

3 Echo: Concept of Operations for Early Care and Evacuation of Victims of Mass Violence

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Conflicts of interest: The authors have no disclosures or conflicts of interest to report

Keywords: mass violence; rapid casualty evacuation; tourniquets

Abbreviations:

3 Echo: Enter, Evaluate, and Evacuate
EMS: Emergency Medical Services
LE: law enforcement
MMRS: Metropolitan Medical Response System
SOP: standard operating procedure
TCCC: tactical combat casualty care

Received: December 30, 2013

Accepted: April 6, 2014

Online publication: June 9, 2014

doi:10.1017/S1049023X14000557

Abstract

This report describes the successful use of a simple 3-phase approach that guides the initial 30 minutes of a response to blast and active shooter events with casualties: Enter, Evaluate, and Evacuate (3 Echo) in a mass-shooting event occurring in Minneapolis, Minnesota USA, on September 27, 2012. Early coordination between law enforcement (LE) and rescue was emphasized, including establishment of unified command, a common operating picture, determination of evacuation corridors, swift victim evaluation, basic treatment, and rapid evacuation utilizing an approach developed collaboratively over the four years prior to the event. Field implementation of 3 Echo requires multi-disciplinary (Emergency Medical Services (EMS), fire and LE) training to optimize performance. This report details the mass-shooting event, the framework created to support the response, and also describes important aspects of the concepts of operation and curriculum evolved through years of collaboration between multiple disciplines to arrive at unprecedented EMS transport times in response to the event.

Autrey AW, Hick JL, Bramer K, Berndt J, Bundt J. 3 Echo: concept of operations for early care and evacuation of victims of mass violence. *Prehosp Disaster Med.* 2014;29(4):421-428.

Introduction

In Minneapolis, Minnesota USA on September 27, 2012, a former employee, terminated from employment earlier in the day, returned to his former workplace armed with a handgun and began systematically shooting employees and others inside his former workplace office building. Multiple 911 calls were received in the initial minutes of the event, and a multi-agency response was initiated.¹

Initial law enforcement (LE) responders immediately entered the building to contain and neutralize the threat. During that action, locations of casualties were identified and communicated. This allowed a secondary group of officers (rescue) to: access identified casualties and to secure the immediate area where they were located, rapidly identify viable victims, develop a safe corridor from a safe point of entry, and to call in Emergency Medical Services (EMS) from staging (which had been established two blocks away). Emergency Medical Services personnel entered the secured area under LE escort, rapidly evaluated and evacuated several victims, and transported three to the nearest Level 1 trauma center, where two died from nonsurvivable injuries. The third victim transported to the trauma center survived, due, in part, to emergent interventions (chest thoracostomy for large hemopneumothorax). Three additional victims were dead on first responder arrival at the scene.

Once the victims had been evacuated, LE expanded the secure perimeter and continued to search the building. The shooter was found dead of a self-inflicted gunshot wound, bringing the total deaths from this incident to six.

Hostile event scenes, such as active shooter or postblast response scenes, present unique hazards to responding public safety and medical personnel. These hazards can delay both EMS access to victims and transport.²⁻⁶ To the knowledge of the authors, the rapidity with which LE established a corridor of safety for EMS in this shooting, facilitating the early transport of patients with critical injuries, was not paralleled in other United States mass-shooting events prior to the time of this event (Table 1). At least some portion of the success of this response was due to the attributes and implementation of the Enter, Evaluate, Evacuate (3 Echo) conceptual framework, as well as the 3 Echo

specific training that public safety and EMS agencies in the area received over the four years preceding the event.¹ This report is significant in that it provides concrete outcome and response time evidence that the collaborative and deliberate incorporation of operations derived from military and international experiences into the current civil response to mass-hostile events does work. This report also highlights the importance of multidisciplinary collaboration around planning, doctrine, training, and communications that must be fostered in a community to achieve these objectives safely. The 3 Echo process began prior to the recent rise in United States hostile events, as multiple experts in the Minneapolis/St. Paul (Minnesota USA) community became concerned about civilian vulnerability and sought pertinent measures through exercises to define response gaps to mass-violence events. This community experience was not a plug and play of increasingly available and hard won tactical standard operating procedures (SOPs), but rather a grassroots operational evolution fostered over years to include expertise from locations where hostile events were common. The 3 Echo approach seeks to map out implementation steps, designed to place into the hands of first responding police, EMS, and firefighters a best practice framework that has passionately been called for by other experts familiar with Tactical Combat Casualty Care (TCCC).⁷ The development of 3 Echo started with joint first response goals, similar to those outlined in recent consensus statements⁸ that have cited the importance of aggressive entry into an unsecured scene containing casualties, followed by rapidly addressing correctable trauma and promptly evacuating victims in a joint entry involving LE and medical personnel. The 3 Echo process defines hands on steps and training methods needed for successful implementation of these priorities in the United States, with implications for international implementation as well. Currently pertinent to other communities now implementing new national consensus priorities is the finding that proper operational implementation of such priorities will require a series of multidisciplinary collaborative steps that may need specific modifications for a given response community over a period of time prior to specific SOP codification. Given the maturity of the 3 Echo program and the fact that community 3 Echo efforts to create a collaborative, safe, and aggressive entry began several years before this successful response, this report could serve to encourage communities implementing TCCC-based frameworks, provide operational pearls, and support position statements currently promoting use of the same principles utilized in the framework, training, and response.

Report

Background /Identification of Need

In 2009, following the 2008 Republican National Convention held in the Minneapolis-St. Paul area, discussions were energized between collaborating LE and rescue response agencies across disciplines. This coincided with increased awareness of terrorist threats, in conjunction with information shared by the Federal Bureau of Investigation and Homeland Security of the United States,⁹ and so a formal workgroup, under the auspices of the Metropolitan Medical Response System (MMRS), convened to carry out a gap analysis discussion involving multiple agencies. This workgroup involved stakeholders from the military (Civil Support Team), tactical LE, fire, EMS, EMS medical direction, and bomb squad. In 2009 through 2010, increased attention in these jurisdictions was devoted to full-scale exercises involving hostile

Event	Time (24 h)	Elapsed (min)
Time first 911 call answered	16:35:37	0
1st PD Unit arrival	16:39:23	3:46
1st EMS Unit arrival ^a	16:46:56	11:19
2 nd EMS unit arrival ^a	16:53:30	17:53
3 rd EMS unit arrival ^a	16:53:52	18:15
1 st EMS unit departs	16:52:41	17:04
2 nd EMS unit departs	16:59:51	24:14
3 rd EMS unit departs	16:59:28	23:51

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Table 1. Key Timeline of Events (from 911 dispatch records)
Abbreviation: EMS, Emergency Medical Services; PD, police department.

^a Indicates arrival to building, not staging area.

event response, one involving active shooters in a multi-story grade school,¹⁰ and the other involving a school bus bombing in a junior high school parking lot,¹¹ both in 2010. Despite agency-specific education prior to the exercises regarding the need to rapidly treat and transport victims of penetrating trauma and to integrate the response across agencies to facilitate early access, several key deficiencies were identified across both exercises (Table 2). By design, the exercise experience parallels “real-world” findings for underestimation of risk of secondary threats, breakdowns in communication, and lack of specific interagency operational protocols. The result of these failures for such events may include delays in care or transport, or result in providers assuming responsibilities that are suboptimal (such as transporting multiple victims to the hospital in LE vehicles with limited hemorrhage control, as occurred in Aurora, Colorado USA, in 2012).² Given the increasing frequency of casualties due to mass-hostile events seen in the United States, including active shooter and blast events,¹²⁻¹⁴ responding agencies need to have a common approach. Given the above observations as a next step, it was decided that a common response template and training plan should be created.

Methods/Development

The workgroup examined the deficiencies exhibited in the exercises and determined the following:

- First responders (first arriving police departments, fire, and EMS), and not tactical responders (Special Weapons and Tactics or Tactical Emergency Medical Support), were the key to a timely and effective response, primarily due to the fact that a standup of specialized teams was not feasible for timely response to these rapidly unfolding events.
- Simple, common principles adopted from overseas experience would have to be held in common by all agencies and practiced *together* in order to facilitate a successful response. This is primarily due to the interdependence of LE and rescue in the early minutes of these chaotic events, and the fact that success involves retraining first responders in muscle memory actions that differ from past protocols that do not emphasize rapid access to hemorrhaging victims.

Issue	Outcome
LE focus was on neutralization of threat, with minimal attention to living victims, location, and potential safe areas of access.	Though initial response was appropriately directed to threat containment and neutralization, follow-up resources were not used effectively to secure areas for EMS/fire or to identify victim locations, resulting in substantial delays.
EMS and fire staged far from the event and did not approach until the scene was declared fully secure.	Substantial delays in accessing and transporting patients occurred, many of whom would have likely died awaiting care.
LE command transitioned rapidly, with little to no information sharing between LE and EMS/fire in the early stages.	Substantial delays in communication occurred, which could have adversely impacted victim outcome and responder and bystander safety as evolving threat information was not communicated to EMS/fire.
LE and EMS personnel were not comfortable with, or equipped to treat, immediate life threats, such as exsanguinating limb hemorrhage.	Without tourniquets and other equipment and training, victims would have died from their simulated injuries.
Responders were not attuned to “plus one” threats (eg, looking for secondary devices or a perpetrator among the victims).	Secondary devices and a perpetrator among the victims would have claimed more lives in the scenarios.

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Table 2. Key Deficiencies Identified in Functional Exercises
Abbreviations: EMS, Emergency Medical Services; LE, law enforcement.

- Basic equipment and training in hemorrhage control was lacking among area EMS agencies, most notably a lack of field access to tourniquets.
- EMS/fire had unrealistic expectations of safety at hostile event scenes and needed to begin thinking of “relative safety” and “plus one” threats (eg, looking for secondary devices or a perpetrator among the victims).

Group members conducted literature searches of Medline (Medline Industries, Mundelein, Illinois USA) and military databases, sought expert opinions, and reviewed response and training plans. Tactical Combat Casualty Care principles, and other tactical response operations, were considered and examined alongside international experience and opinions. It was clear that there was a need for conversion of such practices into a template that could work in the United States first response community, in order to arrive at hands-on best practices. Priorities were agreed upon, and draft and final protocol and training templates were created using a consensus process. The response template was modeled after common military priorities for command, control, scene safety, and basic victim care (including an established role for tourniquet use) in hostile environments.¹⁵⁻¹⁷ The template reflects civilian priorities typical in Israeli¹⁹⁻²¹ and other terrorism experienced EMS systems.^{6,22} It also is designed to be used for both active shooter and postblast responses, as these share many common features and hazards.^{7,21} The template was designed to be the foundation of an open-source curriculum that could be used to introduce any first responder to the key operations at these scenes.

Following development of the response template, additional group members with experience in training and EMS education were added, and a curriculum was developed to advance learners sequentially through awareness, knowledge, and proficiency levels with the materials. Pilot trainings were conducted with on-site input from Israeli and Scotland Yard experts familiar with mass-violence events involving blast and active shooter response in their own civilian environments. The training materials and schedule were modified according to instructor, subject matter expert, and student input. The final objectives, instructor guide,

and learning materials were submitted to the US Department of Homeland Security, and received approval as a sanctioned training curriculum, allowing use of Homeland Security grant funding to conduct training.

Using MMRS grant funding, tourniquets were purchased for all area ambulance services (two per ambulance) and integrated into SOPs and training. Plastic cards for the 3 Echo response template were made that are designed to be clipped behind the agency photo identification badge. Additional grant funds were used to train most of the key metropolitan response agencies. Additional agencies elected to pay for the training from operating budgets.

Discussion

Concept of Operations

3 Echo is designed to create common priorities for all responding agencies and serve as a basis for training and response. The core priorities of the template, enter, evaluate, evacuate, or “3E” (which was rebranded as 3 Echo, “e” = echo in phonetic alphabet) to reduce confusion and reinforce the “echo” of closed-loop communications expected between responding agencies. Subcomponents of the template provide operational specificity to the core priorities.

The core philosophical tenets of the response are:

- LE priorities include establishing safe access and supporting victim evacuation in addition to containing/neutralizing the threat. This requires coordination with EMS/fire agencies.
- Rescue responses appropriate to the needs of the already injured and hemorrhaging patient must be incorporated into initial operations, and is a higher priority than establishing a completely safe scene. This is due to the primary objective of reducing the total overall body count accumulating from the already hemorrhaging injured, and those still being injured by the perpetrator, where waiting just to clear territory may not improve survival.
- EMS/fire agencies need to stage at a safe distance, but establish early liaison with LE and be prepared to rapidly enter areas or corridors in the scene that are secure to

Enter	Caution	<ul style="list-style-type: none"> • Hazard survey and rapid identification of potential secondary threats
	Communicate	<ul style="list-style-type: none"> • Report hazards and casualties, staging location, and incident talk group assignment to dispatch
	Create	<ul style="list-style-type: none"> • Unified command • Initial perimeter • Ambulance staging area, loading zone (closer in than staging) • Assembly area for evacuated walking wounded and uninjured
	Concealment(hidden) and Cover(protection)	<ul style="list-style-type: none"> • Move in secured areas only • Create cover as required (fire trucks, etc)
	Corridor	<ul style="list-style-type: none"> • Secure access/evacuation corridor(s) • Enter with basic treatment and evacuation supplies
Evaluate	Caution	<ul style="list-style-type: none"> • Secondary threat awareness – victim vs perpetrator, evolving threats
	Care	<ul style="list-style-type: none"> • Rapid triage • Body sweep living victims for weapons/devices • Hemorrhage control
Evacuate		<ul style="list-style-type: none"> • Direct walking along corridor to assembly area • Rapid carry/drag of nonambulatory victims to ambulance loading zone and/or intermediate triage point (casualty collection point) if required

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Table 3. 3Echo Response Template with Preconditions: (1) Viable Victims, and (2) Access to Victims Able to be Secured

provide basic care and evacuation for victims (if staffing permits, LE can assist with this function as well). All EMS/fire personnel need to confirm that the areas they will enter are secured by LE. This represents a shift from an emphasis on the time-consuming clearing of a wide geography, to making it a high priority to clear and secure functional areas needed for rapid victim access and evacuation. Corridor development and development of relatively safe work areas can be applied to both postblast and active shooter scenarios.

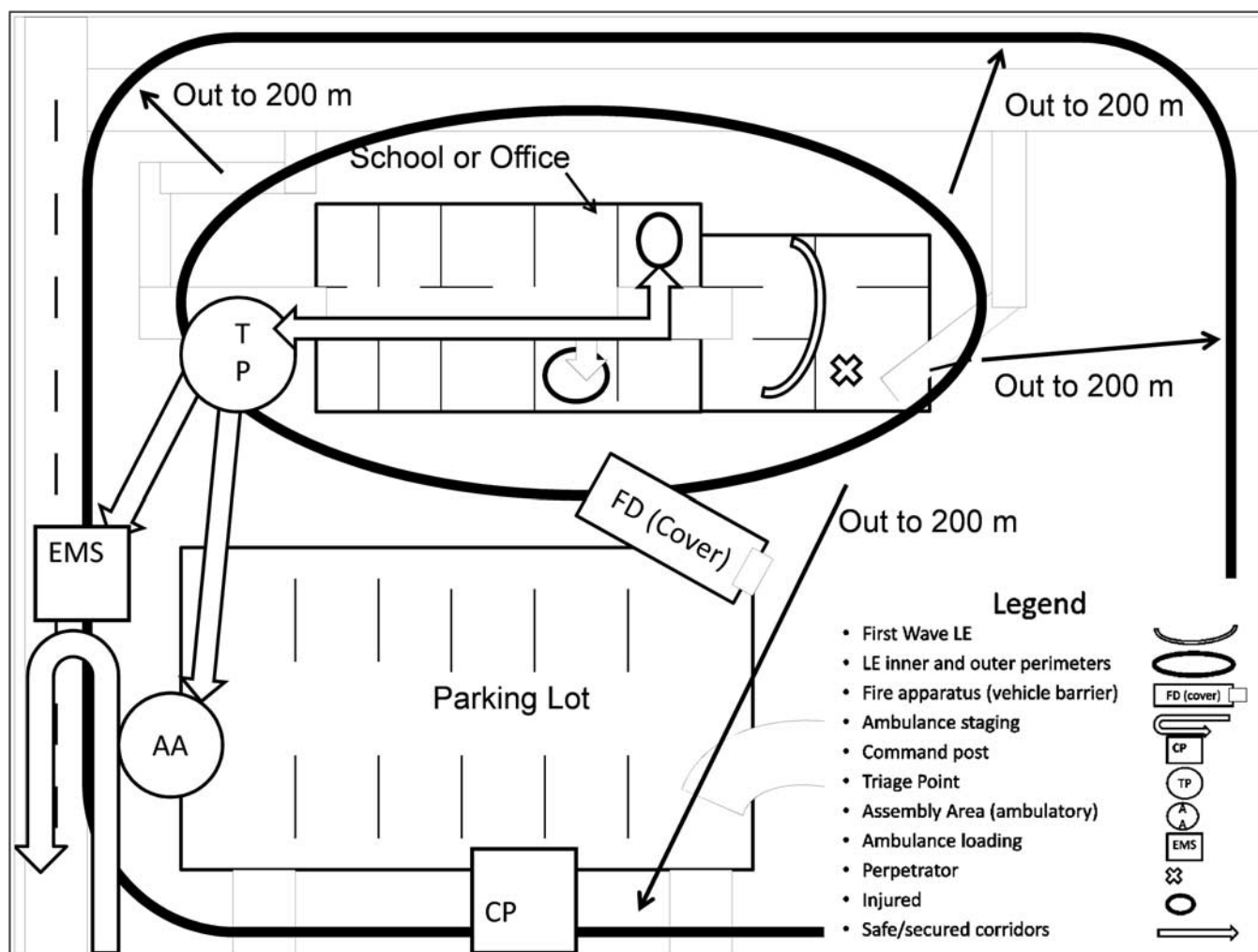
The operational elements of the response are described in Table 3. Note that these operations are used *only* when living victims are present, and when there are secured evacuation routes for the movement of viable patients. Only personnel with appropriate tactical training should operate in environments where immediate human threats exist.

Illustrations of the establishment of corridors and the designated areas are provided in Figures 1 and 2. In Figure 1, LE arrives at the school first and directs activity in order to neutralize the shooter in the first wave. Knowledge acquired from the first entry provides information on medical needs, locations of casualties, and suggests rapid corridors of access and evacuation. Additional arriving support, including LE, first emergency medical services/fire department personnel, begin to establish perimeters, command, and staging areas and coordinate medical asset deployment. As this is occurring, responders collaborate to rapidly create a common operating picture and locate/summarize

hazards. Law enforcement then provides a second wave of LE to allow medical assets into the scene while protecting them. Injured casualties are accessed and immediately treated with tourniquets if needed, and then evacuated along the corridor. Triage, rapid security screening, and rapid evacuation are used to promptly clear the scene of casualties who are then transported to hospitals; further care is occasionally provided at safer triage points or en route to hospitals as patient condition dictates. In Figure 2, LE creates an initial inner perimeter, followed by access corridors inside, and functional staging areas at a more distant safe outer perimeter, as able. Arriving medical responders link with LE to create a common operating picture, including potential locations of casualties and secondary hazards. Created access corridors are then used by LE who lead medical responders to casualties, and LE security screens the walking wounded as they are guided out of the hazard area to safe staging. Triage, tourniquet application, rapid security screening, and rapid evacuation are used to promptly clear the blast area of casualties who are unable to self evacuate. Medical responders entering a larger scene will evacuate casualties from the easiest to access area with the most need first. Further care is provided in safer areas, including temporary triage points. An interagency approach to securing these areas is a core outcome of the educational curricula.

Curricula and Training

The training curriculum (Table 4) is designed to introduce students to the priorities of hostile event scenes, and the time-critical nature



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Figure 1. Corridors of Safety and Operational Areas, Active Shooter
Abbreviations: EMS, Emergency Medical Services; LE, law enforcement.

of the injuries that are often sustained by the victims. The Department of Homeland Security-approved training takes 12 hours to complete; though it can be broken up into sections, it seems best to conduct the tabletop and walk-through exercises so that the same personnel have an opportunity to build on their learning together. Typically, the didactic and hands-on training occur on separate days; however, it is important that all sessions include multidisciplinary participation in order to maximize the understanding of varying priorities, strategies, and tactics. The introductory materials review the core concepts and how 3 Echo priorities integrate the initial response, optimally saving time while enhancing provider safety.

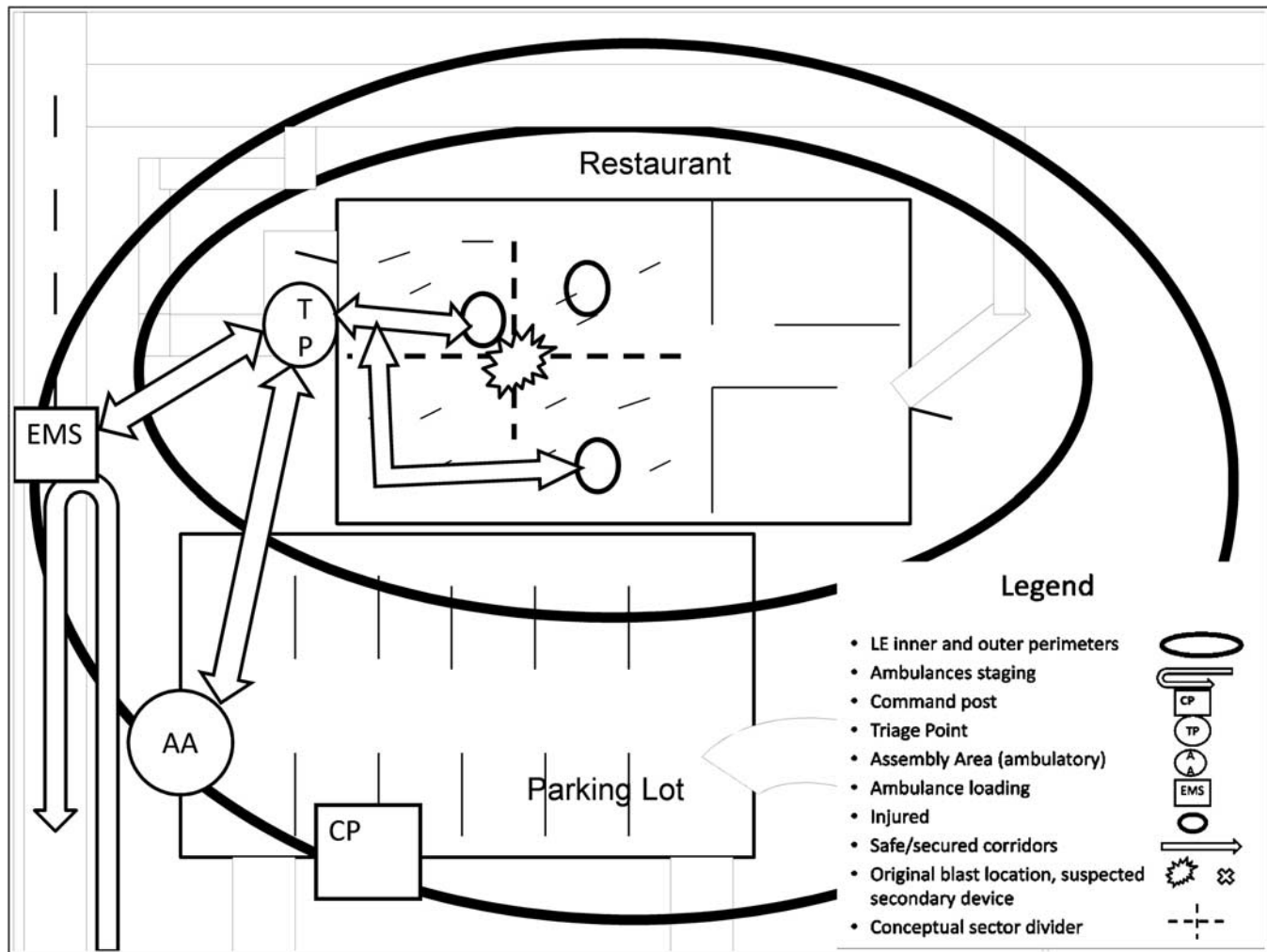
Tabletop sessions are designed to provide the transfer of learning from the awareness materials to a simulated event in which the agencies must work together to determine priorities, communicate, define and secure access, and facilitate evacuation. These tabletop scenarios utilize standardized maps of buildings, and other materials, to facilitate concrete application of the priorities.

Finally, during the functional and performance sessions, groups of students walk through active shooter and blast response models, using a “pause-play” model of discussion and action to

highlight key learning points. The functional sessions are as realistic as possible, using simulated weapons and ammunition, and although the structural damage of a blast scene cannot be replicated easily in most teaching environments, an attempt to capture some of the risks and issues (including obscured vision from smoke, debris hazards, electrical hazards, alarms, secondary device hazards, and using debris/structure as cover) is made.²³

During the development and implementation of the training, valuable lessons were learned. The major points include:

- Advocacy for the course by agency leadership was key to successful training. Awareness level orientation of leadership, prior to presenting a course, was critical to course success, as there was often a misunderstanding about the focus or objectives of the training. In particular, the training was often misunderstood as tactical training for LE personnel, rather than awareness training for all disciplines and emergency response personnel.
- Clear understanding of the risks of entering a scene either too early (increased provider risk) or too late (increased loss of life) and how these are balanced by the responding



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Figure 2. Corridors of Safety and Operational Areas, Postblast
Abbreviations: EMS, Emergency Medical Services; LE, law enforcement.

agencies during the event to assure the scene is adequately secured for rescues to begin.

- Integration of public safety dispatchers in the training is critical to a successful response.
- Use of experienced LE tactical officers as trainers was crucial to LE officer acceptance. This occasionally carried a risk that some of these trainers introduced into the discussion or exercises elements of tactical response (protective formations, etc) that were not appropriate for the audience, creating concern among EMS/fire personnel about their safety. This resulted in the requirement for more specific training materials, instructor briefings, and honing of station objectives.
- Awareness materials (such as use of the job aid) did not substitute for applying the principles in tabletop and functional environments.
- Familiarity with incident command was important to successfully apply the model. Agencies without strong incident command/structure had difficulty with the coordination expectations.

Most of the Minneapolis/St. Paul metropolitan area providers have received the full 3 Echo training, with other agencies planning

to complete the training within the next year. Even though grant funding is diminishing, many agencies have decided, based on the positive information they have received, to support the training with agency funds. Ongoing challenges include: broadening the instructor base to meet demand while retaining the expertise and skill sets required, determining appropriate refresher training (including more frequent, but less intensive application of the principles through question/response and tabletop scenarios), and determining how 3 Echo applies to rural areas that may not have the LE resources to appropriately secure corridors for entry while also attempting threat containment/neutralization with limited backup.

Successful field penetration of 3 Echo also could have some added morbidity and mortality benefits. If properly implemented in the field, 3 Echo also will provide opportunities for preplanned configuration of institutional emergency responses (schools, public venues, private buildings, etc) to facilitate 3 Echo goals by assuring that on-site security personnel are familiar with the 3 Echo principles, and allow them to facilitate early threat containment, victim identification, and corridors of safe access with arriving LE. Also, 3 Echo may provide incentives for improvements in trauma systems and hospital responses. It

Session	Objectives
Didactic (Awareness)	<ul style="list-style-type: none"> Review problems in prior responses and overview of 3 Echo framework Discuss time vs risk of death from hemorrhage and blast injuries Overview of IED and blast scene response
Tabletop 1 (Knowledge)	<ul style="list-style-type: none"> Integration of response in an Active shooter event
Tabletop 2 (Knowledge)	<ul style="list-style-type: none"> Integration of response in a Blast response event
Station 1: Evaluate (Participation)	<ul style="list-style-type: none"> Body sweep and hemorrhage control practice In-depth discussion of incident command priorities and unified command strategies
Station 2: Active Shooter Walk-through (Participation)	<ul style="list-style-type: none"> Scene assessment (casualties and hazards), entry of law enforcement, creation of corridors of safety to reach victims, evacuation (uses dummy guns, ammo, shooter(s) in secured school or office building area)
Station 3: Blast Scene Walk-through (Participation)	<ul style="list-style-type: none"> Scene assessment (casualties and hazards) entry of law enforcement, creation of corridors of safety, triage points, perimeters, evacuation
Scenario #1 Active Shooter (Performance)	<ul style="list-style-type: none"> Students demonstrate all 3 Echo response elements in a real-time active shooter scenario.
Scenario #2 Post Blast (Performance)	<ul style="list-style-type: none"> Students demonstrate all 3 Echo response elements in a real-time postblast scenario.
Conclusions and discussion	

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Table 4. 3 Echo Curriculum

Abbreviation: IED, improvised explosive device.

remains important to fully educate and prepare hospitals regarding the utility and management of tourniquets, and to prepare them to manage large volumes of salvageable victims that may result from prompt field evacuation. Trauma systems, such as state trauma systems, may want to develop standards utilizing 3 Echo principles to designate aspects of mass-violence trauma events.

More recently, the Hartford Consensus on Improving Survival from Active Shooter Events⁸ and the International Association of Firefighters²⁴ have posted positions in support of approaches like 3 Echo that incorporate some tactical combat casualty care best practices²⁵ into collaborative early entry strategies, designed for early rescue in the setting of civilian-first response to hostile events. Efforts along these lines over the past several years have now produced a set of tested and mature operations and training techniques applicable to current United States first response practitioners, whose lessons learned can be of immediate use to the many agencies that may be interested in implementing these now national priorities.

Conclusion

Through a multi-disciplinary process, the authors have created an integrated, proactive approach to hostile event scenes that stresses communication between agencies, common priorities (including early determination of viable victims and securing access/evacuation corridors), and common tactics. This process has

included input from experienced international experts and is relevant to active shooter and postblast response events, both of which are on the rise in the United States.^{13,14}

This approach has been taught successfully to hundreds of providers and is believed to be validated by the response to a real-life active shooter incident in their community, during which EMS safety was assured by early LE actions to: secure the area where viable victims were located (in addition to their global priority to identify and contain/neutralize the threat), summon EMS from staging, and facilitate rapid patient extrication; resulting in scene clearance of critical casualties within 25 minutes from the initial 911 call. Though this incident was limited in scope, the authors believe that the principles and joint-agency approach described here will help to save more lives in future events. Also, this report does represent documentation of the first use of an LE corridor, allowing rapid entry of EMS for victim evacuation during a hostile mass event in recent times in the United States.

Acknowledgements

The publication was not commissioned or funded by the Department of Defense (DOD). The views, opinions and findings contained in this article are those of the authors and should not be construed as the official or reflecting the views of the Department of Defense, the United States Army or the Minnesota National Guard.

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