

# Warm Zone Care: Lessons Learned From Large-Scale Active Shooter Training Prior to the STEM **School Shooting**

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## INTRODUCTION

Terrorism and mass shootings in the US have shifted first responder tactics to care in the warm zone, a zone where responders could potentially be under fire. An important concept in active shooter responses is the implementation of the rescue task force (RTF) in which fire/rescue are teamed up with law enforcement to enter the warm zone and begin treatment of critical patients.<sup>1</sup> In order for success, both medical and non-medical leadership need to organize a prehospital response to standardize the speed of initial treatment and transportation from the scene of chaos. Responders also need to be trained in and for the environment that they will be expected to perform. This includes incorporating full-scale multi-agency immersive Hyper-Realistic<sup>®</sup> training that involves going from injury to disposition or post-anesthesia care unit (PACU). The Cut Suit<sup>™</sup> is a human worn task trainer that allows responders to practice real-life interventions without harming the individual.<sup>2,3</sup>The present study evaluates the effect of Hyper-Realistic<sup>®</sup> multi-agency training and its impact on team dynamics, with the goal of improving the time between the first unit arriving on the scene and transport of the first critical patient. It is hypothesized that this training will have a positive effect on team performance and ultimately decrease the amount of time it takes for first responders to produce the first critical patient for transport.

#### **METHODS**

Prior to "The Next Nine Minutes" training, the 18<sup>th</sup> Judicial District in Colorado agreed upon uniform regional standard operational guidelines for active threat resolution. The training included 904 personnel that were involved in a nine-day event with 126 patients. Personnel included South Metro Fire Rescue, all of which were EMT or Paramedic certified, law enforcement (LE), dispatchers, private ambulance services, trauma and non-trauma medical teams, and hospital staff. LE and fire/EMS had static training using the Cut Suit<sup>™</sup> in the mornings that included tourniquet application, wound packing, cricothyrotomy, and needle decompression. Each station was skill level appropriate and progression was not allowed until competency was achieved.

There were 18 dynamic sessions that involved all agencies listed above. Each session was an MCI active shooter drill that was choreographed to be the same with identical dispatch information. Predictable injury patterns from recent shootings that looked, felt, sounded, and smelled like the patients they would encounter in real life. The objective of each event was to take patients from the scene of the MCI, through the emergency department, into surgery if indicated, and then to the appropriate floor or discharge at multiple Level 1 and 2 Trauma hospitals in the South Denver Metro area. Every event had 7-9 critical patients wearing Cut Suits<sup>™</sup> that were accompanied by subject matter experts (SME). All procedures from chest tubes to mass transfusion protocols were completed with either real or training supplies. Patient monitor for vital signs, labs, imaging, and EKG tracings were accessible for any critical patient of the providers were not adequately or accurately providing successful interventions, as determined by the SME, the patient's vital signs would reflect this.

The number of procedures performed in each event were recorded. Each MCI drill was followed by staff debriefings that identified and corrected deficiencies that were observed during the event. The training episodes were staggered on different days for each hospital so that problems identified on the first day could be corrected on the next training episode. Each day of training was recorded and time stamps for tactical benchmarks were tracked and reviewed.

### RESULTS

100% of the tourniquets were placed in the correct position with a median blood loss of 589 mL during static training

- kinetic mass casualty events, there was a 93.5% success in application rate and a 6.5% rate of single person rescuer failure due to blood loss.
- 265 procedures were performed in the field; needle decompression was the most performed procedure
- 202 procedures were performed in the ED- including 2 peri mortem c- section and one thoracotomy
- 3 thoracotomies, 7 damage control laparotomies, and 2 pericardial windows were performed in the OR
- Fire/EMS victim extraction time improved from 42 minutes to 12 minutes by the end of the training
- First and a second engine team join the first medic that arrived on scene and assume management of the casualty collection point, and transport, keeping engine team intact
  - Speed of scene transport improved by 26 minutes
  - ED and OR deficiencies included the identification and usage of blood and massive transfusions, patient movement, and communication.
    - Viable solutions were implemented, and each hospital showed improvement in subsequent events



**Figure 1**: EMS, fire, and law enforcement are responding and providing care to a victim in the Warm Zone of an active shooter drill. "Victim" is wearing a cut suit with injuries as well as moulage injuries on his face to mimic some of the common wound injury patterns that responders may encounter

Figure 2: Surgeon and resident performing damage control laparotomy on a critical patient in the OR using the using the Advanced Surgical Skills Packages from Strategic Operations specifically made for resident training in open surgical procedures

# DISCUSSION

There were many valuable lessons learned from "The Next Nine Minutes Training". Results indicate that the tourniquet training fire/EMS and LE personnel received was able to be translated successfully in the field. Additionally, victim extraction time by EMS improved over the course of the training. However, none of the extraction times met our initial nine-minute benchmark but it was unknown prior to the event if this extraction time would be possible. The notable improvement should not be disregarded, as the difference of 30 minutes is critical to patient outcome. The drill also helped highlight deficiencies present in hospital ability to respond to MCIs. These facets may indicate an increase in preparedness for future real-life mass casualty incidents from the first responder level all the way through the OR

The implications of having full immersive multi-agency training with a uniform regional standard operational guideline for active threat resolution were seen six months later at the STEM School shooting in Highlands Ranch, Colorado on May 7<sup>th</sup>, 2019. The police response was immediate, arriving slightly more than two minutes later at the school. Within three minutes an officer engaged the first shooter. In a nearly simultaneous series of events, other officers placed three tourniquets and one chest seal on the victims. Two of these tourniquets were placed on one patient with bilateral thigh GSW injuries. There were nine injured victims in total. These events happened before the first South Metro Fire Rescue unit even arrived on the scene. The 911 call to the first Fire/EMS RTF entering the building was 11 minutes with a transport time from Fire/EMS arrival of 4 min and 32 seconds for the first two critical patients. Four South Metro Fire Rescue paramedic transport medics transported all patients within 13 minutes of Fire/EMS arrival

78% of the fire/EMS that were a part of the STEM School shooting response had taken part in The Next Nine Minutes training. Multiple responders from these agencies commented that the similarities between the training and real-life shooting aided in the success of their response.

# **LIMITATIONS & FUTURE STUDIES**

One of the limitations to the study was that after-action surveys and interviews were not given to fully assess the impact that the training had on the responders in fire/EMS, LE, or within the receiving hospitals. Additionally, we did not record skill maintenance post-event. There was continued individual skill training done post-simulation event within fire/EMS; however, only a small percentage of LE participated in the medical skills training throughout the year. Future studies could include post-simulation surveys to assess the benefit of the training as well as continued quantitative and qualitative evaluation of skills for both LE and fire/EMS. It would be beneficial to assess the usefulness of this type of training with further surveys and metrics in an attempt identify areas of improvement for upcoming courses.

#### REFERENCES

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