics inside the Norris Hall classrooms had two specific goals: first, to identify the total number of victims who were alive or dead; and second, to move ambulatory victims to a safe area where further triage and treatment could begin. The tactical medics employed the START triage system (Simple Triage and Rapid Treatment) to quickly assess a victim and determine the overall incident status. The START triage is a "method whereby patients in an MCI are assessed and evaluated on the basis

[10] Turner, K.N., & Davis, J. (2007). *Public Safety Timeline for April 16, 2007*. Unpublished Report. Montgomery County Department of Emergency Services, p. 6.

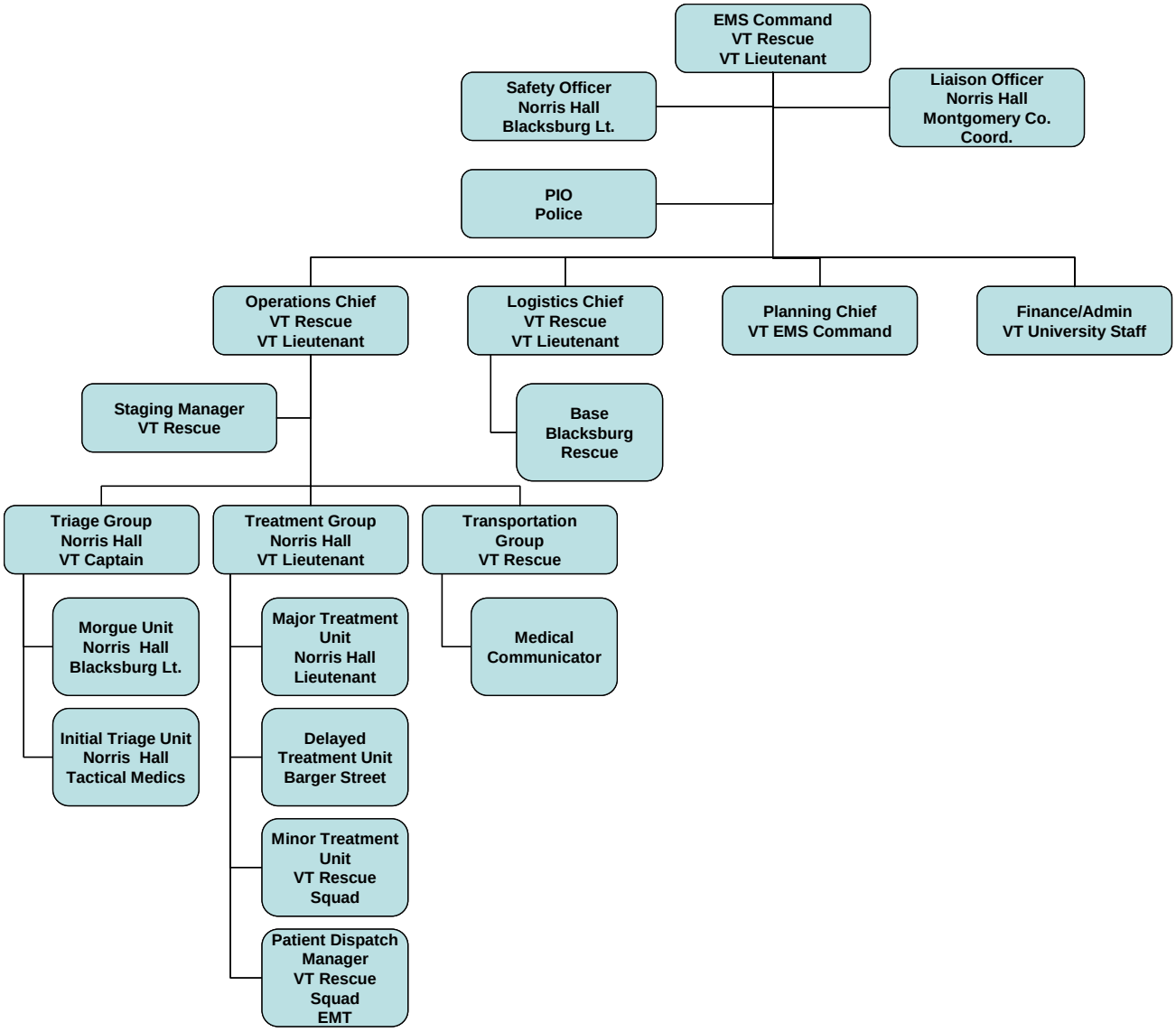


Figure 14. Model ICS Based on the NIMS Guidelines

of the severity of injuries and assigned to treatment priorities."[11] Patients are classified in one of four categories (Figure 15). Colored tags are affixed to patients corresponding to these categories.

In an incident of this nature, the triage team must concentrate on the overall situation instead

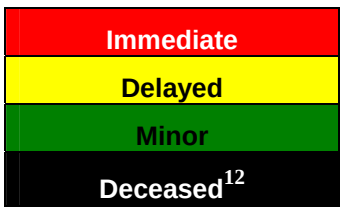


Figure 15. START Triage Patient Classifications

[11] WVEMS. (2006). *Mass Casualty Incident Plan: EMS Mutual Aid Response Guide*: Western Virginia EMS Council, Section 2.1.8, p. 2.

[12] Critical Illness and Trauma Foundation, Inc. (2001). *START—Simple Triage and Rapid Treatment*. http://www.citmit.org/start/default.htm

of focusing on individual patient care. Patient care is limited to quick interventions that will make the difference between life and death. The medics systematically approached the initial triage, with one assessing victims in the odd-numbered rooms on the second floor of Norris Hall while the other assessed victims in the even-numbered rooms. The medics were able to quickly identify those victims who were without vital signs and would likely not benefit from medical care. This initial triage by the two tactical medics accompanying the police was appropriate in identifying patient viability. The medics reported "a tough time with radio communications traffic" while triaging in Norris Hall.

The triage medics identified several patients who required immediate interventions to save their lives. Some victims with chest wounds were treated with an Asherman Chest Seal (Figure 16). It functions with a flutter valve to prevent air from entering the chest cavity during inhalation and permits air to leave the chest cavity during exhalation. This is a noninvasive technique that can be applied quickly with low risk. It was reported that a female victim with chest wounds benefited by the immediate application of the seal. Since the scene was not yet secured at this point to allow other EMS providers to enter, the tactical medics quickly instructed some police officers how to use the seal.

Figure 16. Asherman Chest Seal[13]

[13] ACS (2007). Asherman Chest Seal. http://www.compassadvisors.biz

A decision was quickly made to treat a 22-year-old male victim who exhibited a profuse femoral artery bleed by applying a commercial-brand tourniquet (Figure 17) to control the bleeding. The patient was transported to MRH, where surgical repair was performed and he survived. The application of a tourniquet was likely a lifesaving event.

Figure 17 Tourniquet[14]

At approximately 10:09 a.m., VTPD dispatch notified EMS command that the "shooter was down" and that EMS crews could enter Norris Hall. EMS command assigned a lieutenant from VTRS to become the triage unit leader. Triage continued inside and in front of Norris Hall. Some critical patients at the Drillfield side and others at the secondary triage (critical treatment unit) Old Turner Street side of Norris Hall were placed in ambulances and transported directly to hospitals. Noncritical patients were moved to a treatment area at Stanger and Barger Streets.

A BVRS officer and crew arrived at Norris Hall and began to retriage victims. Their reassessment confirmed that 31 persons were dead. Based on the evidence available, the decision not to attempt resuscitation on those originally triaged as dead was appropriate. No one appeared to have been mistriaged. A medical director (emergency physician) for a Virginia State Police Division SWAT team responded with his team to the scene. He was primarily staged at Burress Hall and was available to care for wounded

[14] Medgadget (2007). http://www.medgadget.com

officers if needed. There were no reports of injuries to police officers.

Interviews of prehospital and hospital personnel revealed that triage ribbons or tags were not consistently used on victims. The standard triage tags were used on some patients but not on all. These triage tags, shown in Figure 18, are part of the Western Virginia EMS Trauma Triage Protocol and can assist with record keeping and patient follow-up.[15] Not using the tags may have led to some confusion regarding patient identification and classification upon arrival at hospitals.

Treatment – Patients were moved to the treatment units based on START guidelines. The treatment group was divided into three units: a critical treatment unit, a delayed treatment unit and a minor treatment unit. The critical treatment unit was located at the Old Turner Street Side of Norris Hall where patients with immediate medical care needs (red tag) received care. Patients who were classified as less critical (yellow tag) were moved to the delayed treatment unit at Stanger and Barger Streets. Patients with minor injuries, including walking wounded/ worried well (green tag) were moved to a minor treatment unit at VTRS (Figure 19). "Worried well" are those who may not present with injuries but with psychological or safety issues.

Patients were moved to the treatment units in various ways. Some critical patients were carried out of Norris Hall by police and EMS personnel. Others were moved via vehicles, while those less critical walked to the delayed treatment or minor treatment units. EMS command assigned leaders to each of the units.

The weather was a significant factor with wind gusts of up to 60 mph grounding all aeromedical services and hampering the use of EMS equipment. This included tents, shelters, and treatment area identification flags that could not be

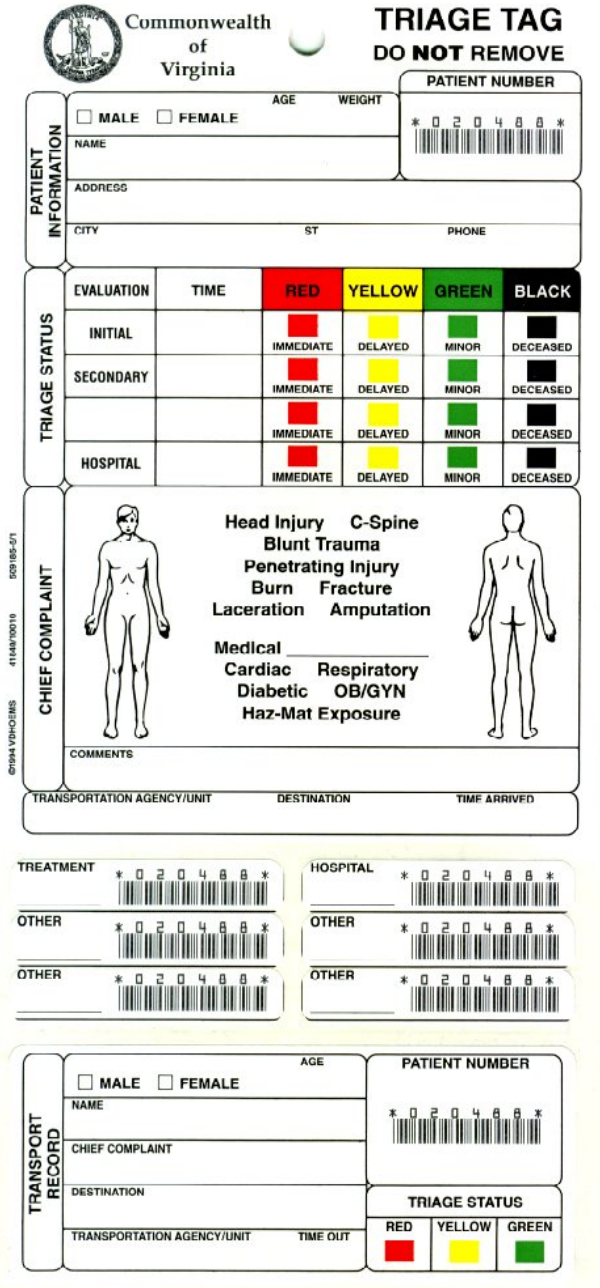


Figure 18. Virginia Triage Tag

set up or maintained. Large vehicles such as trailers and mobile homes, often used for temporary shelter, had difficulty responding as high winds made interstate driving increasingly hazardous. The incident site was close to ongoing construction. High winds blew debris, increasing danger to patients and providers and impeding patient care. To protect the walking wounded/ worried well from the environment, patients

[15] WVEMS. (2006). *Mass Casualty Incident Plan: EMS Mutual Aid Response Guide*: Western Virginia EMS Council., Section 22.3, p. 13.

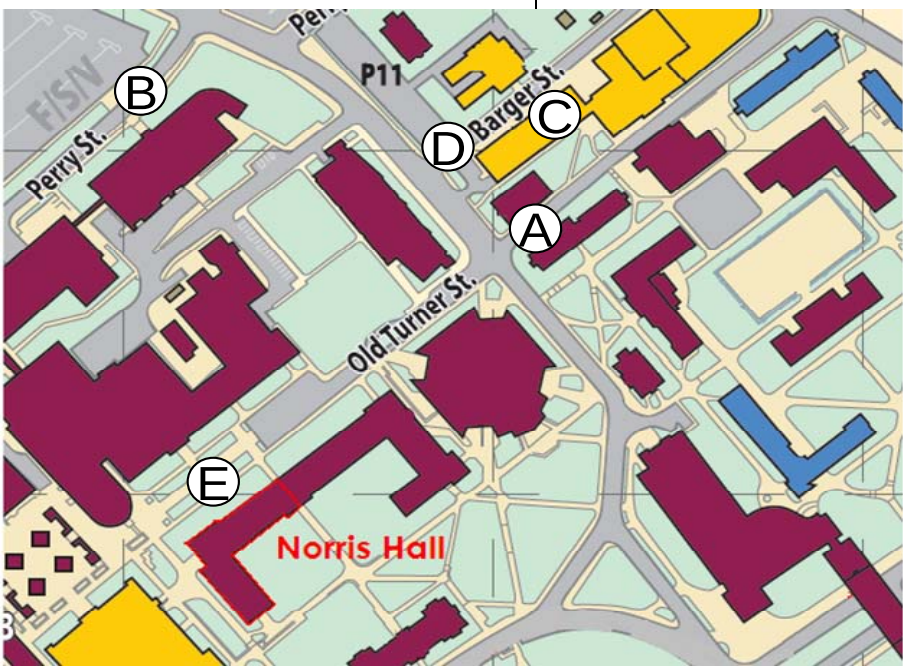


Figure 19. Initial Location of Treatment Units

were moved to the minor treatment unit at the VTRS building.

Twelve EMS patient care reports (PCRs) were available for review. In some cases PCRs were not completed, and in other cases not provided upon request. In multiple casualty incident situations, EMS providers can use standard triage tags in place of the traditional PCR; however, no triage tag records were provided, as noted earlier.

Based on the PCRs available and the interviews of EMS and hospital personnel, it appears that the patient care rendered to Norris Hall victims was appropriate.

Transportation – EMS command appointed a transportation group leader who assigned patients to ambulances and specific hospital destinations. Christiansburg Rescue Squad (CRS) responded with BLS and ALS units and was among the first in line at Norris Hall. CRS, BVRS, CPTS, and Longshop–McCoy Rescue Squad transported critical patients to area hospitals. CPTS ambulances from Giles, Radford, and Blacksburg as well as some of their Roanoke-based units, including Life-Guard flight and ground critical care crews, responded in mass to the incident either at Norris Hall or by interfacility transport of critical victims. By 10:51 a.m., all patients from Norris Hall were either transported to a hospital, or moved to the delayed or minor treatment units. In addition to VTRS, 14 agencies responded to the incident with 27 ALS ambulances and more than 120 EMS personnel (Table 4). Some agencies delayed routine interfacility patient transports or "back filled" covering neighboring communities through preset mutual aid agreements. Agency supervisors and administrators were working effectively behind the scenes procuring

Table 4. EMS Response
14 Assisting Agencies[16]

Montgomery County Emergency Services Coordinator
Blacksburg Volunteer Rescue Squad
Christiansburg Rescue Squad
Shawsville Rescue Squad
Longshop-McCoy Rescue Squad
Carilion Patient Transportation Services
Salem Rescue Squad
Giles Rescue Squad
Newport Rescue Squad
Lifeline Ambulance Service
Roanoke City Fire and Rescue
Vinton First Aid Crew
Radford University EMS
City of Radford EMS

the necessary resources and supporting the response of their EMS crews. These agencies demonstrated an exceptional working relationship, likely an outcome of interagency training and drills.

False Alarm Responses – At 10:58 a.m., EMS command was notified of a reported third shooting incident at the tennis court area on Washington Street that proved to be a false alarm. At 11:18 a.m., EMS command was notified of a bomb threat at Norris and Holden Halls that also proved to be false. Due to safety concerns, EMS command ordered the staging area moved from Barger St. to Perry St.

Post-Incident Transport of the Deceased – At 4:03 p.m., the medical examiner authorized removal of the deceased from Norris Hall to the medical examiner's office in Roanoke. Due to another rescue incident in the Blacksburg area, units were not available until 5:15 p.m. to begin transport of the deceased. Several options were considered including use of a refrigeration truck, funeral coaches, or EMS units. EMS command, in consultation with the medical examiner's representative, determined that EMS units from several companies would transport the deceased to Roanoke. In general, front-line EMS units are not used to transport the deceased. In this instance, however, the use of EMS units was acceptable because emergency coverage was not neglected and the rescuers felt that the sight of a refrigeration truck and funeral coaches on campus would be undesirable.

The decedents were placed two to a unit for transport. A serious concern raised by EMS providers was an order given by an unidentified police official that the decedents be transported to Roanoke under emergency conditions (lights and sirens). Due to safety considerations, EMS command modified this order.

The police order to transport the deceased under emergency conditions from Norris Hall to the medical examiners office in Roanoke was inappropriate for several reasons:

- It is not within law enforcement's scope of practice to order emergency transport (red lights and siren) of the deceased.
- There was no benefit to anyone by transporting under emergency conditions.
- A 30-minute or longer drive to Roanoke, during bad weather, with winds gusting above 60 mph, exposes EMS personnel to unnecessary risks.
- Transporting under emergency conditions increases the possibility of vehicle crashes with risk to civilians.

Critical Incident Stress Management – Although no physical injuries were reported, psychological and stress- related issues can subsequently manifest in EMS providers. Local and regional EMS providers participated in critical incident stress management activities such as defusings and debriefings immediately post-incident.

[16] VTRS. (2007). *April 16, 2007: EMS Response.* Presentation to the Virginia Tech Review Panel. May 21, 2007, The Inn at Virginia Tech.

HOSPITAL RESPONSE

Patients from Virginia Tech were treated at five area hospitals:

- Montgomery Regional Hospital
- Carilion New River Valley Hospital
- Lewis–Gale Medical Center
- Carilion Roanoke Memorial Hospital
- Carilion Roanoke Community Hospital

Twenty-seven patients are known to have been treated by local emergency departments. Some others who were in Norris Hall may have been treated at other hospitals, medical clinics, or doctor's offices including their own primary care providers; but there are no known accounts.

Overall, the local and regional hospitals quickly implemented their hospital ICS and mobilized resources. Aggressive measures were taken to postpone noncritical procedures, shift essential personnel to critical areas, reinforce physician staffing, and prepare for patient surge. Three hospitals initiated their hospital-wide emergency plans. One hospital, a designated Level I trauma center, did not feel that a full-scale, hospital-wide implementation of their emergency plan was necessary.

The most significant challenge early on was the lack of credible information about the number of patients each expected to receive. The emergency departments did not have a single official information source about patient flow. Likely explanations for this were (1) an emergency operations center (EOC) was not opened at the university, and (2) the Regional Hospital Coordinating Center did not receive complete information that it should have under the MCI plan.[17]

Preparedness, patient care/patient flow, and patient outcomes were reviewed for each of the receiving hospitals.

[17] Personal communications, Morris Reece, Near Southwest Preparedness Alliance, June 15, 2007.

Montgomery Regional Hospital – The MRH emergency department, a Level III trauma center, received 17 patients from the Virginia Tech incident; two from West Ambler Johnston and 15 from Norris Hall. The patients from WAJ arrived at 7:51 and 7:55 a.m. The first patient from WAJ was the 22-year-old male with a gunshot wound to the head who was DOA. No further attempts at resuscitation were made in the emergency department.

The second patient from WAJ was the 18-year-old female who arrived in critical condition with a gunshot wound to the head. Upon arrival to the emergency department, she was unable to speak and her level of consciousness was deteriorating. Airway control via endotracheal intubation was achieved using rapid sequence induction. At 8:30 a.m., she was transported by ALS ambulance to Carilion Roanoke Memorial Hospital, the Level I trauma center for the region. She died shortly after arrival at CRMH.

HOSPITAL PREPAREDNESS: At 9:45 a.m., MRH was notified of shots fired somewhere on the Virginia Tech campus. Because they were unsure of the number of shooters or whether the incident was confined to campus, MRH initiated a lockdown procedure. Since the killing of a hospital guard at MRH in August 2006 (the Morva incident mentioned in Chapter VII), there has been heightened awareness at MRH regarding security procedures. At 10:00 a.m., information became available confirming multiple gunshot victims. A "code green" (disaster code) was initiated and the following actions were taken:

- The hospital incident command center was opened and preassigned personnel reported to command.
- The hospital facility was placed on a controlled access plan (strict lockdown). Only personnel with appropriate identification (other than patients) could enter the hospital and then only through one entrance.
- All elective surgical procedures were postponed.

- Day surgery patients with early surgery times were sent home as soon as possible.
- The emergency department was placed on divert for all EMS units except those arriving from the Norris Hall incident. The emergency department was staffed at full capacity. A rapid emergency department discharge plan was instituted. Stable patients were transferred from the emergency department to the outpatient surgery suite.

At 10:05 a.m., the first patient from Norris Hall arrived via self-transport. This patient was injured escaping from Norris Hall. MRH was unable to determine the extent of the Norris Hall incident based on the history and minor injuries of this patient. The Regional Hospital Coordinating Center (RHCC) was notified of the incident and asked to open. Although the RHCC had early notification of the incident, they too were not able to ascertain the extent of the crisis initially.

At 10:14 and 10:15 a.m., two EMS-transported patients from Norris Hall arrived. It was evident that MRH might continue to receive expected and unexpected patients. In preparation for the surge, MRH took the following additional actions:

- The Red Cross was alerted and the blood supply reevaluated.
- Additional pharmaceutical supplies and a pharmacist were sent to the emergency department.
- A runner was assigned to assist with bringing additional materials to and from the emergency department and the pharmacy.
- Disaster supply carts were moved to the hallways between the emergency department and outpatient surgery.[18]

[18] Montgomery Regional Hospital. (2007). Montgomery Regional Hospital VT Incident Debriefing. April 23, 2007, p. 1.

At 10:30 a.m. as the above actions were being taken, four more gunshot victims arrived via EMS transport from Norris Hall. Between 10:45 and 10:55 a.m., five additional patients arrived via EMS. Command designated a public information officer and, by 11:00 a.m., a base had been established where staff and counselors could assist family and friends of patients.

By 11:15 a.m., MRH was still unclear about how many additional patients to expect. (They had a total of 12 by this time.) The operations chief instructed an emergency administrator to respond to the Virginia Tech incident as an on-scene liaison to determine how many more patients would be transported to MRH. At 11:20 a.m., the emergency department administrator reported to the Virginia Tech command center. MRH said that the face-to-face communications were helpful in determining how many additional patients to expect.

At 11:40 a.m., MRH received its last gunshot victim from the incident. By 11:51 a.m., its on-scene liaison confirmed that all patients had been transported. At 12:12 p.m., the EMS divert was lifted. At 13:04 and 13:10 p.m., however, two additional patients from the incident arrived by private vehicle. At 13:35 p.m., the code green was lifted.

PATIENT CARE / PATIENT FLOW / PATIENT OUTCOMES: In all, 15 patients arrived at MRH from the Norris Hall incident (Table 5) and were managed well.

An emergency department (ED) nurse/EMT-C was assigned to online medical direction and assisted with directing patients to other hospitals. EMS was instructed to transport four patients to Carilion New River Valley Hospital and five patients to Lewis–Gale Medical Center. One patient from the Norris Hall incident was transferred from MRH to CRMH in Roanoke.

The hospital representatives reported that there were problems with patient identification and tracking. As noted earlier:

Table 5. Norris Hall Victims Treated by Montgomery Regional Hospital

Injuries	Disposition
GSW left hand – fractured 4th finger	OR and admission
GSW to right chest – hemothorax	Chest tube in OR and admission
GSW to right flank	OR and admission to ICU
GSW left elbow, right thigh	Admitted
GSW x 2 to left leg	OR and admission
GSW right bicep	Treated and discharged
GSW right arm, grazed chest wall; abrasion to left hand	Admitted
GSW right lower extremity; laceration to femoral artery	OR and ICU
GSW right side abdomen and buttock	OR and ICU
GSW right bicep	Treated and discharged
GSW to face/head	Intubated and transferred to CRMH
Asthma attack precipitated by running from building	Treated and discharged
Tib/fib fracture due to jumping from a 2nd-story window	OR and admission
First-degree burns to chest wall	Treated and discharged
Back pain due to jumping from a 2nd-story window	Treated and discharged

- An EOC was not activated at Virginia Tech. Establishing an EOC can enhance communications and information flow to hospitals.
- Triage tags were not used for all patients. This would have provided a discrete number for identifying and tracking each patient.

MRH activated its ICS as shown in Figure 20.

ACCOMMODATIONS FOR PATIENTS' FAMILIES AND FRIENDS: MRH accommodated families and friends of patients they treated in their emergency department. MRH was challenged by the need to provide assistance to those who were unsure of the status or location of persons they were trying to find (possibly victims). An open space on the first floor was used for family and friends to gather. Since Virginia Tech had not yet opened an EOC or family assistance center, some victims' family and friends chose to proceed to the closest hospital. Several family members and friends of victims came to MRH even though their loved ones were never transported there.

A psychological crisis counseling team was assembled at MRH to provide services to victims, their families and loved ones, and hospital staff.[19] Virginia State Police troopers were assigned to the hospital and were helpful in maintaining security.

At 11:30 a.m., a surgeon arrived from Lewis–Gale Hospital and was emergently credentialed by the medical staff office. This is notable as Lewis–Gale and MRH are not affiliated.

Police departments often rely on hospitals to help preserve evidence and maintain a chain of custody. MRH was able to gather evidence in the emergency department and operating rooms, including bullets, clothing, and patient identification. At 1:45 p.m., the Virginia State Police notified the hospital that all bullets and fragments were to be considered evidence. Internal communications issues included:

- The Nextel system was overwhelmed. Clinical directors were too busy to retrieve and respond to messages.
- Monitoring EMS radio communications was difficult due to noise and chatter.
- There was deficient communications between the university and MRH.
- An EOC could have been helpful with communications.

[19] Heil, J. et al. (2007). *Psychological Intervention with the Virginia Tech Mass Casualty: Lessons Learned in the Hospital Setting.* Report to the Virginia Tech Review Panel.

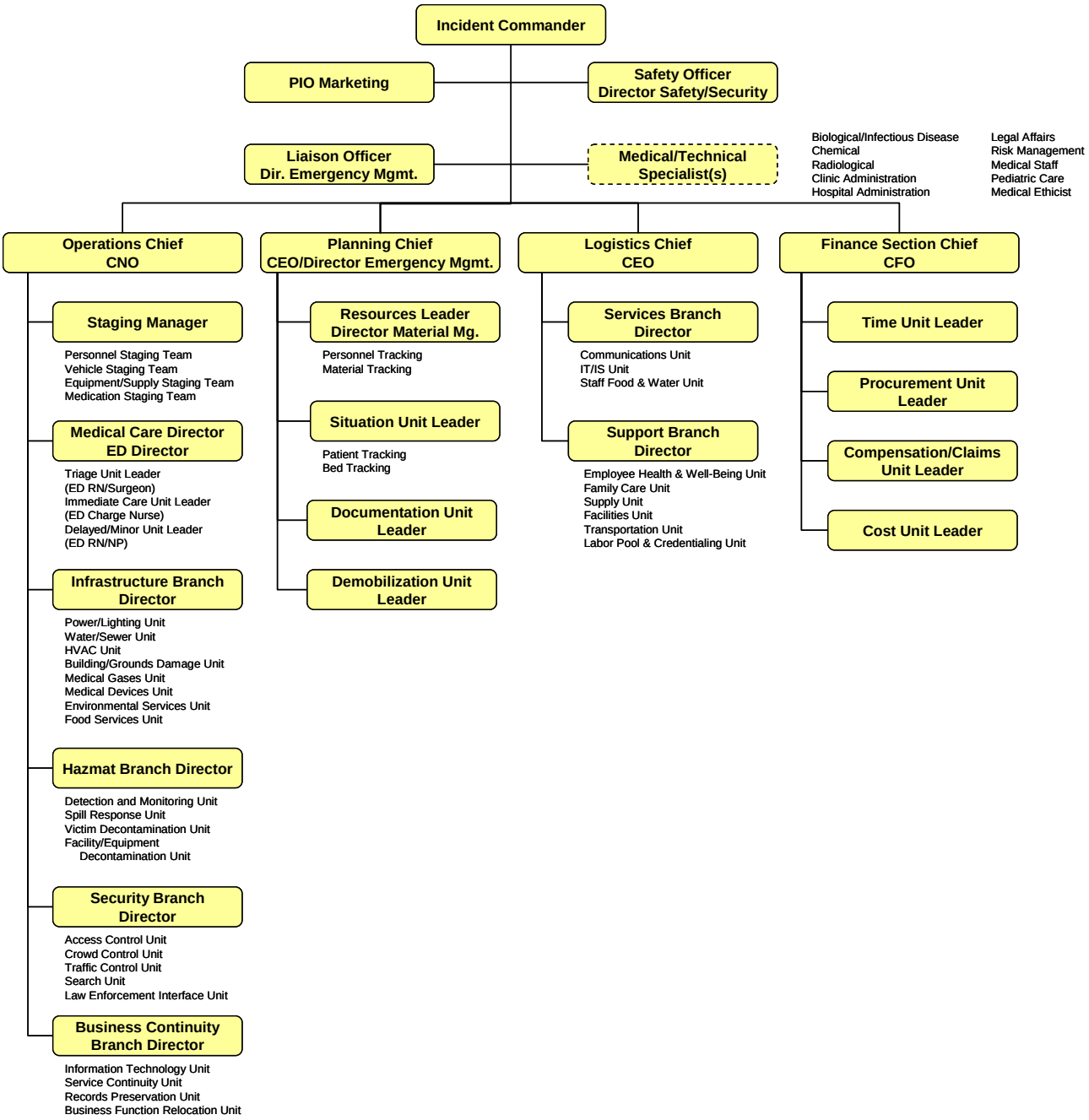


Figure 20. Montgomery Regional Hospital ICS

Carilion New River Valley Hospital – CNRVH is a Level III trauma center that received four patients with moderate to severe injuries.

HOSPITAL PREPAREDNESS: CNRVH initially heard unofficial reports of the WAJ shootings. They heard nothing further for over 2 hours until they received a call from MRH and also from an RN/medic who was on scene. They were called again later by MRH and advised that they would be receiving patients with "extremity injuries." They were also notified that MRH was on EMS divert.

While waiting for patients to arrive, the emergency department (ED) physician medical director assumed responsibility for the "regular" ED patients while the on-duty physicians were preparing to treat patients from Norris Hall. The on-duty hospitalist (a physician who is hired by the hospital to manage in-patient care needs) reported to the ED to make rapid decisions on whether current patients would be admitted or discharged.

The hospital declared a "code green" and their EOC was opened at 11:50 a.m. The incident commander was a social worker who had special training in hospital ICS. Security surveyed all patients with a metal detection wand because they were unsure who may be victims or perpetrators. A SWAT team from Pulaski County responded to assist with security.

PATIENT CARE/PATIENT FLOW/PATIENT OUTCOMES: Four patients were transported by EMS to CNRVH, each having significant injuries. The hospital managed the patients well and could have handled more. Table 6 lists the patient injuries and dispositions.

ACCOMMODATIONS FOR PATIENTS' FAMILIES AND FRIENDS: The hospital received many phone calls concerning the whereabouts of Virginia Tech shooting victims. Communications issues, particularly the lack of accurate information, were a big concern for the hospital; while providing accommodations for patients' families and friends and assisting others who were looking for their loved ones.

Table 6. Norris Hall Victims Treated by Carilion New River Valley Hospital

Injuries	Disposition
GSW to face, pre-auricular area, bleeding from external auditory canal, GCS of 7, poor airway, anesthesiologist recommended surgical airway	Surgical cricothyrotomy Transferred to CRMH by critical care ALS ambulance
GSW to flank and right arm, hypotensive	Immediately taken to OR; small bowel injury/resection
GSW to posterior thorax (exit right medial upper arm), additional GSWs to right buttock, and left lateral thigh	To OR for surgical repair of left femur fracture
GSW to right lateral thigh, exit thru right medial thigh, lodged in left medial thigh	Admitted in stable condition and observed; no vascular injuries

Lewis–Gale Medical Center – LGMC, a community hospital, received five patients from the Norris Hall shootings. The ICS structure used and their emergency response to the incident were appropriate. Multiple casualty incidents and use of the ICS were not new to LGMC. Their ICS had been recently tested after an outbreak of food poisoning at a local college.

HOSPITAL PREPAREDNESS: LGMC first became aware of the Norris Hall incident when a call was received requesting a medical examiner. They were unable to fulfill the request. At 11:10 a.m., they received a call from Montgomery Regional Hospital advising them of the incident. LGMC immediately declared a "code aster," which is their disaster plan.

The code aster was announced throughout the hospital, the EOC was opened, and the ICS was initiated. At 11:16 a.m., they were notified that MRH was on EMS diversion. At 11:32 a.m., they were notified that they were receiving their first patient suffering from a gunshot wound. In addition to preparing for the patients to arrive at their own hospital, LGMC sent a surgeon to MRH to assist with the surge of surgical patients there.

PATIENT CARE / PATIENT FLOW / PATIENT OUTCOMES: EMS transported five patients from the Norris Hall shootings to LGMC. Table 7 lists the patient injuries and dispositions. These patients were well managed.

Table 7. Norris Hall Victims Treated by Lewis–Gale Medical Center

Injuries	Disposition
GSW grazed shoulder and lodged in occipital area, did not enter the brain	Patient taken to surgery by ENT for debridement
GSW in back of right arm, bullet not removed	Patient admitted for observation
GSW to face, bullet fragment in hair, likely secondary to shrapnel spray	Treated in ED and released
Jumped from Norris Hall, 2nd floor, shattered tib/fib	Admitted, taken to surgery the next day
Jumped from Norris Hall, 2nd floor, soft tissue injuries, neck and back sprain, reportedly was holding hands with another jumper	Treated in ED and released

ACCOMMODATION FOR PATIENTS' FAMILY AND FRIENDS: No specific information was obtained from LGMC about accommodations for patients' families and friends. However, the hospital's needs for accurate information while accommodating patient families' and friends and assisting others in attempting to locate loved ones are similar for all emergency departments in times of mass casualty incidents.

Carilion Roanoke Memorial Hospital – This Level I trauma facility located in Roanoke received three critical patients transferred from local hospitals. Two patients were transported from MRH (one from the WAJ incident and one from the Norris Hall incident). The third patient was transferred from CNRVH (from the Norris Hall incident).

HOSPITAL PREPAREDNESS: CRMH did not initiate its hospital-wide disaster plan since standard procedures allowed for effective incident management with the relatively small number of patients received. They did initiate a "gold trauma alert" that brings to the ED three nurses, one trauma attending physician, one trauma fellow physician, one radiologist, one anesthesiologist, and a lab technician.

In addition to the patient transfers, CRMH received a trauma patient from another incident. The ED had three other emergency physicians physically present with others on standby. A neurosurgeon was also in the ED awaiting the arrival of transfer patients.

CRMH's concerns echoed those of the other hospitals who received patients from the Virginia Tech incident, including lack of clarity as to expected patient surge and the need for better regional coordination. It was suggested that the RHCC Mobile Communications Unit could have been dispatched to the scene.

PATIENT CARE / PATIENT FLOW / PATIENT OUTCOMES: CRMH appropriately triaged and managed well the patients they received. Adequate staffing and operating rooms were immediately available. Table 8 lists WAJ and Norris Hall victims treated at CRMH.

Table 8. WAJ and Norris Hall Victims Treated by Carilion Roanoke Memorial Hospital

Injuries	Disposition
Transfer from MRH, severe head injury	Pronounced dead in ED
Transfer from MRH, head and significant facial/jaw injuries, subsequent orotracheal intubation	Patient taken to OR for surgery, subsequently transferred to a facility closer to home
Transfer from CNRVH, GSW to face, subsequent cricothyrotomy	Patient taken to OR for surgery

Carilion Roanoke Community Hospital – CRCH is a community hospital located near and associated with CRMH. CRCH treated a self-transported student who was injured by jumping from Norris Hall. Table 9 lists the injuries and disposition of this patient.

Table 9. Norris Hall Victim Treated by Carilion Roanoke Community Hospital

Injuries	Disposition
Ankle contusion and sprain secondary to jumping	Treated and released

EMERGENCY MANAGEMENT

Multicasualty incidents often require coordination among state, regional, and local authorities. This section reviews the interrelationships of these authorities.

Virginia Department of Health – In 2002, the Virginia Department of Health (VDH) was awarded funding from the Health Resources and Services Administration (HRSA) National Bioterrorism Hospital Preparedness Program (NBHPP) for enhancement of the health and medical response to bioterrorism and other emergency events. As part of this process, VDH developed a contract with the Virginia Hospital and Healthcare Association (VHHA) to manage the distribution of funds from the HRSA grant to state acute care hospitals and other medical facilities and to monitor compliance. A small percentage of the HRSA funds were used within VDH to fund a hospital coordinator position, as well as to partially fund a deputy commissioner and other administrative positions. Substantially more than 85 percent of this HRSA grant funding was distributed to hospitals or used for program enhancement, including development of a web-based hospital status monitoring system, multidisciplinary training activities, behavioral health services, and poison control centers.

At the same time, VDH received separate funding from the Centers for Disease Control and Prevention (CDC) for the enhancement of public health response to bioterrorism and other emergency events. The position of VDH Deputy Commissioner for Emergency Preparedness and Response was created, with responsibility for both CDC and HRSA emergency preparedness funds. The physician in this position reports directly to the state health commissioner, who serves as the state health officer for Virginia.[20]

[20] Kaplowitz, L, Gilbert, C. M., Hershey, J. H., and Reece, M. D. (2007). *Health and Medical Response to Shooting Episode at Virginia Tech, April, 2007: A Successful Approach*. Unpublished Manuscript. Virginia Department of Health, p. 2.

The Virginia Department of Health regional planning approach aligns hospitals with health department planning regions. In collaboration with the 88 acute care hospitals in the Commonwealth, six hospital and healthcare planning regions were established, closely corresponding with five health department planning regions. Each of the six hospital planning regions has a designated Regional Hospital Coordinating Center (RHCC) located at or near the Level I trauma facility in the region as well as a regional hospital coordinator funded through the HRSA cooperative agreement.

Near Southwest Preparedness Alliance – The Near Southwest Preparedness Alliance (NSPA), which covers the Virginia Tech area, was developed under the auspices of the Western Virginia EMS Council pursuant to a memorandum of understanding between the Virginia Department of Health, the Virginia Hospital and Healthcare Association, and the NSPA. NSPA is organized to facilitate the development of a regional healthcare emergency response system and to support the development of a statewide healthcare emergency response system. Regional hospital preparedness and coordination will foster collaborative planning efforts between the several medical care facilities and local emergency response agencies in the established geographically and demographically diverse region.[21]

The "Near Southwest" region is defined as:

- 4th Planning District (New River area), which includes Floyd, Giles, Montgomery, and Pulaski counties and the City of Radford.
- 5th Planning District (Roanoke and Alleghany area), which includes Alleghany, Botetourt, Craig, and Roanoke counties as well as the cities of Covington, Roanoke, and Salem.
- 11th Planning District, which includes Amherst, Appomattox, Bedford, and

[21] Ibid.

Campbell counties; the cities of Lynchburg and Bedford; and the towns of Altavista, Amherst, Appomattox, and Brookneal.

- 12th Planning District (Piedmont area), which includes Franklin, Henry, Patrick and Pittsylvania counties and the cities of Danville and Martinsville

The region covers 7,798 square miles and houses a population of 910,900. It has 24 local governments and 16 hospitals.

Regional Hospital Coordinating Center – At the regional level, hospital emergency response coordination during exercises and actual events is provided by RHCCs that have been established to facilitate emergency response, communication, and resource allocation within and among each of the six hospital regions. These centers serve as the contact among healthcare facilities within the region and with RHCCs in other state regions. RHCCs are also linked to the statewide response system through the hospital representative seat at the VDH Emergency Coordinating Center (ECC) in Richmond, Virginia. The hospital seat at the ECC serves as the contact between the healthcare provider system and the statewide emergency response system. It provides a communication link to the Virginia Emergency Operations Center (VEOC).[22]

The primary responsibilities of the RHCC include:

- Provide a single point of contact between hospitals in the region and the VDH ECC.
- Collect and disseminate initial event notification to hospitals and public safety partners.
- Collect and disseminate ongoing situational awareness updates and warnings, including the management of the current bed availability in hospitals.
- Establish and manage WebEOC[23] and communications systems for the duration of the incident.
- Serve as the single point of contact and collaboration point for Virginia fire/EMS agencies for the purposes of hospital diversion management, movement of patients from an incident scene to receiving hospitals, and input/guidance with respect to hospital capabilities, available services, and medical transport decisions.
- Coordinate interhospital patient movement, transfers, and tracking
- Provide primary resource management to hospitals for:
  Personnel
  Equipment
  Supplies
  Pharmaceuticals.
- Coordinate regional expenditures for reimbursement.
- Coordinate regional medical treatment and infection control protocols during the incident as needed.
- Coordinate Virginia hospital requests for the Strategic National Stockpile through the local jurisdiction EOC.

The RHCC complements but does not replace the relationships and coordinating channels established between individual healthcare facilities and their local emergency operations centers and health department officials. The regional structure is intended to enhance the communication and coordination of specific issues related to the healthcare component of the emergency response system at both regional and state levels.

At 10:05 a.m. on April 16, MRH requested that the RHCC be activated. At 10:19 a.m., it was activated under a standby status and signed on

[22] Ibid.

[23] WebEOC is a web-based information management system that provides a single access point for the collection and dissemination of emergency or event-related information

to WebEOC.[24] By 10:25 a.m., the Virginia Department of Health also had signed on to WebEOC and monitored the event. At 10:40 a.m., the RHCC requested that all hospitals provide an update of bed status and diversion status for their facility. By 10:49 a.m., LGMC was the only hospital that signed on to WebEOC of the hospitals that had received patients from the Norris Hall incident. Pulaski County Hospital also signed on and provided their status. At 11:49 a.m. (1 hour later), MRH signed on followed by CNRVH at 12:33 p.m.[25]

The WebEOC boards (the RHCC Events Board and the Near Southwest Region Events Board) were used for a variety of communications between the RHCC, hospitals, and other state agencies. Some hospitals spent considerable time attempting to post information on the WebEOC boards. None of the EMS jurisdictions signed on to either of the boards. Not all hospitals or EMS agencies are confident in using WebEOC and require regular training drills for familiarity.

The hospitals and public safety agencies should have used the RHCC and WebEOC expeditiously to gain better control of the situation. Considering the many rumors and unconfirmed reports concerning patient surge, the incident could have been better coordinated. If the RHCC was kept informed as per the MCI plan, it could have acted as the one official voice for information concerning patient status and hospital availability.

Western Virginia EMS Mass Casualty Incident Plan – The Western Virginia EMS region encompasses the 7 cities and 12 counties of Virginia Planning Districts 4, 5, and 12. The region extends from the West Virginia border to the north and to the North Carolina border to the south. The region encompasses the urban and suburban areas of Roanoke and Danville, as well as many rural and remote areas such as those in Patrick, Floyd, and Giles counties. The region's total population (based on 1998 estimates) is 661,200. The region encompasses 9,643 square miles.

The region encompasses the counties of Alleghany, Botetourt, Craig, Floyd, Franklin, Giles, Henry, Montgomery, Patrick, Pittsylvania, Pulaski, and Roanoke (Figure 21).[26]

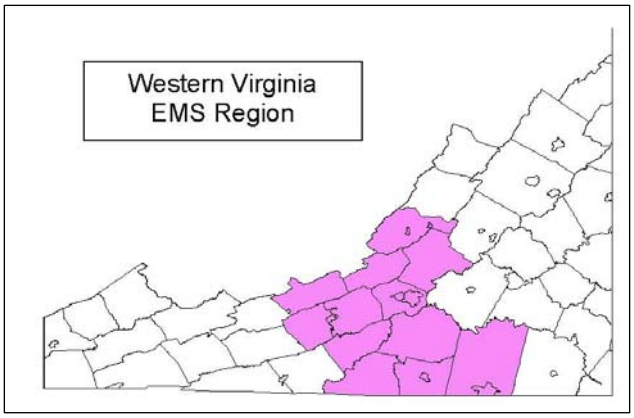


Figure 21. Map Showing Counties in the Western Virginia EMS Region[27]

Multicasualty Incidents – The Western Virginia EMS Mass Casualty Incident Plan (WVEMS MCI) plan defines a multiple casualty incident as "an event resulting from man-made or natural causes which results in illness and/or injuries that exceed the emergency medical services capabilities of a hospital, locality, jurisdiction and/or region."[28] Online medical direction is the responsibility of the MCI Medical Control, defined as:

> That medical facility, designated by the hospital community, which provides remote overall medical direction of the MCI or evacuation scene according to predetermined guidelines for the distribution of patients throughout the community.[29]

[24] Baker, B. (2007). *VA Tech 4-16-2007: RHCC Events Board*, p. 1.
[25] Baker, B. (2007). *April 16, 2007*: *Near Southwest Region Events Board,* p. 1.
[26] WVEMS. (2006). *Trauma Triage Plan*. Western Virginia EMS Council, Appendix E.
[27] Ibid.
[28] WVEMS. (2006). *Mass Casualty Incident Plan: EMS Mutual Aid Response Guide*: Western Virginia EMS Council, Section 2.1.1, p. 1.
[29] Ibid., Section 2.1.4, p. 1.

Access to online physician medical direction should be available. In MCI situations, modern EMS systems rely more on standing orders and protocols and less on online medical direction. Therefore, it may be more logical to have the RHCC coordinate these efforts, including patching in providers to online physician medical direction as needed.

The MCI plan identifies three levels of incidents based on the initial EMS assessment using the Virginia START Triage System:

- *Level 1* – Multiple-casualty situation resulting in less than 10 surviving victims.
- *Level 2* – Multiple casualty situation resulting in 10 to 25 surviving victims.
- *Level 3* – Mass casualty situation resulting in more than 25 surviving victims.[30]

The Virginia Tech incident clearly fits into the definition of a Level 3 MCI, since at least 27 patients were treated in local emergency departments.

Frustrating communications issues and barriers occurred during the incident. Every service operated on different radio frequencies making dispatch, interagency, and medical communications difficult. These issues included both on-scene and in-hospital situations that could be avoided. Specific communications challenges included the following:

- The radios used by responding agencies consisted of VHF, UHF, and HEAR frequencies. This led to on-scene communications difficulties and the inability for EMS command or Virginia Tech dispatch to assure that all units were aware of important information.
- Communications between the scene and the hospitals were too infrequent. Hospitals were unable to understand exactly what was going on at the scene. They were unable to determine the appropriate level of preparation.
- In several instances, on-scene providers called hospitals or other resources directly instead of through the ICS. This included relaying incorrect information to hospitals.
- Cell phones and blackberries worked intermittently and could not be relied upon. Officials did not have time to return or retrieve messages left on cell phones. A mobile cell phone emergency operating system was not immediately available to EMS providers.

Interviews with EMS and hospital personnel reiterated a well-known fact: face-to-face communications, when practical, is the preferred method.

From a technological standpoint, the NIMS requirement for interoperability is critical. Local communities must settle historical issues and move forward toward an efficient communications system.

Lack of a common communications system between on-scene agencies creates confusion and could have caused major safety issues for responders. Each jurisdiction having its own frequencies, radio types, dispatch centers, and procedures is a sobering example of the lack of economies of scale for emergency services. Local political entities must get past their inability to reach consensus and assure interoperability of their communications systems. In this case, the most reasonable and prudent action probably would be to expand the Montgomery County Communications System to handle all public safety communications within the county. Cooperation, consensus building, and the provision of adequate finances are required by emergency service leaders and governmental entities. Failure to accomplish this goal will leave the region vulnerable to a similar situation in the future with potentially tragic results.

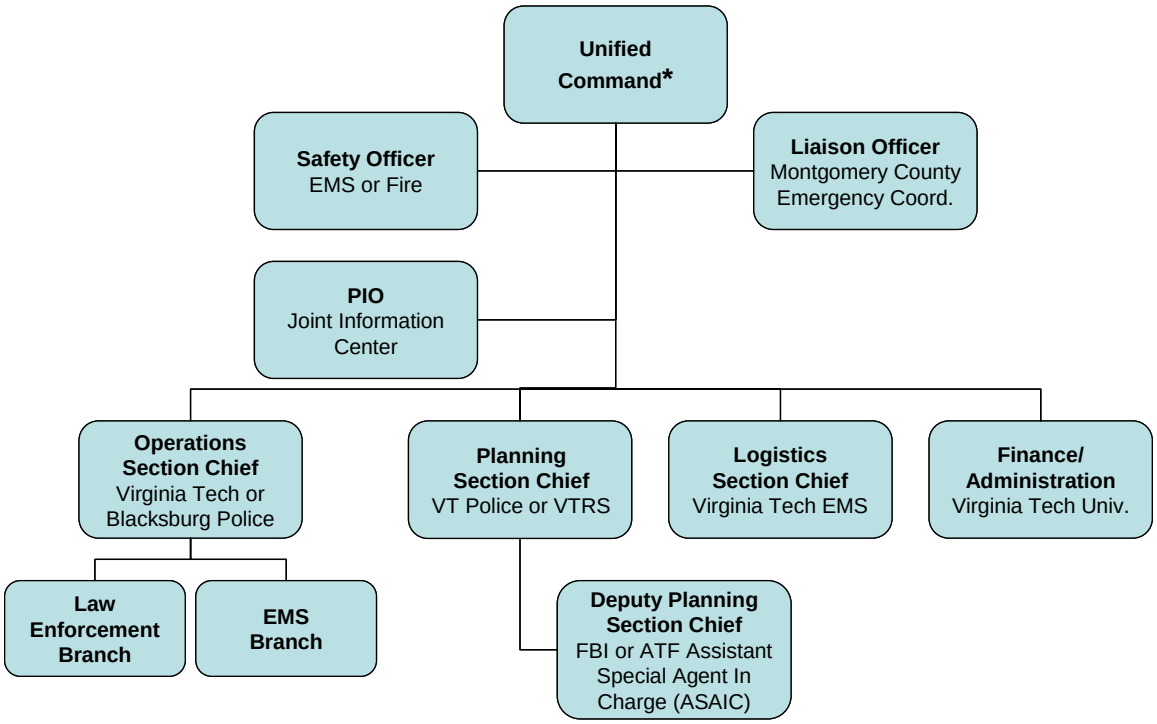
Unified Command – There is little evidence that there was a unified command structure at

[30] Ibid., Section 7, p. 4.

the Virginia Tech incident. Command posts were established for EMS and law enforcement at the Norris Hall scene and for law enforcement at another location. Separate command structures are traditional for public safety agencies. The 9/11 attack in New York City exemplified the need for public safety agencies to step back and reconsider these traditions. At Norris Hall, a unified command structure could have led to less confusion, better use of resources, better direction of personnel, and a safer working environment. Figure 22 depicts a proposed model unified command structure that could have been utilized.

The unified command post would be staffed by those having *statutory authority*. During the Virginia Tech incident, those personnel would likely have been the police chiefs for VTPD and the BPD, a university official, a VT EMS officer, a BVRS EMS officer, the FBI special agent-in-charge, the state police superintendent, and the ranking elected official for the City of Blacksburg. The operations section chief would have received operational guidelines from the unified command post and assured their implementation.

The unified command team would be in direct communications with the EOC and policymaking group. Command and general staff members would have communicated with their counterparts in the EOC. The policymaking group would have transmitted their requests to the EOC and the unified command post.



*For this incident, law enforcement would have been the lead agency. The unified command post would be staffed by those having *statutory authority.* During the Virginia Tech Incident, those personnel would likely have been the police chiefs for the VTPD and BPD, a university official, a VT EMS officer, the FBI special agent-in-charge, the Virginia State Police superintendent, and the ranking elected official for the City of Blacksburg.

Figure 22. Proposed Model Unified Command Structure for an April 16-Like Incident

Emergency Operations Center – The lack of an EOC activated quickly as the incident unfolded led to much of the confusion experienced by hospitals and other resources within the community. An EOC should have been activated at Virginia Tech. The EOC is usually located at a pre-designated site that can be quickly activated. Its main goals are to support emergency responders and ensure the continuation of operations within the community. The EOC does not become the incident commander but instead concentrates on assuring that necessary resources are available.

A policy-making group would function within the EOC. Virginia Tech had assembled a policy making group that functioned during the incident.

Another responsibility of the EOC is the establishment of a joint information center (JIC) that acts as the official voice for the situation at hand. The JIC would coordinate the release of all public information and the flow of information concerning the deceased, the survivors, locations of the sick and injured, and information for families of those displaced. By not immediately activating an EOC, hospitals or the RHCC did not receive appropriate or timely information and intelligence. There was also a delay in coordinating services for families and friends of victims who needed to be identified or located. Although Virginia Tech eventually set up a family assistance center, it was not done immediately.

KEY FINDINGS

Positive Lessons

The EMS responses to the West Ambler Johnston residence hall and Norris Hall occurred in a timely manner.

Initial triage by the two tactical medics accompanying the police was appropriate in identifying patient viability.

The application of a tourniquet to control a severe femoral artery bleed was likely a life-saving event.

Patients were correctly triaged and transported to appropriate medical facilities.

The incident was managed in a safe manner, with no rescuer injuries reported.

Local hospitals were ready for the patient surge and employed their NIMS ICS plans and managed patients well.

All of the patients who were alive after the Norris Hall shooting survived through discharge from the hospitals.

Quick assessment by a hospitalist of emergency department patients waiting for disposition helped with preparedness and patient flow at one hospital.

The overall EMS response was excellent, and the lives of many were saved.

EMS agencies demonstrated an exceptional working relationship, likely an outcome of interagency training and drills.

Areas for Improvement

All EMS units were initially dispatched by the Montgomery County Communications Center to respond to the scene; this was contrary to the request.

There was a 4-minute delay between VTRS monitoring the incident (9:42 a.m.) on the police radio and its being dispatched by police (9:46 a.m.).

Virginia Tech police and the Montgomery County Communications Center issued separate dispatches. This can lead to confusion in an EMS response.

BVRS was initially unaware that VTRS had already set up an EMS command post. This could have caused a duplication of efforts and further organizational challenges. Participants interviewed noted that once a BVRS officer reported to the EMS command post, communi-

cations between EMS providers on the scene improved.

Because BVRS and VTRS are on separate primary radio frequencies, BVRS reportedly did not know where to stage their units. In addition, BVRS units were reportedly unaware of when the police cleared the building for entry.

Standard triage tags were used on some patients but not on all. The tags are part of the Western Virginia EMS Trauma Triage Protocol. Their use could have assisted the hospitals with patient tracking and record management. Some patients were identified by room number in the emergency department and their records became difficult to track.

The police order to transport the deceased under emergency conditions from Norris Hall to the medical examiners office in Roanoke was inappropriate.

The lack of a local EOC and fully functioning RHCC may lead to communications and operational issues such as hospital liaisons being sent to the scene. If each hospital sent a liaison to the scene, the command post would have been overcrowded.

A unified command post should have been established and operated based on the NIMS ICS model.

Failure to open an EOC immediately led to communications and coordination issues during the incident.

Communications issues and barriers appeared to be frustrating during the incident.

RECOMMENDATIONS

IX-1 Montgomery County, VA should develop a countywide emergency medical services, fire, and law enforcement communications center to address the issues of interoperability and economies of scale.

IX-2 A unified command post should be established and operated based on the National Incident Management System Incident Command System model. For this incident, law enforcement would have been the lead agency.

IX-3 Emergency personnel should use the National Incident Management System procedures for nomenclature, resource typing and utilization, communications, interoperability, and unified command.

IX-4 An emergency operations center must be activated early during a mass casualty incident.

IX-5 Regional disaster drills should be held on an annual basis. The drills should include hospitals, the Regional Hospital Coordinating Center, all appropriate public safety and state agencies, and the medical examiner's office. They should be followed by a formal post-incident evaluation.

IX-6 To improve multi-casualty incident management, the Western Virginia Emergency Medical Services Council should review/revise the Multi-Casualty Incident Medical Control and the Regional Hospital Coordinating Center functions.

IX-7 Triage tags, patient care reports, or standardized Incident Command System forms must be completed accurately and retained after a multi-casualty incident. They are instrumental in evaluating each component of a multi-casualty incident.

IX-8 Hospitalists, when available, should assist with emergency department patient dispositions in preparing for a multi-casualty incident patient surge.

IX-9 Under no circumstances should the deceased be transported under emergency conditions. It benefits no one and increases the likelihood of hurting others.

IX-10 Critical incident stress management and psychological services should continue to be available to EMS providers as needed.