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Intentional Mass Casualty Events

Implications for Prehospital Emergency Medical Services Systems

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Domestic and international events of mass violence, including active shooter and intentional mass casualty incidents, warrant unique response considerations for prehospital emergency medical services (EMS) and first responder agencies. Regardless of whether an EMS system serves an urban, suburban, or rural community, and independent of the EMS system's architecture, these events represent a complex and challenging interagency response scenario for which all EMS agencies must be prepared. These events have resulted in multiple casualties with both blunt and penetrating injury patterns.

For any critically ill or injured patient, survival is often dependent on prompt and immediate access to lifesaving interventions. The principal concept of THREAT (***T***hreat suppression, ***H***emorrhage control, ***R***apid ***E***xtrication to safety, ***A***ssessment by medical providers, and ***T***ransport to definitive care), as outlined in the Hartford Consensus documents, provides an organized and systematic approach to the priorities of responding emergency personnel. Specifically, the notion of hemorrhage control represents a fundamental tenet of responder capability for both lay and professional rescuers, as well as for EMS system readiness. Past experience has demonstrated that those casualties with mild injuries tend to self-evacuate. These prior events also have demonstrated that civilian immediate responders will often render aid to more seriously injured victims. The role of immediate responders in providing immediate hemorrhage control cannot be underestimated and is a vital link in the chain of survival for victims.

Beyond theory, the tenets behind THREAT have been proven both on the battlefield and in the wake of some of the worse recent domestic attacks in the U.S. This concept aligns naturally with recommendations and guidelines of other allied groups, including the U.S. military's Committee on Tactical Combat Casualty Care[1] and the civilian Committee for Tactical Emergency Casualty Care.[2] Both groups emphasize the importance of early hemorrhage control, in addition to the ability to address immediately correctible causes of death, including tension pneumothorax and airway obstruction. The work of these groups has helped shape national-level policy and guidance documents, most recently including the U.S. Department of Homeland Security's June 2015 *First Responder Guide for Improving Survivability in Improvised Explosive Device and/or Active Shooter Incidents*.[3] This evidence-based document calls for a realignment of traditional emergency services practices to improve victim survivability and responder safety. It focuses on three specific areas: hemorrhage control, protective equipment, and response/incident management.

A Paradigm Change

Enhanced readiness to respond to active shooter and intentional mass casualty events necessitates a fundamental change in the operational paradigm of many prehospital EMS agencies. The conventional EMS training and practice of waiting for a scene to be safe before medical personal enter the scene conflicts with the need for rescuers to access those victims who have potentially survivable injuries before they die. Every minute that goes by following an event, the probability of survival decreases for critically injured patients. Lessons learned from previous incidents have taught us that waiting for the entire scene to be totally safe and without the possibility of threat results in more lives lost. We need to fundamentally change how we in EMS think about response.

Planning and Operational Considerations

The safety and accountability of all responders must be in the forethought of all personnel responding to active shooter and mass casualty incidents. Rescuers must maintain situational awareness of the dynamic nature of these incidents, including the possibility of ambush and secondary devices intended to harm responding personnel. Rapid changes in conditions and the overarching need to evacuate personnel and patients may require incident commanders to call for real-time adjustments to the delivery of lifesaving interventions.

Responders should be encouraged to approach and evaluate potentially volatile situations in terms of calculated risk versus benefit. This concept is not foreign to

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emergency services agencies and is already used in normal daily fire and EMS operations. From operating on the scene of a motor vehicle crash on a busy roadway to offensive versus defensive firefighting tactics, risk-based operations are common practice in emergency services. Themes such as "Risk a lot to save a lot" are used to depict the degree of risk tolerance that responders are willing to take. In Maryland, a statewide EMS protocol was created to allow EMS personnel the necessary clinical latitude to provide lifesaving interventions in potentially volatile environments.[4] Intended to be "all hazards" in nature and modeled after THREAT, this protocol incorporates the best practices of Tactical Combat Casualty Care and Tactical Emergency Casualty Care. The protocol is threat-based in that the type of intervention to be provided is dependent on the proximity of the patient to the threat.

Various response models include the forward deployment of specially trained and equipped medical assets into the warm zone following active shooter/ intentional mass casualty events. Common examples include mixed-asset teams composed of law enforcement and medical/ rescue responders. Personnel assigned to such teams must be specially trained and equipped with ballistic protection appropriate for entering these environments. The success of such programs requires partnership and commitment between EMS and law enforcement agencies well ahead of an incident and should not haphazardly be implemented during the incident.

Operational and incident command considerations include early implementation of a unified command structure, designation of zones of operation, interagency and mutual aid coordination, delineation of roles, and the establishment of casualty collection points. In addition, consideration should be given to how to incorporate the assistance of immediate responders, who can serve as force multipliers to assist in providing lifesaving interventions. Operational plans and any specialized response models must be exercised and critiqued to ensure that operational issues can be addressed and mitigated. Resource documents such as the U.S. Fire Administration's *Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents* contain valuable information regarding additional operational and planning considerations.[5]

Education and Training

Central to the implementation of the concepts outlined in the Harford Consensus is the structured training of prehospital personnel in the clinical issues surrounding EMS response to intentional events. The medical portion of this training should emphasize the priorities of care and immediate hemorrhage control, as well as rapid identification and correction of airway and breathing problems; it also should cover how this approach differs from the conventional rescue ABCs (airway, breathing, circulation). Personnel also should be trained in the principles of self-care and buddy care.

Training initiatives should focus on the threat-based dynamic nature of these incidents and the potential for the scene to change at any time. Comprehensive training programs should incorporate immediate action drills to ensure that essential skills of hemorrhage control are second nature. The concepts of hemorrhage control can be easily integrated into mass casualty triage training. In addition to robust initial training, the low-frequency, high-consequence nature of these incidents makes it equally important to have ongoing training programs to help ensure that personnel retain these skills.

In addition to education and training for EMS personnel and professional rescuers, EMS agencies can incorporate public-access hemorrhage control training into community events, civic group meetings, and existing hands-only cardiopulmonary resuscitation training programs.

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Equipment

An EMS system's readiness to respond to active shooter and intentional mass casualty events necessitates rapid access to specialized medical equipment. This equipment includes, but is not limited to, hemorrhage control devices, such as commercially available tourniquets and hemostatic dressings.

Customary practice for many EMS agencies is to centrally stockpile mass casualty equipment. However, given

the immediate need for this equipment in the moments following such incidents, such stockpiles will likely not be mobilized with enough time to be clinically useful. Prompt access to lifesaving equipment requires strategic pre-placement, including the addition of these items to standard ambulance and first responder vehicle inventories. Some public safety agencies have elected to pre-deploy equipment caches in areas of high occupancy and mass gatherings, similar to the location of automatic external defibrillators.

Other essential medical equipment is recommended in resource documents, including the U.S. Department of Homeland Security's *First Responder Guide for Improving Survivability in Improvised Explosive Device and/or Active Shooter Incidents*.[3] Specialized logistical equipment, including patient-extraction devices, as well as ballistic and personal protective equipment also may be warranted. Further discussion regarding additional equipment selection is beyond the focus of this article.

Conclusion

Prehospital EMS systems represent an essential component of a comprehensive trauma network. Preparedness and response to active shooter and intentional mass casualty events require an adaptation of current EMS system practices that must at all times be balanced with a threat-based approach to operational and clinical actions. Having an enhanced preparedness for such incidents will heighten a region's resilience and improve the EMS system's ability to handle casualties from all hazards.

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