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The reason for this special focus on Active Shooter Incidents & Tactical Emergency Casualty Care

By A.J. Heightman, MPA, EMT-P

High-profile and high-fatality events have put substantial pressure on public safety agencies to respond and mitigate threats rapidly, quickly treating injured responders and victims as close to their point of injury as possible.

Following the Sandy Hook Elementary School active shooter incident (ASI) in Newtown, Conn., the American College of Surgeons and the FBI collaborated to respond to the ongoing threat of ASIs by assembling specialists in surgery and emergency medicine. Their goal was to quickly identify a plan of action to increase victim survival using concepts and actions supported by the medical literature and by military and civilian operational experience.

The group met in Hartford, Conn. Thus, the product of this important effort is called “the Hartford Consensus.”

With solid evidence from the military on the effectiveness of rapid care at the point of conflict, and new techniques and products to rapidly stem active bleeding in combat situations, the Hartford Consensus calls for a coordinated response by law enforcement, rescue and EMS, and receiving hospitals with the goal of controlling hemorrhage as quickly as possible.

Similar to the approach used by the Hartford Consensus, PennWell, publisher of the Journal of Emergency Medical Services (JEMS), Law Officer, Fire Engineering, FireRescue Magazine and Public Safety Communications, convened experts in the field of ASI medicine and tactical emergency casualty care (TECC) to focus on the need for, and delivery of, rapid care for officers, crews and patients involved in incidents that have a high probability for injuries and fatalities so that we, as a response community, can reduce morbidity and mortality.

This special editorial supplement presents not just the results and recommendations of the Hartford Consensus, but also the latest data and techniques on how to care for yourself, your co-workers and victims of violent and fast-moving incidents.

To exhibit why this is so important, I want to point out some key facts presented in research of ASIs from 2000 to 2012 conducted by Texas State University through examination and cross-referencing of police reports, public records and media reports. This data serves as a blueprint for why we must focus on early and rapid emergency care in the field:

• The frequency of events is increasing, from approximately one every other month between 2000 and 2008 (five per year) to more than one per month between 2009 and 2012 (almost 16 per year). In 2013, 72 people were shot and 39 were killed in an ASI.
• Schools were the second-most attacked locations (29%), and approximately 20% occurred in outdoor environments. Responders must be trained to operate in both outdoor and indoor (i.e., close quarters) environments, recognizing the tactics for each are different.
• The median number of people shot per event was five, exhibiting why multiple tourniquets and hemorrhage control supplies must be available early at all ASIs. One tourniquet per ambulance will be inadequate. Recommendations are that all responders carry tourniquets, learn to “pack” wounds and have hemostatic (wound-clotting) bandages and dressings as well as dressings that can seal open chest wounds.
• Shooters brought multiple weapons in 33% of the attacks. In 3% of the cases, perpetrators brought IEDs to the attack site and wore body armor 5% of the time.
• In 51% of the cases, the ASIs were still ongoing when law enforcement arrived. Of these, attackers stopped themselves when police arrived 40% of the time, most commonly by committing suicide.
• In 7% of the cases, the attacker shot the responding officers. If you look at the 53 shootings that were “active” at the time police arrived, officers were shot in 15% of events. That makes ASIs among the most dangerous in law enforcement.
• In 18 events, solo officers arrived and engaged the shooter; 72% were still ongoing when solo officers arrived on scene. However, in solo incidents officers were more likely to be injured during these events, with 17% of officers shot.

Make no mistake about it, active shooter events are dangerous and challenging for all emergency responders and require a systematic search of the attack location to mitigate the threat, find and treat victims and confirm there’s not another shooter. In a large attack site, this search can take hours. During this time, victims may bleed to death or die from shock.

We must train and equip law enforcement officers to provide care at the points of impact. Many areas are incorporating the rescue task force concept and including EMS personnel in entry teams to stabilize and rapidly remove the injured while a ballistic or explosive threat may still exist.

Read this supplement and then work with all the agencies that will be on the scene of ASIs and other incidents requiring TECC so that you’re prepared to protect and perhaps save yourself while saving others at these fast-moving, high-risk events.

Reference
RESEARCH

2013: Tourniquets and occlusion: the pressure of design.
Military Medicine: May 2013
Conclusion: The SWAT-T™ performed better than the CAT (Combat Application Tourniquet). The SWAT-T™ had safer pressures, and was more effective.

2012: Lighting did not affect self-application of a stretch and wrap style tourniquet.
Journal of Special Operations Medicine: Fall 2012
Conclusion: The SWAT-T™ stretch and wrap style tourniquet can be self-applied properly even in darkness. When properly applied, it stops limb arterial flow.

2012: Stretch and wrap style tourniquet effectiveness with minimal training.
Military Medicine: November 2012
Conclusion: The SWAT-T™ can easily be properly applied and can stop arterial flow at a variety of extremity locations. Proper application is associated with cessation of arterial flow.

2010: An Evaluation of the SWAT-T
Presented at the 2010 Annual meeting of the Special Operations Medical Association - Douglas M. Kleiner, PhD
Conclusion: The SWAT-T™ rated very well in the variables evaluated and was rated comparable to, or better than the C-A-T for size, versatility intuitiveness, durability cost and comfort.

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“Worked great after windlass failure (high axillary wound).” -CY US Border Patrol
“The SWAT-T saved my K9 partner! As a tactical team member, I will never deploy without a SWAT-T” -NL
“It was soaked in blood and it held up great, still plenty of friction. Successful application, bleeding terminated.” -SV
Focus on Active Shooter Incidents and Tactical Emergency Casualty Care

A
n active shooter is an individual actively engaged in killing
or attempting to kill people in a confined and populated
area. Recent active shooter incidents have underscored
the need for a coordinated response by public safety agencies to
save lives.

As we approach the second anniversary of the Sandy Hook Ele-
mlementary School shooting, which resulted in the murder of 27 chil-
dren and adults in Newtown, Conn., it’s sensible to take stock of
the lessons learned and actions taken by public safety agencies as a
result of that extraordinary tragedy.

A Challenge to Every Community
Mass casualty shooting incidents aren’t new in the United States. The 1966 “Tower Sniper” incident
at the University of Texas, Austin, left 14 dead and 31 injured at the hands of a single gunman. The
1999 Columbine, Colo., incident was perpetrated by two assailants who killed 13 and wounded 24.

Since Columbine, active shooter incidents have become more frequent. In the eight-year period
after Columbine, an average of five active shooter events occurred per year. Since 2009, that figure
has increased threefold.

While the reason for this increase is unclear, the layperson’s impression that active shooter inci-
dents have become more frequent appears valid. A recent study by Texas State University (TSU)
examined and cross-referenced police reports, public records and media reports for the period 2000–
2012. The increased frequency of incidents seen in the TSU study isn’t explained by changes in case
definition or solely on the basis of increased case reporting.

The FBI is actively collecting and analyzing detailed data on these incidents. This ongoing effort

Improving Survival in Active Shooter Events

The FBI’s view two years after Sandy Hook

By William P. Fabbri, MD, FACEP

EMS actions must not degrade the police response or place either EMS or the police at increased risk by complicating the tactical situation.

PHOTO COURTESY FBI
is a source of periodic guidance to improve actions to prevent, prepare for and respond to active shooter mass casualty incidents (MCIs).

The TSU study also observed that most active shooter incidents (40%) occurred in places of business including offices, stores and industrial locations. Schools and colleges were the next most common locations for these events at 29%. The assailant moved between multiple locations in almost 20% of the incidents and had no apparent connection to the shooting location almost 50% of the time.

These findings emphasize the need for all communities to develop response plans for an active shooter event. These incidents have occurred in municipalities of all sizes, raising the possibility of similar MCIs occurring without warning in communities with limited police, rescue and emergency medical resources.

From the standpoint of definitive care, another significant finding of the TSU analysis is that the median number of shooting victims was five per incident. This translates to 58 incidents over a 12-year period in which at least five victims were shot. In preparing for active shooter incidents, hospital emergency and surgical departments must address the major challenge of providing timely treatment to multiple victims of gunshot wounds to the chest and abdomen.

So, almost two years after Sandy Hook, what has been accomplished?

The Hartford Consensus
In the period following Sandy Hook, the American College of Surgeons (ACS) and the FBI collaborated to respond to the ongoing threat of active shooter events by assembling a group of surgery and emergency medicine specialists. The goal was to quickly identify a plan of action to increase survival of victims of these events, using concepts and actions supported by the medical literature and by operational experience.

These recommendations were developed and presented as apolitical and achievable within the existing budgets of communities of any size. The product of this effort is the Hartford Consensus.6

The bottom-line imperative of the Hartford Consensus is that “no one should die from uncontrolled bleeding.” Citing evidence of the effectiveness of actions taken in military medicine over the past decade, the Consensus calls for a coordinated response by law enforcement, fire/rescue, EMS and receiving hospitals with the goal of controlling hemorrhage as quickly as possible.

While victims who receive immediately lethal wounds can’t be saved, as was the unfortunate case in Sandy Hook, rapid control of hemorrhage in victims of otherwise survivable wounds will have the greatest impact in total lives saved.

An acronym describing the required actions by responders at all levels is THREAT. (See Figure 1.) Each THREAT step is critical to victim survival in fast-moving active shooter or MCI incidents. These steps are: Hemorrhage control, either by prevention of further injuries or by rapid recognition and control of the subset of life-threatening hemorrhage treatable on scene; extraction and triage of victims with internal hemorrhage for prioritized transport; and definitive surgical treatment at a hospital for those victims with internal hemorrhage.

Figure 1: THREAT acronym

| T | Threat suppression |
| H | Hemorrhage control |
| RE | Rapid Extrication to safety |
| A | Assessment by medical providers |
| T | Transport to definitive care |

By the time of its second meeting in July 2013, the Hartford Consensus group had expanded to include representatives of law enforcement, emergency, surgical and military medicine, fire/rescue and EMS as well as representatives of the Federal Emergency Management Agency and the White House National Security Staff.

This larger group focused on how their organizations could assist their colleagues in the field in implementing the THREAT concept in their communities. Another goal was to identify educational tools and performance measures to ensure that programs to reduce death and injury in active shooter/MCIs were sustainable and their effectiveness validated.

Intended to develop broadly acceptable concepts for countermeasures to the active shooter problem, the Hartford group worked for weeks, hoping to harness the motivation for action that followed the Sandy Hook tragedy. At the same time, the ACS, FBI and others pursued parallel projects over a longer term.

Benchmarks of Progress since Sandy Hook
Since Sandy Hook, a number of national public safety organizations have advocated for im-
Focus on Active Shooter Incidents and Tactical Emergency Casualty Care

During the 2013 Boston Marathon bombing, rapid control of hemorrhage in victims of otherwise survivable wounds was critical to saving lives.

proved response to active shooter and intentional MCIs, incorporating the basic concepts of the Hartford Consensus in their recommendations.

In September 2013, following collaboration with leaders of public safety agencies and professional organizations, the U.S. Fire Administration (USFA/FEMA) released detailed operational guidance for fire and EMS agencies in development of local active shooter response plans.

Following the Boston Marathon bombing the previous April, this project expanded its scope to include similar contingencies. The resulting manual assists local agencies in using existing incident command and control concepts in the context of active shooter and MCI events.7

In addition to the efforts of USFA/FEMA and participation in the discussions previously mentioned, the Department of Homeland Security (DHS) brought together authorities in medicine, law enforcement, fire/rescue and EMS at all levels with specialists in the private and public sectors to develop collaborative guidance for active shooter and MCI planning.

In February 2014, the DHS Office of Health Affairs assembled over 250 representatives to continue this process, working collaboratively on specifics of hemorrhage control, protective equipment, interoperability of responding authorities and advocating for a role for citizen bystanders in MCIs.8 Recommendations in these important areas of concern are expected in the near future.

As part of President Barack Obama’s directive to expand access to federal active shooter training, the Department of Justice (DOJ) launched its active shooter response training initiative.9–11 A central component of the initiative is Advanced Law Enforcement Rapid Response Training (ALERRT), a program partnership between Texas State University, the San Marcos (Texas) Police Department and Hays County (Texas) Sheriff’s Office.

ALERRT and the DOJ have been associated for more than a decade. In June 2013, the FBI established ALERRT as the recommended national standard for active shooter response training.12 ALERRT includes training in emergency hemorrhage control and recognizes this skill as a law enforcement function. This training has been provided at no cost to over 50,000 police officers. With additional DOJ support under the active shooter initiative, an additional 30,000 officers are to receive training in the next 18 months.13

Beginning in March 2013, the FBI’s 56 field offices hosted active shooter workshops for more than 10,000 police commanders from approximately 4,400 agencies. More than 7,600 leaders from more than 3,000 public safety agencies at all levels of government have attended tabletop exercises in active shooter response and recovery since that time. And, in an internal effort, the FBI expanded medical first aid training emphasizing immediate hemorrhage control to all of its 12,000 special agents.13

Progress on the Street

Since the beginning of 2013, more than 30 police departments across the country, varying in
size and available resources, have provided local training in emergency hemorrhage control to approximately 82,000 law enforcement officers. Encouraged by organizations like the Major Cities Chiefs Association and others, these efforts complement federally sponsored law enforcement medical training.

These programs can be incorporated into existing plans and budgets, and when supported by the agency medical authority, can serve as a bridge to their colleagues planning active shooter response in the fire/rescue and EMS communities and at destination hospitals.

The national EMS community is more diverse than law enforcement, making integration of EMS into active shooter response a complex task. While inclusion of hemorrhage control in police doctrine can gain ready acceptance as an officer safety issue, bringing EMS closer in time and space to an active shooter scene is a more difficult concept to implement.

In the minority of communities where the police provide EMS services, rapid suppression of the threat can be followed by entry of medically-trained law enforcement officers performing the rapid extrication and first medical assessment of victims.

In the majority of communities where EMS isn’t a police service function, public safety officials must develop a response plan that’s workable within the resources and risk tolerance of that community.

A number of national organizations, including the International Association of Fire Chiefs and the International Association of Fire Fighters have encouraged the Rescue Task Force (RTF) concept. RTFs are a means of providing faster medical access to an active shooter scene, after elimination or isolation of the shooter threat, before completion of the laborious process of fully clearing the location of possible hidden threats.

While this approach is unlikely to become universal, a number of communities have developed joint RTFs, and have conducted critically important field training exercises to implement and fine tune the complex process of rapid access, reassessment and evacuation of victims triaged in order of severity. (Editor’s note: For more on RTFs, see “Inside the Warm Zone: Blacksburg Volunteer Rescue Squad partners with police to create a rescue task force” in May JEMS.)

The Continuing Challenge
A number of recurring concepts were noted by the group at the first and second meetings of the Hartford Consensus. First, because the next active shooter event can occur anywhere in the U.S., local public safety in all communities must incorporate active shooter planning into their operations. The ability to respond immediately and effectively is critical if the number of victims and loss of life are to be minimized. This means all elements of a coordinated public safety response to an active shooter must be available at all times, on every shift, and integrated into the routine operations of fire/rescue and EMS services as well as the police.

Regular training and review by leaders across public safety agencies are required to ensure a practiced, coordinated response by police, fire/rescue services and EMS without advance notice. We must remain capable of deploying special teams to critical incidents, as the possibility of complex attacks involving multiple assailants and unconventional threats certainly exists. However, experience over the past decade and a half demonstrates that the vast majority of incidents involve one assailant armed with conventional firearms.

This is partly the basis of the change in police tactics advocating immediate engagement of the shooter by patrol officers. Like law enforcement, fire/rescue and EMS agencies must be capable of rapid action without the delay required to marshal special operations teams.

Second, hemorrhage control actions by the police must be taught and applied in a manner consistent with law enforcement tactics. These skills must augment rather than degrade the primary police mission of stopping the wounding of additional victims while managing the risk to responding officers, who are at statistically high risk for injury as they engage the shooter.

The same requirement applies to supporting actions by fire/rescue and EMS. Their actions must not degrade the police response or place themselves or the police at increased risk by complicating the tactical situation any more than necessary.

Coordinated active shooter responses by police, fire/rescue and EMS are complex, and don’t lend themselves to a cookie cutter approach. To be effective they must be tailored to the resources and level of risk tolerance of a given community.

Third, if community-based active shooter plans are to become a long-term capability, education and training in the skills and concepts underlying these plans must be provided consistently over the long term.

Existing training programs such as the
Prehospital Trauma Life Support (PHTLS) course and the military equivalent Tactical Combat Casualty Care (TCCC) course are examples of medical analogs to the special training available to our law enforcement colleagues. The recent ACS guideline for prehospital hemorrhage control is an example of the evidence-based guidance needed to improve the uniform effectiveness of emergency care prior to arrival at the hospital.

Development of similar training and guidance applicable to critical incidents is one means of maintaining an effective, agile medical response to active shooter and other criminal MCIs.

Finally, it’s important that access to surgical care is in place at the end of the continuum of public safety response to active shooter events. While appropriate emphasis is placed on field tourniquet control of extremity hemorrhage, victims of penetrating chest and abdominal wounds require priority triage and evacuation to a surgical suite. In parts of the country with limited hospital resources, surgeons and their emergency medicine colleagues will play an important role by ensuring that the hospital contingency plans required for accreditation include the capability to provide damage control surgery to multiple victims of an active shooter event.

While trauma center designation isn’t an option for some smaller hospitals, a basic emergency surgical capability for all hospitals similar to that in place in hospitals in Israel is a concept worth consideration in areas with limited services.

Emergency hemorrhage control techniques employed in the field, such as a pressure dressing, hemostatic dressing or a tourniquet require definitive treatment at the ED or in the surgical suite. Penetrating wounds to the chest or abdomen require the services of the surgeon.

It falls upon emergency physicians to maintain familiarity with current recommendations for hemorrhage control and initial hospital trauma treatment. And, like their emergency medicine colleagues, general surgeons who don’t treat penetrating trauma frequently may benefit from continuing education and training in this area offered by ACS and other institutions.

Maintaining basic trauma receiving capability at all potential receiving hospitals is a critical part of active shooter and mass casualty response. The role of the receiving hospital is deserving of increased recognition.

Seeing the Whole Picture

Professionals in public safety, prehospital and hospital-based medical care might also ask, “Two years later, what do we do next?”

As all segments of our community continue robust efforts to prepare for and respond to active shooter events and incidents like the Boston Marathon bombing, we would be well served to find ways to measure the effectiveness of these efforts.

The professions of law enforcement, EMS and hospital care are resource intensive, and both monetary and human resources are limited. The validity and effectiveness of the countermeasures we propose can only be proven if we collect data. The U.S. military improved the survival of its wounded members by changing their approach to life-threatening hemorrhage across the spectrum of care from field medic and casualty evacuation to trauma surgeon and combat support hospital.

Change of this magnitude was made in large part because our medical colleagues in the Defense Department masterfully collected and interpreted patient data to develop an evidence-based reason for change.

Our civilian medical care system doesn’t lend itself to easy collection of data on patient outcomes. Patients move through the care continuum from first responder to EMS to the various departments of one or more hospitals, each modality with different ownership, supervision and data management. Important legal protec-
tions to personal medical information have the unfortunate side effect of impeding collection of data, either by law or by misinterpretation.

The majority of medical evidence supporting our current effort to improve survival from these events is derived from the military. While anecdotal reports of survival of wounded police officers and civilian victims is highly motivating and a source of encouragement, methods to collect treatment and outcome data on victims of these events are needed.

Detailed injury and treatment information is required at each phase of the emergency care continuum in order to know which techniques, procedures and equipment provide the best chance for survival. This process is critically important to making informed decisions on where to devote finite human and financial resources. The need for data supporting evidence-based trauma treatment is well recognized in the medical community. Incorporating data on the use of tourniquets, hemostatic agents and junctional hemorrhage control devices within trauma registries and similar databases will significantly enhance the ability to evaluate and improve what we do.

It’s important that data from all points in the patient care continuum be included, in a manner preserving medical confidentiality and in compliance with the law, while presenting a complete picture of the progression of patient care in statistically useful ways.

Conclusion
Considerable progress has been made since the tragic events at Sandy Hook prompted an increased focus on response to active shooter events in the U.S. It’s critical to recognize that the most important response to these incidents is local, and that continued support of local public safety agencies in all parts of the country is key to improving survival for victims of these tragic events.

William P. Fabbri, MD, FACEP, is medical director of the Emergency Medical Support Program of the Federal Bureau of Investigation. Fabbri served as a member of the committee responsible for the Hartford Consensus document.

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Focus on active shooter incidents and tactical emergency casualty care

The need for & evolution of civilian high threat medical guidelines

By E. Reed Smith, MD, FACEP & David W. Callaway, MD, FACEP

The multiple mass killing events over the past five years have become game-changers for the first responder community. Events that were commonplace in other parts of the world have, unfortunately, become an almost routine occurrence in the United States.

The emergency response community has been tackling these events since 9/11. This is the new reality and first responders must be properly prepared to face the challenge.

Despite the evolution in the risk, the preparation and paradigm of civilian operational medical response as a whole hasn’t evolved. Consider the traditional teaching for the reconnaissance and subsequent rescue of wounded victims in scenarios where there’s an ongoing threat. The overwhelming guidance and culture has been scene safety first for medical providers—“staging and waiting” for the all clear.

Considering the past few years and the subsequent knowledge first responders have on both the threat and the rapid nature of the fatalities, it would be reasonable to wonder if the first responders will actually follow the safe staging guidance.

The vast majority of fire and EMS responders, as has been demonstrated several times over the past few years, aren’t satisfied to stand by. They know there are injured in need of immediate care. They know the risk, and with that knowledge they’ve demonstrated a predilection for action. First responders are heroes and, as a whole, they’re going to go to work even when the risk is high.

If these first responders decide to effect life rescue and enter the scene, do they carry in the
same items they would bring to a routine medical call—all the different medical bags piled on top of the stretcher with a monitor and oxygen bottle? Are they carrying the right medical and rescue equipment for high threat scenarios?

Has the traditional EMS medical training properly prepared these first responders to provide care under these conditions? There are multiple wounded and dead with the potential for additional explosions or other threats to safety. Are they trained to approach the patient in this scenario? Do they know how to appropriately change from their everyday medicine to a practice that is efficient and appropriate given the ongoing threat?

In essence, the question is whether a gap exists in how civilian first responders both train and respond to operational scenarios with an ongoing threat, direct or indirect, to provider and patient? The answer is simply yes. When considering medical and rescue operations in high threat scenarios, there’s an absolute gap in the traditional training and guidance to medical first responders.

Rejecting the Old Paradigm

Stage and wait? In trauma, time counts. Essentially, every minute with uncontrolled life-threatening traumatic injury decreases the casualty’s chance of survival. This is just common sense, but it also holds true in high threat scenarios.

The Wound Data and Munitions Effectiveness Team (WDMET) study completed in the early 1970s was the first dataset that clearly demonstrated the unique timing of battlefield deaths and emphasized the need for forward medical care. In the examination of a cohort of Vietnam era battlefield deaths, conclusions from WDMET showed that the greatest opportunity for lifesaving intervention on the battlefield is early on. The study showed that 90% of the studied deaths on the battlefield occurred before designated medical care was given to the injured: 42% immediately, 26% within five minutes and 16% within five to 20 minutes. That means 84% of the fatalities on the battlefield died quickly, within 30 minutes of their injury.

Additionally, only 10% of the fatalities in the dataset received medical care. The natural assumption then is that those who received care were less likely to die. The summary results from the WDMET study echoed common sense conclusions, “The greatest benefit is achieved through a tactical configuration that puts the caregiver at the patient’s side within a few seconds to minutes of wounding.”

This conclusion doesn’t endorse the current paradigm of “stage and wait until everything is safe.” Instead, the operational response needs to be configured to get the caregiver to the patient’s side within a few seconds to minutes of wounding. Far-forward placement of medical assets is lifesaving.
Evolution of Combat Care

Essentially, the current concept is point of wounding care; rapidly provide stabilizing treatment where the wounded lies before evacuating to care. As with all advanced concepts in trauma care, the military leads the way through care of the wounded on the battlefield. U.S. military medics have been deploying to provide combat rescue and medical care since Union Army surgeon Jonathan Letterman deployed his ambulance corps during the Civil War’s Battle of Antietam.4

However, prior to the 1990s, there was no truly defined set of medical guidelines or rules specific to the battlefield. Combat medics were taught to manage battlefield injury using the same medical paradigm that was taught to civilian EMTs and paramedics.

The problem was that civilian prehospital trauma life support (PHTLS) and advanced trauma life support (ATLS) courses were developed to manage the common injuries and operational considerations encountered in the civilian trauma setting. Although the pathophysiologic process of dying is the same, these civilian medical courses failed to account for the unique considerations around trauma resuscitation in combat: the high lethality and high energy wounding pattern, multiple causes of wounding, preponderance of penetrating injury, persistence of threat, austere and resource constrained environment, and delayed access to definitive care.

As a result of several high-profile, high-fatality operations in the military special operations community, the U.S. Navy funded a study in the early 1990s to examine the military paradigm of combat medicine and the application of civilian medical standards in the combat environment. The results demonstrated significant issues with the application of civilian medical principles to the battlefield, especially the lack of provisions to allow for prioritization of the management of casualties with the ongoing threat and the ongoing combat mission.

The study’s conclusion was that the military needed a new paradigm for combat medicine and, in 1996, Frank Butler Jr., MD; Colonel John Hagmann and Ensign George Butler created and published military-specific combat medical guidelines called “tactical combat casualty care” (TCCC).5

The TCCC guidelines represented an operational paradigm that allowed for the prioritization and application of medical care on the battlefield addressing the three preventable causes of death identified in the post-Vietnam fatality studies while accounting for limitations and conditions of ongoing combat.

TCCC was quickly adopted throughout the special operations community, and, since the mid-2000s, was adopted throughout all branches of the military for deploying military personnel.

TCCC guidelines have been one of the major factors in reducing preventable death on the modern battlefield: the case fatality rate in current combat operations has decreased from approximately 15% in Vietnam to 7.6–9.4% during Operation Iraqi Freedom and Operation Enduring Freedom.6

In a memorandum dated Aug. 6, 2009, the Defense Health Board made note of several special operations where all members were trained in TCCC and had no reported incidents of preventable battlefield fatalities during the entirety of their combat deployments. American forces are now down from 9% to 2–3% killed in action due to exsanguination from an extremity wound; down from 5% to less than 1% killed from open/tension pneumothorax; and remain around 1% killed in action from airway obstruction (but these airway issues are more complex than those of the past).7

More than 10 years of data have presented continuing evidence to support TCCC. The guidelines are well known, well supported and ingrained throughout the military. The proven success of TCCC on the battlefield has led the civilian medical community, both tactical and conventional, to closely examine the tenants and consider integration of TCCC into civilian trauma care.

From Combat to Civilian

Is TCCC the right fit as a new civilian operational paradigm? It’s clear that current fire and EMS operational medical response is inadequate for atypical high-risk emergencies, and it would seem that because the bullets and bombs are the same, TCCC principles and practices should work in civilian operations as well. However, when truly considering the inherent differences...
Finally, the inherent military combat language of TCCC is different than civilian language. Civilians need a framework utilizing common operating language that can be applied across all first responder disciplines. Terms such as “care under fire” and “tactical field care” may be acceptable for law enforcement operations but are easily misunderstood to imply an unacceptable conditional threat and are thus easily rejected by other response disciplines.

Common language is essential across all disciplines during high threat response. Although a common argument by military TCCC personnel to civilians is to emphasize the principles and not to “get caught up in the language,” those with true civilian multidisciplinary operational experience understand the need for even the most simple generic common operating terms.

In 2005, several civilian first responder entities began discussing how TCCC could be transitioned into a civilian-appropriate format. In 2008, the George Washington University and Arlington County (Va.) Fire Department coined the term “Tactical Emergency Casualty Care (TECC)” for the translation of TCCC into a set of guidelines for use by civilian first responders in high threat scenarios. Emergency is a civilian term; combat is a military term.

The concepts in each set of guidelines are the same, but the language and the focus are different. As part of the process, development and continued evidence-based and best-practice-based growth of the civilian TECC guidelines, the founders of the TECC concept established the Committee for Tactical Emergency Casualty Care (CTECC)—a nonprofit committee of civilian operational experts. These experts first met in 2011 and established the first set of TECC guidelines by changing TCCC to civilian language and focus.

CTECC works as a nonprofit and nonproprietary grassroots effort to create and maintain a set of high threat medical guidelines that are open to and shared with all first responders.8
TECC is a medical care framework for high threat operations based upon the military dogma of TCCC, but adapted to allow for civilian language, protocols, population, scope of practice and operational constraints.

TECC isn’t in competition with TCCC, it’s the evolution of TCCC into the civilian realm. They’re the same principles and practices translated and evolved for civilian use and operations.

Adaptable Guidelines

Given the need for diverse operational protocols and considerations, TECC can be considered to be a set of bricks. As a whole, the military TCCC is dogma, applied without change despite operational or provider considerations. For civilian application, TECC is designed to allow for different agency-specific adaptations. Each agency should take the TECC “bricks” that fit into their protocols, scope, culture, liability, mission and operational considerations to build a high threat medical response program. In addition, each agency must select the right equipment and hemorrhage control items that best suit their clinical and operational needs. (See “Selecting Hemostatic Dressings: The decision-making process for wound control” that follows this article, as well as “Tools of the Trade: Rapidly deployable products for TECC & Active Shooter Incidents,” p. 43).

By using only the parts of the guidelines that fit into the agency’s needs, each TECC application will be slightly different and specific to the agency. However, overall, the application between agencies will be the same.

Although there are some generic TECC courses currently being taught, there’s no official TECC course, no need for instructor certification or for an official TECC provider course or card. TECC is less about what to do and more about when (or when not) to do something. The medical interventions inherent to TECC are common everyday trauma interventions standard to almost all prehospital providers. It’s the integration of these guidelines into an agency’s standard operating procedures that’s the foundation of TECC. Instead of a premade course, operationalizing TECC should be done in a manner unique to each agency.

The goals of TECC are to establish a medical care framework that balances the threat, the civilian scope of practice, the differences in civilian population, the medical equipment limits and variable resources for all atypical emergencies and mass casualties, to provide aggressive forward deployment and principles for point of wounding care in high threat and mass casualty environments, to provide care guidelines and account for the ongoing threat in operations and minimize the provider and patient risk while maximizing patient benefit.9

To address needs of the civilian population and mission that differ from the military, the TECC guidelines specifically address the care of pediatric patients in high threat environments. (See “Preparing for the Unthinkable: Tactical Emergency Casualty Care pediatric guidelines, p. 30.) There’s emphasis on the treatment of civilian-specific conditions such as smoke inhalation and civilian-specific operational considerations, such as priority and destination triage and establishing casualty collection points. And, similar to the “all hazards” approach of civilian fire and EMS service, TECC is a set of high threat principles for all operational hazards to be applied in any operational scenario where there’s an ongoing threat to the provider and patient.

TECC guidelines aren’t only for trained medical personnel. They can be easily limited to any scope and should be taught to all provider levels. In mass casualty scenarios, uninjured citizens often step forward to initiate care for the wounded. The goals of TECC are to establish a medical care framework that balances the threat, the civilian scope of practice, the differences in civilian population, the medical equipment limits and variable resources for all atypical emergencies and mass casualties, to provide aggressive forward deployment and principles for point of wounding care in high threat and mass casualty environments, to provide care guidelines and account for the ongoing threat in operations and minimize the provider and patient risk while maximizing patient benefit.9

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High threat medical principles apply widely across multiple agencies including law enforcement, fire and EMS.

PHOTO COURTESY E. REED SMITH
Conclusion

The TECC guidelines are multiagency, multispecialty evidence- and consensus-based. TECC is civilian driven and civilian appropriate. Its guidance, appropriate for use by all disciplines of first responders and first care providers in any scenario where there’s significant ongoing operational risk to providers and patients. It’s vetted, evolving and a great venue for future research.

The implications of high threat medical principles apply widely across law enforcement, fire and EMS operations. The principles should be built into the operational response for incidents including, but not limited to, active shooter/active killing events, medical response to explosive mass casualty, patrol officer first aid, SWAT/tactical medicine programs, technical rescue operations, wilderness medicine settings and large-scale mass casualty to identify and treat those casualties with preventable causes of death as soon as possible at or near the point of wounding to improve survivability and keep the victim alive long enough to get them to definitive medical care.

E. Reed Smith, MD, FACEP, is the medical director for Arlington County (Va.) Fire Department and its rescue task force. Contact him at rsmith@arlingtonva.us.

David W. Callaway, MD, FACEP, is co-chairman of the Committee for Tactical Emergency Casualty Care.

References

**Selecting Hemostatic Dressings**

*The decision-making process for wound clotting agents*

Advanced hemostatic (wound clot) dressings and agents have proven to be a critical component of EMS and fire service trauma kits as well as law enforcement officers’ individual first-aid kits. So, selecting the best dressing for your needs is a decision to thoughtfully consider.

The major brands (Celox, QuikClot and HemCon) will all work in a three-minute “hold in place” product model. But rarely do we have the luxury of a three-minute stay and treat environment at active shooter or other mass casualty incidents. So, product review must be a multifactorial decision.

Hemostatic technology and capabilities have advanced considerably over the past few years. In addition, this is no longer just a pure “clinical data” argument, as the stakes are considerably higher in deployment of these products in the tactical law enforcement environment. While budgets and personal experience are relevant decision-making points, there are a set of key variables to consider.

Despite the rapid increase in acceptance in the tactical law enforcement communities, a standardized, quality decision-making process that focuses on the three key variables of the clinical, tactical and economical aspects hasn’t existed. So, what follows is a non-biased set of standards (benchmarks) to assist you in your decision-making process for these products.

### 1 Clinical Considerations

Sufficient data now exists to evaluate the performance of wound clot products in the context of survivability and total blood loss.

Most of this data has been performed on products using three-minute “hold” times after dressing application. However, some dressings now dramatically reduce the need for three minutes of post-application compression because they can control active bleeding in seconds rather than minutes.

So, the primary clinical concerns for those in the tactical space are mechanism of action (how it works) and time to hemostasis (how fast it works).

**Mechanism of clotting agent action:** Stopping the flow of blood is paramount. The faster bleeding is stopped (hemostasis), the less blood is lost and there’s less chance of a patient going into difficult-to-manage or irreversible shock.

Some products rely on or are dependent on the body’s clotting factors and ability to form a stable clot. These are the mineral-based ingredients such as Kaolin (Combat Gauze) and Smectite (WoundStat).

Other wound clot products work independent of the body’s intrinsic clotting pathway. These are the chitosan-based products such as Celox and HemCon’s ChitoGauze.

The bottom line is that relying on the body’s ability to provide the factors necessary to stop bleeding can be problematic in a life or death environment. If an emergency care provider comes across a casualty with diminished clotting capabilities due to hemorrhage and the person is taking aspirin or using blood-thinning prescription medications like warfarin (Coumadin), products dependent on the patient’s body systems will be less effective than those that aren’t.

### 2 Tactical Considerations

Data from recent mass violence and active shooter events presented in this supplement demonstrate that you don’t have three minutes to hold pressure on wound clotting agents or bandages because these events are high-speed scenarios where seconds—not minutes—matter.

The concept of tactical hemostasis is centered around “hands free—faster.” As stated, although multiple products can stop bleeding in a three-minute model, several wound clot products can stop bleeding faster, thereby freeing up the hands of emergency providers to treat other wounds or treat other casualties. Perhaps more important is the ability to free up the hands of law enforcement officers to “fight back” when under fire. So, the products that free up the caregivers’ hands the fastest, can dramatically impact the casualty or rescuer’s safety and security.

### 3 Economic Considerations

Economic considerations round out the decision-making process. Product cost and shelf life represent a “cost per month” for products that may sit unused in kits and vehicles for extended time periods. The longer the shelf life, the more the savings on restocking expense.
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External hemorrhage is a common problem encountered in the management of prehospital trauma. The vast majority of hemorrhage is relatively minor and easily controlled by simple maneuvers, such as direct pressure and the application of a pressure dressing.

Occasionally, such hemorrhage can be brisk and life threatening. Military research shows that extremity hemorrhage is responsible for approximately 9% of battlefield deaths and represents the largest preventable cause of death in combat.1,2

The mortality from extremity hemorrhage in civilian EMS is much lower, estimated at 2.8% of trauma patients.3

However, despite the relative rarity of such injuries in civilian EMS, the appearance of military-type injuries are a possibility in every community, with mass shootings (Columbine, Aurora, Sandy Hook) and bombings (Oklahoma City, Boston Marathon) making the news more frequently.

In such cases, early management of hemorrhage by first responders can mean the
difference between life and death by exsanguination. So, despite the infrequency of such horrific events, we must be ready to respond when disaster strikes our communities. First response in such situations may be by bystanders, law enforcement personnel or EMS.

In response to these incidents, federal and state authorities have convened panels of EMS and law enforcement experts to reevaluate our combined responses to such domestic mass casualty incidents. As part of these conversations, there developed a realization that some of the lessons learned from our combat trauma management experiences could be applied to minimize the morbidity and mortality of these tragic events.

One such effort was a National Highway Traffic Safety Administration Office of EMS-funded request to the American College of Surgeons (ACS) to develop an evidence-based guideline (EBG) for initial hemorrhage control by first responders, whether they be layperson bystanders, law enforcement or trained EMS providers.

This effort culminated in the recent publication of Evidence-Based Prehospital Guideline for External Hemorrhage Control: American College of Surgeons Committee on Trauma.4

Evidence-Based Guidelines
An EBG is a recommendation for treatment that’s developed using a structured process to evaluate the existing medical literature to answer specific treatment questions. For the current hemorrhage control EBG the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) process was utilized.

This is a standardized process for such EBG development. GRADE is part of the Model Process for Development of Prehospital EBGs that has been established as a standard model process for the development of prehospital EBGs by the Federal Interagency Committee on EMS and the National EMS Advisory Committee (NEMSAC).5

Simply stated, the GRADE process begins by developing very specific questions to be answered. In addition, the values and preferences of the group regarding these questions are defined. For example, the expert panel felt that guidelines should guide care in the prehospital environment and should improve patient outcomes.

After these “ground rules” are established, the available medical literature is collected and reviewed to answer the defined questions. Each of the relevant articles is then reviewed, evaluated and graded based on the quality of the research.

Articles are ranked as strong, moderate, weak or very weak evidence.

Finally, after all of the evidence is reviewed and graded for answers to the research questions, guideline recommendations are made. Based on the strength of the evidence, and the likelihood that the recommendations are going to do more good than harm to the patient, these final recommendations are considered either “strong” or “weak.”

A strong recommendation is based on good-quality evidence and is considered very likely to provide more good than harm. A weak recommendation is based on weaker evidence and is thought likely to provide more good than harm.

The prehospital hemorrhage control guideline described below was developed after review of all of the available medical literature on hemorrhage control and using this rigorous model. As new medical evidence becomes available, this guideline could change. However, at this time it’s based on the best available evidence as assessed by the ACS expert panel. The panel was made up of experts in trauma care, hemorrhage control, emergency medicine and EMS. It included both military and civilian members.

Figure 1: Prehospital external hemorrhage control protocol

The findings of the expert panel are summarized in Figure 1. In summary, the first step in hemorrhage control is direct pressure and application of a pressure dressing. If that results in cessation of bleeding, then you’re done. However, if direct pressure is either “ineffective” or “impractical,” then more advanced hemorrhage control techniques are required.

Indications for More Advanced Techniques
“Ineffective” is pretty simple: Despite your efforts to apply direct pressure and a pressure dressing, the bleeding continues.
“Impractical” means these measures can’t be immediately applied or sustained because: a) the nature of the wound doesn’t allow effective hemorrhage control by this technique; or b) you don’t have sufficient hands, equipment or time to apply an effective pressure dressing.

This could occur, for example, because you’re first on the scene of an incident involving a patient with multiple injuries who needs attention (airway, breathing, circulation) in addition to a severe extremity hemorrhage.

Applying direct pressure and applying an effective pressure dressing may require more time or supplies than you have immediately at your disposal, since you also need to manage the unstable airway, decompress the tension pneumothorax, get lines started, etc.

In this case, the pressure dressing is impractical and the rapid placement of a tourniquet or hemostatic gauze may be required to stem the severe hemorrhage while other priorities are attended to.

Alternatively, in a mass casualty situation like a shooting at a shopping mall, you may be required to rapidly assess, triage and begin lifesaving treatment for multiple patients.

Until further rescue personnel arrive, the priorities must be to immediately stop obvious life-threatening hemorrhage, provide simple airway management maneuvers and to evaluate, triage and categorize all of the injured at the scene.

This is the current military model for mass casualty management and is at the heart of the SALT (sort, assess, lifesaving interventions and treatment/transport) triage system.6

In this situation, it’s “impractical” to apply direct pressure or a proper pressure dressing to each patient until all patients have been assessed and triaged. So advanced hemorrhage control techniques, such as tourniquets or hemostatic gauze, should be utilized, which may prevent exsanguination while the patients await further treatment and transportation to definitive care.

The next step of the hemorrhage control algorithm divides wounds into those “amenable to tourniquet placement” and “not amenable to tourniquet placement.” In general, this divides wounds into extremity wounds (for which tourniquet placement is possible), “junctional” wounds (wounds to the groin, axilla, neck, or scalp) and torso wounds (chest, abdomen, pelvis).

These latter two areas preclude secure tourniquet placement and require other means, such as the packing of hemostatic gauze to control severe hemorrhage.

The expert panel, based on the evidence available, felt that the strength of the recommendation for tourniquet use was “moderate,” because of the preponderance of beneficial effect and minimal harm in the literature, the vast majority of which were retrospective military studies.

The strength of the recommendation for the use of hemostatic gauze was considered to be “weak,” because it consists entirely of animal studies on these hemostatic products; there are no human studies to date. However, in these animal studies, including a standardized swine model developed by U.S. military researchers, the benefit of hemostatic gauze consistently outweighs the risks of its use.

In line with the new external hemorrhage control protocol, effective wound packing should be added to the standard prehospital and first responder skill set.
Several specific points made by the expert panel regarding the use of these advanced hemorrhage control techniques should be reviewed.

Regarding tourniquet use, the committee suggests that a commercially-produced windlass, pneumatic or ratcheting device, which has been demonstrated to occlude arterial flow, be used; that narrow, elastic or bungee-type devices be avoided; that improvised tourniquets be utilized only if no commercial device is available; and that, in short urban transports, a properly applied tourniquet not be released until the patient reaches the hospital.

In longer transports, or in austere or complex situations (for example rural, wilderness or an entrapped patient with an extended extrication), on-line medical control should be contacted to consider replacing the tourniquet with an effective pressure dressing when/if possible.7

Regarding the use of hemostatic agents for junctional or torso injuries, the expert panel suggests utilizing only hemostatic agents which are available in a gauze format, which support firm packing of the bleeding wound and have been determined to be effective and safe in a standardized laboratory injury model.

It should be noted that the federal Department of Transportation standardized curriculum and most prehospital training programs don’t currently teach wound packing as a required skill. We would suggest, based on this evidence, that effective wound packing be added to the standard prehospital and first responder skill set and that training in this lifesaving technique be added to EMS training programs nationwide.

Similarly, effective tourniquet use should be added to all first responder training programs, including training for law enforcement personnel, as they are often the first on the scene of active shooter or other disaster scenes.

More civilian prehospital research is needed to better define the use of tourniquets and hemostatic agents in the patients that we see daily. As was mentioned, much of the research on these techniques has been performed by the U.S. military, whose patient population is generally young, fit and healthy soldiers.

We need to know if these techniques are safe and effective for our typical civilian EMS patients, including children, the elderly and those with chronic cardiovascular and other diseases. Such research is currently underway in several large EMS systems.

**Conclusion**

The publication of this external hemorrhage control EBG will provide EMS medical directors and field providers the guidance and confidence they need in the training and implementation of local hemorrhage control protocols and the deployment of tourniquets and hemostatic gauze.

These advanced hemorrhage control techniques won’t be frequently required in civilian EMS situations. However, when needed, they can be lifesaving and are, therefore, important “tools in the toolbox” for the EMS responder. +

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**References**

It was a beautiful spring day in Boston the morning of April 15, 2013; ideal weather conditions for the 117th running of the prestigious Boston Marathon, the oldest annual marathon in the world. Unlike the previous year when temperatures reached 90 degrees F and resulted in 2,000 runners seeking medical attention along the course, the weather was cool and comfortable for the 27,000 registered runners and 500,000 spectators cheering them on.

But then, at 2:49 p.m., everything changed. Two improvised explosive devices were intentionally detonated in the crowd resulting in the deaths of three spectators and the serious injury and maiming of scores of others. One hundred eighteen patients were transported from the scene by ambulance to nine area hospitals. All would survive.

It was the beginning of a week unlike any other in the Boston area: a terrorist attack in the city’s Back Bay neighborhood, a presidential visit, the murder of a Massachusetts Institute of Technology police officer, a gunfight with the two bombing suspects during which a Massachusetts Bay Transit Authority police officer was shot, a suspect was killed, a 12-hour “shelter in place” request for a major metropolitan area and the eventual capture of the second suspect.

Challenging the universal first responder tenet of scene safety, the Boston bombings represented a response that required a rapid, but thoughtful plan which took into account a fluid and dynamic threat, while mitigating as much risk to first responders as possible.

While the Boston bombing response didn’t involve an active shooter, it had many of the same concepts and components: multiple patient injury locations, a scene that wasn’t able to be totally secured by law enforcement in which critically injured patients were literally bleeding to death and requiring rapid treatment and transport.

Had Boston EMS personnel, active bystanders and other professional rescuers not immediately rendered aid, more lives would’ve been
lost. Initial actions focused on identifying viable patients, providing hemorrhage and airway control and rapidly clearing patients from an unsafe scene to areas of lower threat, and ultimately to definitive care.

Video taken by a *Boston Globe* sports videographer at the finish line with Boston EMS radio traffic overlaid on it illustrates what Boston EMS personnel were doing and thinking in the moments after the explosions. (Watch the video at http://youtu.be/7j7LkuPzT1c.)

Incident command positions were already established as part of the special event planning, so radio traffic was minimized. The nature and exact location of the incident was confirmed and units in the area were instructed to hold their positions. Boston EMS’ mass casualty incident (MCI) plan was put into effect, area hospitals were notified and put on alert, a secondary staging area was established and mutual aid plans were seamlessly implemented. These immediate actions didn’t occur by chance; they were years in the making.

**Identifying the Problem**

The response to active shooter incidents (ASIs) in the United States has historically involved a segmented, sequential public safety operation. Patrol officers were commonly trained to “contain and wait” at an ASI until more specially trained personnel (e.g., SWAT) arrived.

The mass shooting at Columbine (Colo.) High School has been widely viewed as the watershed moment in law enforcement that brought about a major tactical shift and reinforced the need for an immediate, aggressive response to active shooters. Since then, law enforcement response to ASI no longer focuses on threat containment, but instead emphasizes a rapid and immediate response by first arriving units to neutralize the shooter as quickly as possible.1,2

In the years preceding the Boston bombing, Boston EMS had begun training in conjunction with the Boston Police Department on how both agencies would coordinate a response to ASIs.

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Defining the Operational Environment

The “warm zone” concept represents a shift in law enforcement and EMS response tactics, equipment needs and incident command practices. Boston EMS recently developed a policy to provide departmental guidance for EMS operations in the warm zone, defined as an area of indirect threat that has been swept by law enforcement and cleared of any immediate threats.

A key component to successful warm zone operations is joint command and control by all disciplines involved at an incident. In metropolitan Boston area demonstrated to both law enforcement and EMS officials that despite best efforts to bring lifesaving medical care to victims after a threat had been neutralized, the time to first tourniquet or bandage placement remained unacceptably high. According to the FBI, a typical ASI lasts on average 12 minutes with 37% lasting less than five minutes.3

Recognizing the significant time delay to definitive care for victims during an ASI until the scene is rendered “clear,” Boston EMS began developing a joint EMS/law enforcement “rescue task force” response model described by other first response agencies, such as Arlington County (Va.) Fire Department.4

While training, Boston EMS focused specifically on the active shooter threat, and many of the same principles found immediate application at the bombing incident that occurred on Boylston Street.5

Military experiences over the past decade have demonstrated improved outcomes to victims of traumatic bleeding with early hemorrhage control techniques employed at the point of injury.6–8

This type of focused intervention, described in military-based medical training programs such as Tactical Combat Casualty Care (TCCC), has been integrated into an early and coordinated response with law enforcement.4

EMS personnel are instructed not to enter an area that hasn’t been cleared without law enforcement consent and protective escort. EMS providers wear issued ballistic body armor and function within the force protection structure provided by accompanying law enforcement personnel.

Active shooter training for Boston EMS personnel has included an understanding of the tactics, techniques and procedures of our law enforcement and EMS officials that despite best efforts to bring lifesaving medical care to victims after a threat had been neutralized, the time to first tourniquet or bandage placement remained unacceptably high. According to the FBI, a typical ASI lasts on average 12 minutes with 37% lasting less than five minutes.3

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A key component to successful warm zone operations is joint command and control by all disciplines involved at an incident. In Boston, all major events and incidents are operated through a unified command process made up of command staff from the primary response agencies within our jurisdiction.

Operations in a warm zone can only be successful when leaders recognize the roles of participating disciplines as well as the overall objective.

As areas are cleared and resources permit, law enforcement operations may initially include deployment of rescue teams that focus on extraction of wounded victims to a designated casualty collection point for EMS to render initial aid. EMS personnel may be requested to join a law enforcement rescue team, thereby forming a “rescue task force” for operating in the warm zone to provide medical operations including triage, primary point-of-wounding treatment (hemorrhage control and airway), and assist with extraction of victims based on available resources and capabilities.

EMS personnel are instructed not to enter an area that hasn’t been cleared without law enforcement consent and protective escort. EMS providers wear issued ballistic body armor and function within the force protection structure provided by accompanying law enforcement personnel.

Training conventional EMS providers to operate in what has been traditionally considered a “tactical” operation has focused on developing a mindset to operate jointly with law enforcement and focus medical interventions based on nationally recognized recommendations such as the Committee for Tactical Emergency Casualty Care (C-TECC) and the Hartford Consensus.9,10

Active shooter training for Boston EMS personnel has included an understanding of the tactics, techniques and procedures of our law enforcement.
enforcement partners responding to an ASI, developing common terminology among all the responding disciplines and adopting focused medical care our providers will deliver in the active shooter environment.

EMS provider comfort and ability to respond jointly with law enforcement to ASIs is directly related to the knowledge and experience developed during training. With the Boston EMS experience, 89% of providers felt adequately prepared to respond to an ASI after specialized training, compared to 41% of providers who felt this way prior to the training.11

The decision by EMS personnel to jointly operate under the force protection of law enforcement for the preservation of lives must be judged carefully against the risk of injury or harm to operate in such an environment. Boston EMS personnel operating at an incident are trained to constantly assess for secondary devices or other threats. Should threats be identified, it would necessitate upgrading the area to one of direct threat (“hot zone”) requiring rapid evacuation of all EMS personnel and surviving patients.

Medical Treatment in the Warm Zone
The importance of integrating early lifesaving medical interventions in the response to an ASI is an integral component to victim survival.10 Boston EMS has long recognized the critical importance of aggressive hemorrhage control along with rapid transport to an appropriate receiving facility in the case of severe trauma.

Since the late 1970s, Boston EMS EMTs and paramedics have used surgical tubing tourniquets for extremity hemorrhage control successfully.12,13 In the last few years, all Boston EMS field response units have added hemostatic gauze dressings to their hemorrhage control kits. And since the 2013 bombings, commercial windlass-type tourniquets have been issued to all department members in addition to the surgical tubing tourniquets.

Boston EMS has also developed response kits that focus on hemorrhage control and basic airway measures based on TCCC & TECC guidelines.8 These compact kits include rapid deployment items such as tourniquets, hemostatic gauze and pressure bandages that focus care primarily on hemorrhage control.

Additional warm zone treatment interventions include MCI triage review, rapid sweep triage tagging with colored triage tape and rapid extrication techniques. Boston EMS has also incorporated use of an armored tactical response rescue unit into joint training exercises with the Boston Police Department and other regional tactical teams to provide force protection and a relatively safe location to provide initial patient care.

The focus of medical care in this environment isn’t based on conventional basic trauma life support standards, rather, it accounts for the dynamic situation of an event, such as a terrorist bombing or active shooter, and limits care to high-yield, best practices while providing rapid extrication of victims to a safer environment more appropriate for further medical care.
A Paradigm Shift for EMS

The 1999 Columbine school shooting was a turning point for law enforcement response tactics to ASIs. A realization had been made that the time delay for specialized law enforcement assets to arrive and manage a dynamic event wouldn’t work.

The Boston bombings in 2013 have been viewed as an affirmation that current recommendations for EMS operations at mass bombing and ASIs do indeed work. Similar to the law enforcement paradigm shift, EMS has now seen a major change in the way we assess the level of threat of an incident and develop an appropriate, logical response to maximize the number of lives saved.

The EMS response mindset is undergoing change; rather than asking, “Is the scene completely safe?” the more appropriate question should be, “Is the scene safe enough?” based on what’s known at the time.

EMS agencies need to consider how they will operate in a warm zone environment with other responding agencies. Regular training with law enforcement partners is a key component to a successful response, with all agencies knowing how they’ll work with one another. This is done through the sharing of ideas, understanding common tactics, techniques and procedures, developing common terminology and understanding both capabilities and limitations.

Ricky Kue, MD, MPH, FACEP, is associate medical director of the Boston EMS, Police and Fire Departments, an assistant professor of emergency medicine at Boston University School of Medicine and a Major in the Medical Corps of the U.S. Army Reserve.

Brendan Kearney, EMT-P, MPA, is superintendent-in-chief of Boston EMS. He can be contacted at Kearney@bostonems.org.

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On a typical school day morning, school bus 17, carrying 42 elementary school students through suburban roads and main thoroughfares, suddenly strikes metal debris in the road blowing out the bus’s right tire and sending the bus careening off the road and into a tree.

The bus lands on its side and the passengers are trapped inside. After a frantic 9-1-1 call by a commuter, law enforcement arrives on scene, followed closely by the first fire and EMS units. They quickly establish incident command, declare a mass casualty incident (MCI), order additional resources and begin triaging the casualties. The responding medics find numerous school-age casualties in varying degrees of injury, criticality and distress.

Shifting the Paradigm of Treating Pediatric Trauma

The rise in Active Violence Incidents (AVIs) is a concerning trend facing EMS. While we shouldn’t let AVIs dominate discussions regarding trauma care, the increased awareness offers opportunities to drive a paradigm shift in the prehospital training and treatment of pediatric trauma casualties.
Training that was once the domain of only specialized law enforcement teams and their medical components is slowly but steadily transitioning to street-level first responders. In the past five years, fire-based systems have driven much of this expansion. The traditional EMS community is now racing to catch up.

It’s important to recognize that threats don’t simply include active shooters or terrorists; threats can include a burning bus, structural collapse, gas leaks, etc. The case above highlights two distinct gaps in the prehospital care in the high threat environment. First, although the system-level training of the civilian Tactical Emergency Casualty Care (TECC) principles has begun to reach the ground level with the recent International Association of Fire Fighters and United States Fire Administration/Federal Emergency Management Agency position papers, traditional EMS trauma education (e.g., BTLS and PALS) falls short on the treatment of the pediatric casualty in today’s high-threat environment.

Although these protocols are helpful in most cases of blunt trauma or medical arrest, they aren’t sufficient in the setting of multiple, high acuity penetrating trauma patients.

Second, the teaching and use of triage protocols without guidance on intervention may be due to the previous lack of literature regarding the treatment of the critically injured child.

For example, an EMS provider encountering a situation with multiple children suffering critical bleeding is currently being taught to respond via MCI declaration and triage protocol such as JumpSTART. However, in many cases this approach may subject the pediatric casualty to unnecessary delays in hemodynamic stabilization.

Currently there are no critical care pediatric programs that deal with critically injured pediatrics within the austere environment of mass casualties involving predominantly pediatric patients. This differs markedly from the literature base and approach taken with adult MCI and poly-trauma casualties.

Recognizing this gap in rescue operations, the Committee for TECC began an effort to develop a set of evidence-based pediatric casualty care guidelines.

Beginning in 2011, the committee formed a special populations subcommittee and pediatric working group to address the less represented demographics in our casualty population. These guidelines were developed using the same methodology employed for the development of the adult guidelines combining expert agreement, best evidence and current practices.

Beginning with an extensive literature review, the pediatric working group analyzed the literature for current evidence regarding pediatric casualty treatment. Given the significant lack of prehospital pediatric trauma data, the literature review included ED, operating theater and pediatric critical care data as well as prehospital and international disaster response research. The findings were presented for consensus review and published as the initial pediatric appendix to the TECC guidelines in 2013.

How the Pediatric Guidelines Apply to EMS

While modern law enforcement and EMS training frequently focuses on the response to dynamic threats, there’s wide variability in the preparation for pediatric casualties. Additionally, multiple sources confirm that children are often overlooked in disaster response, which may be resultant from inadequacy of current pediatric training.

Within the past two years, events involving public locations (e.g., schools, churches and theaters) have attracted the attention of the national media. Most, if not all, have involved pediatric casualties. The guidelines proposed by the TECC committee will greatly empower first responders of all types to improve familiarity and confidence with care for the pediatric trauma while in the high-threat scenario.

Understanding the current recommendations for an efficient and effective approach to the injured child incorporates not just mitigation of the physical injury but a holistic approach to minimize emotional distress in the casualty and improve understanding and thus compliance with direction given by responders. Integration of this approach into current protocols will go far to eliminate the confusion and uncertainty that often accompany these situations.

Approaching the Injured Child

The response to pediatric AVIs or MCIs is a poorly researched topic. As a result, we have incorporated data from several related fields including literature from experts in disaster/refuge care and child life specialists for general guidance on broad themes. Because of the difficulty writing guidance for a patient population ranging from infant to young adult, particular attention was paid to methods for improving communication with pediatric casualties and minimizing exposure to emotional distress.

Understanding that a child’s ability to respond to a stressful event is directly related to their development level and is critical to prepar-
ing providers to meet this challenge.

Because stress comes in many forms and is the summation of an emotional response to an event, it’s incumbent upon EMS and safety providers to minimize distress. Improper or ineffective management of the pediatric casualty’s distress will damage trust, complicate medical care and create difficulty in communication with the patient.

This perceived loss of control has operational consequences for the tactical response element. A child’s information processing ability is impaired under moderate stress. The extra time that’s required to engage a patient in a state of “frozen watchfulness” may have direct and severe consequences on the immediate operations of the response team.13 Moreover, the younger the child’s age, the more likely the child is to devolve into a state of undifferentiated threat and generalized distress.14

Not only might a child in this state be non-compliant with instruction or treatment, but this may limit information valuable to respond-

### Strategies for Communicating with Children During Trauma

- Approach from eye level.
- Use “minimally threatening” or “soft” language.
  - Use direct phrases (i.e., an incision should be described as “making a small opening” rather than a “cut” or “hole”).
  - Avoid using the word “hurt” because it has nonspecific connotations, and doesn’t convey helpful information. Try “sting” or “prick” when preparing children for an IV.
- Give analogy for medical terms (e.g., shot, pressure dressing, stretcher or butterfly). When using a tourniquet describe it like a “big rubber band” (something familiar to most children).
- Don’t provide explicit detail.
  - Only provide children with the information that they will directly experience.
  - Too much information may confuse or frighten children.
- Have child repeat back what they’ve heard.
- Allow child to make choices.
  - “Some kids say it feels like a pinch and others say a sting. What do you think?”
- Restore sense of control.
- Give child autonomy over his or her body.
- Enable children to play an active role.
  - “Your job is to hold his hand” or “sing the Air Force Song.”

### Strategies for Post-Trauma Management of Children

- Assign a single information provider for pediatric victims.
  - The absence of a trusting relationship is a cause of emotional distress.14
  - Provide at least one care provider who is frequently and readily available.
  - Be mindful of nonverbal communications.
- Allow for “play therapy” during evacuation phase and after the event.
  - Facilitate the transmission of complex or abstract concepts
  - Use drawings, medical tools, etc.
  - May provide more information post-event than verbal interviews.
- Allow for family reunification.
  - Emphasizing “family-centered care” fosters return of family unit autonomy.
- Keep parents with children.
- Keep siblings together.
  - Increases familiarity for children affected by events (parental signaling).
  - Provide anticipatory guidance.
- Increase familiarity and predictability
  - Need to work closely with families to assess their understanding of the situation.
  - Anticipatory guidance will reduce emotional distress.

### Pediatric vs. Adult TECC Guidelines

Pediatric care guidelines for the TECC phases of care as a whole mirror the adult guidelines with several important distinctions. As with adults, rapid hemorrhage control and tourniquet application is emphasized. The TECC pediatric guidelines are the first to specifically recommend pediatric tourniquet application. Supported by the only study to date,15 this recommendation is carried through the direct care, indirect care and evacuation phase guidelines.

Further recommendations put forth in the guidelines are important both for the provider and the management level oversight of response personnel. Based on physiologic differences in pediatric patients, changes in management and equipment are delineated.
Consistent with the adult guidelines, primary emphasis is again placed on achieving and maintaining hemostasis. Once achieved, controlling the pediatric airway is the next priority. Interventions, including positioning, manipulation and ventilation strategies, diverge from the adult guidelines.

Utilization of bag-valve mask ventilation is emphasized and shoulder elevation is recommended. Age criteria for invasive airway intervention is delineated and makes use of the “signs of puberty” method of age delineation familiar to most prehospital providers.

Other topics addressed in the pediatric appendix include recommendations for intrasosseous line placement as primary access, vigilance in avoidance of hypothermia and resuscitation guidelines.

Again, because of the dramatic variance in size of the pediatric population, thoracostomy needle sizes in pediatric casualties have yet to be proven in the literature. As such, the TECC committee chose to recommend a minimum catheter gauge size thereby allowing for local medical direction and provider discretion.

Recommendations regarding the use of tranexamic acid, hypotensive resuscitation and whole blood transfusion were deferred pending establishment of supporting evidence. These topics were passed to the TECC research subcommittee to drive future pediatric trauma resuscitation studies.

Reducing Post-Event Emotional Distress

Understanding that minimizing additional emotional distress is critical to the post-traumatic management of pediatric casualties and their parents, the TECC pediatric guidelines incorporate strategies directly for this during the evacuation phase.

Information exchange in the post-event setting too often follows a unidirectional flow from provider to patient. This information, in the form of announcements or briefings, assumes the message can be clearly understood and easily processed by the recipient. However, a child’s ability to process the information is impaired under even moderate stress.

Because the bidirectional information flow can be useful to both care providers and first responders alike, care must be taken to ensure that communications with casualties, witnesses and parents are presented in a manner that facilitates processing and retention.

Children, like adults, obtain information from their surroundings, incorporating visual and other types of nonverbal clues with the actual message. Preferably, this information can be provided by the parent. However, in times of disaster, separation from their parents is likely. Unfortunately, parental absence or anxiousness on the part of the providers can be interpreted as a loss of control and is likely to increase emotional distress.

Accordingly, the TECC guidelines have suggested that first responders or care providers plan operationally, not only for a “child friendly space,” but for an individual or group of individuals dedicated specifically to interaction with pediatric casualties.

This shouldn’t be interpreted as a requirement for a pediatric specialist, but for at least one care provider who’s “frequently and readily available”
to provide consistency and help offset the perceived loss of control by the children affected.

The final aim of the pediatric guidelines is to ensure that providers recognize the necessity for ensuring integrity of the family unit. This will fulfill two goals. First, it improves communication between those affected and the providers caring for them and, second, it’s essential to mitigating post-event emotional distress. By emphasizing family-centered care we can return a sense of autonomy to the family unit.

Too often, mission objectives are prioritized over patient care. Simple steps such as reuniting parents with children and keeping siblings and extended family groups together will improve operational flow, medical care and pediatric victim recovery. Improving familiarity will also improve both the victims’ and families’ understanding of a dynamic situation.

Providing prospective guidance to parents and families will increase predictability in these situations. This improved familiarity and predictability has a demonstrable effect on mitigating emotional distress. In this case, reducing distress can actually help reach mission objectives. Considering that information obtained by both law enforcement and EMS is obtained through witness testimonial, reduction of distress is paramount operationally. Community resilience is paramount culturally.

Conclusions

There’s no greater challenge to an EMS system or a society than an MCI involving children. As these events become a greater concern, systems and communities must evolve in their preparation.

Our hope is that family-centered care and mitigation of emotional distress improves community and first responder resiliency. The mission of the Committee for TECC is to improve the civilian prehospital medical and law enforcement response to atypical disasters.

With the publication of the pediatric appendix to the TECC guidelines, we seek to continue the expansion of these principles of response to a broader demographic. We hope this article will empower local jurisdictions to tailor their response protocols to meet the needs of their civilian populations.

References


Joshua P. Bobko, MD, FAAEM, is medical director for the Westminster (Calif.) Police Department and an assistant professor in the Department of Emergency Medicine at Loma Linda University. He may be contacted at jbobko@valiantresearch.com.

David W. Callaway, MD, FACEP, is director of operational and disaster medicine in the Department of Emergency Medicine at Carolinas Medical Center. He may be contacted at dcallawa@gmail.com.

E. Reed Smith, MD, FACEP, is operational medical director for the Arlington County (Va.) Fire Department and an associate professor in the Department of Emergency Medicine at George Washington University. He may be contacted at rsmith@arlingtonva.us.
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In the wake of Columbine, Virginia Tech, Aurora, Sandy Hook and other recent active shooter/mass casualty incidents (ASI/MCIs), there are numerous federal, state and local agencies scrambling to establish operational guidelines for combining law enforcement, fire and EMS first responders into rescue task forces (RTFs) prior to the arrival of tactical teams.\(^1\)

At the same time, thousands of law enforcement officers (LEOs) are being violently assaulted each year and, as a result, there’s a national call for training and equipping all officers for self-aid and buddy aid (SABA).\(^2\) However, unified command and interagency emergency operations plans will only work if first responders are properly equipped and trained to assess, treat and extract casualties much faster than normal EMS operations.

Therefore, the main purpose of this article is to identify specific core skills, training and equipment necessary to assure that the RTF brings assets, rather than liabilities, into an ASI/MCI. This will increase efficiency of operations, thereby decreasing preventable deaths, rather than adding more potential casualties.

**Tactical Combat Casualty Care**

TCCC is currently the only evidence-based standard of prehospital care rendered to a casualty in a tactical, combat environment from the point of injury until they arrive at the medical treatment facility. A comprehensive study of preventable deaths in Vietnam and Somalia concluded the three most common causes of preventable battlefield death are exsanguination from extremity wounds (60%), tension pneumothorax (33%) and airway obstruction (6%).\(^6\)

Although battle-proven TCCC principles on potential causes of death that can kill within 20 minutes from the point of injury clearly apply to civilian tactical trauma care, the terminology is military, which can sometimes be controversial.
Tactical emergency medical support (TEMS) or tactical emergency casualty care (TECC) are civilian terminology for TCCC. The Committee for Tactical Emergency Casualty Care (C-TECC) used the military battlefield guidelines of TCCC as the evidence-based starting point in the development of TECC terminology. TCCC/TECC doctrine states three distinct threat levels or “phases” which indicate the kind of care that should or shouldn’t be rendered. Recognizing that nothing is absolute, these are guidelines where “tactics drive medicine.”

1. **Hot zone** (care under fire/direct threat): The casualty is exposed to effective or potentially effective enemy fire. Either there is a clear and present active shooter, or the casualty is still in the line of fire where a perpetrator can pop up and start shooting again. All efforts are directed at eliminating the threat and/or getting the casualty and the team out of the line of fire. Assuming the team has established fire superiority, the only appropriate treatment would normally be to stop uncontrolled extremity hemorrhage with a tourniquet in less than 20 seconds. If fire superiority can’t be reasonably assured, the casualty should be immediately extracted using standardized techniques without medical aid.

2. **Warm zone** (tactical field care/indirect threat): The casualty is still on the inner perimeter of a live mission, but is in a position of cover and concealment, not directly exposed to enemy fire. Appropriate actions at this stage include tourniquet application, wound packing, hemostatic agents, compression bandaging, chest sealing and/or decompression and advanced airway control.

3. **Cold zone** (tactical evacuation/evacuation): The casualty and the medic are now out of the inner perimeter.

**RTF Basics, Configuration & Movement**

In May 2001, the Colorado Governor’s review of the Columbine massacre called for a new paradigm shift where police officers should no longer simply stage and contain active shooters. They should immediately call SWAT, but not wait for their full response. Rather, they should “be trained at the concepts and skills of rapid deployment.”

This ushered in the concept of the rapid reaction team, or contact team, where first arriving officers team up, typically in a four-man diamond, but maybe two-man or even solo, to move to “the sound of shooting.”

In 2008, the Arlington (Va.) Police Department entered into an agreement to train with Arlington Fire Department to form RTFs that will trail contact teams into warm zone areas they cleared to treat and/or extract victims. This innovative approach led to a nationwide shift now supported by the U.S. Fire Administration and the Federal Emergency Management Agency.

The RTFs see first arriving street medics (usually not tactical medics) team up with at least two patrol officers to move quickly into warm zone areas along cleared corridors to initiate treatment and evacuation of casualties. It will be a rare occurrence for a full SWAT team to arrive with all their tactical officers and tactical medics before local patrol officers and local fire/EMS. Still, in many systems, among the first responding officers will be one or more SWAT officers and among fire/EMS, there may be one or more tactical medics. In these cases, the first SWAT officer will usually form a contact team with one or more patrol officers and lead the team in to eliminate the threat.

Similarly, if a tactical medic is among the first responders, he or she would be the right person to become part of the first RTF.

The minimum configuration of an RTF would include two patrol officers for front and rear security and two paramedics with the same level of ballistic personal protective equipment as the officers and be equipped with tactical medical equipment. If there are enough RTF trained responders, a more robust RTF can be formed into a “diamond.” (See Figure 1.)

The first RTF will advance in warm zone area already cleared by the contact team and treat and extract victims. If there are more victims in other cleared warm zones, then other RTFs can leapfrog past the first RTF to attend to the victims in those areas.

**Figure 1: RTF diamond configuration**
All movement into or out of warm zones are tactical decisions made by the LEOs who are providing cover for the medics.

It should also be clearly stated that warm zones can suddenly turn into hot zones when the prime suspect, additional suspects or potential explosive devices are encountered unexpectedly. Therefore, all team members should be prepared to immediately evacuate on the command of the law enforcement officers.

**Building Motor Memory Core Skills**

Specific tactical medicine core knowledge and skills should be taught to all levels of emergency responders and should be done prior to multiagency drills, scenarios and actual tactical missions. The most important part of this is repetitive practice of core skills. Once this is accomplished, there will be true interoperability and minimum time-on-target during ASIs/MCIs or any life-threatening penetrating trauma.

Certain core skills, such as effective tourniquet application within 20 seconds, automatic extraction handholds, etc., can only be performed under pressure if the skill is stored and able to be instantly retrieved from memory. This is called “procedural memory” or “motor memory.”

In training literally thousands of first responders, the authors have found that motor memory of the complex-motor skill of applying a combat application tourniquet (CAT) in less than 20 seconds requires 15–25 repetitions (depending on the student) under various conditions.

The best way to repeat the skill is to actually practice it from top to bottom. Once the student is confident in the skill in a well-lit room with no pressure, it should be repeated under a compressed time frame in low light with their pulse rate elevated (as is likely in a real-life scenario).

Once a complex motor skill has been performed correctly several times during core training, it can be visualized and practiced mentally step-by-step and this will be 85–90% as effective as physically repeating the same skill.

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**Figure 2: Fore-and-aft lift and carry**

1. Move tactically to casualty and assume best positions to cover casualty and grabbers.
2. Treat immediate life threats.
3. Fore grabber wraps arms around chest locking wrists. Aft grabber backs into legs and lifts under knees.

**USES:**
- Most common EMS/law enforcement lift when Code-4.
- Loading onto litters (side-by-side is a better TRE in some cases).
- Best/only TRE for “pancake” into backseat of patrol cars/sedans.
- Trunk loading casualty.
- Carrying to cover.
  - Best TRE carry for narrow hallways or through narrow doors.
  - Drags may be faster if casualty has secure drag holds, handles, straps.
  - Shoulder/belt carry is faster over longer distances in open space.
- If casualty has fractures, consider litter carries when tactically feasible.

**Alternate position for aft grabber**

1. Cross victim’s legs.
2. Place casualty legs on hip with one arm, leaving other arm free.

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\(^1\) Rall JM et al. Comparison of Novel Hemostatic gauzes to QuikClot Combat Gauze in a standardized swine model of uncontrollable hemorrhage. TR-2012-22
\(^2\) DoD test results reference based on 10 Celox™ Gauze

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There are many different tactical medical courses taught by various certifying agencies such as the National Association of EMTs (NAEMT), National Tactical Officers Association (NTOA) and state offices of emergency services. They can range in length from four hours to several days.

**Victim Movement**

The key to effective and rapid casualty extraction is also repetitive practice of interoperable skills within each agency and between agencies in a given region.

If there’s no uneven terrain or long stairways to climb, stretchers or drag litters might be the most expedient way to get victims out of the warm zone. If there’s only one or a few victims in an outside, open area, and an armored vehicle is available, it can be used as a tactical extraction vehicle. If the victim is a police officer or firefighter or anyone wearing body armor or some kind of harness and they’re on a flat surface, then a one- or two-person drag can be used. (See photo, p. 36.)

**Figure 3: Side-by-side lift and carry**

1. After moving in tactically and ensuring coverage, grabbers draw their forearms under victim’s armpits and lock the wrists (underhand or overhand).
2. Grab under knees and lift casualty, and signal cover officers they’re ready to move. Then move tactically to safety.

**USES:**
- Loading onto litters.
- Vehicle rescue—loading into vans, SUVs, bears, bearcats.
- Carrying to cover—Drag may be faster if casualty has secure drag holds, handles, straps, but if not, this is quickest for short distance carry.
- Shoulder-belt carry usually faster over longer distances in open space.
- If casualty has fractures, consider litter carries when tactically feasible.

**Figure 4: Shoulder/belt (“Seal Team 3”) carry/drag**

1. After moving in tactically and ensuring coverage, grabbers lift casualty to seat position with arms over shoulders and grab belt (or top of pants) from behind.
2. Grabbers lift casualty to feet and signal cover officers they’re ready to move. Then move tactically to safety.

**USES:**
- Fastest carry/drag over longer distances in open space.
- Especially better over uneven terrain with debris than two-person drag/carry.
- Doesn’t matter how tall the casualty is as the feet drag behind with little friction.
- If casualty has fractures, consider litter carries when tactically feasible.

**Figure 5: Modified fireman (“Hawes”) carry**

1. Two rescuers bring casualty to standing position using standard “shoulder/belt” lift.
2. One rescuer crouches and slides in front of casualty. Rear rescuer helps facilitate casualty’s arms around front rescuer, who pins casualty’s elbows across chest with non-dominant hand.
3. Communicate with cover officer to move tactically to safety.

**USES:**
- Limited personnel where only one rescuer can be used for actually carrying casualty.
- Rescuer carrying casualty can provide limited cover with own weapon during extract.
- Casualty’s weight is on rescuer’s hips rather than back as in traditional “Fireman’s.”
- If only two rescuers, there will be a brief period with no cover.
However, there may be multiple victims and they may be strewn in far-flung areas with uneven terrain, or they may need to be quickly extracted through narrow hallways or doors or quickly loaded into various vehicles of different configuration.

A national focus group under the National Tactical EMS Council (NTEMSC) recently identified four manual lifting techniques, referred to as tactical rescue extractions (TREs), which can be useful in these circumstances particularly when you don’t have various litters or technical rescue equipment readily available. Figures 2–7 illustrate the four basic TREs that should be taught and refreshed in all tactical medical courses.

The interoperable handholds used in the manual TREs can be used to lift victims out of the street into vehicles of various configuration. Once all personnel learn these, a victim can be extracted in as little as 12 seconds from the time the vehicle stops in front of the victim to the time it speeds from the potential line of fire.

Core Medical Skills for ALS First Responders
A frequently used treatment acronym for ALS tactical responders is MARCH (Massive bleeding; Airway obstruction; Respiratory compromise due to penetrating chest trauma, indicating chest sealing; Circulatory compromise due to tension pneumothorax or hypovolemic shock; and Hypothermia).

Equipment should be staged in a kit (waist pack, vest or pockets on the front of body armor) so it can be accessed with one hand without looking or putting anything down. Even a backpack is too cumbersome for situations in which you have to move your victim unexpectedly.

Tactical Medical Equipment for LEOs
A minimum of one tourniquet should be carried at all times by every law enforcement officer for self-aid, partner- and citizen-aid as recommended by the Hartford Consensus.14

All San Diego County Sheriff’s deputies are issued an IFAK which is placed in their vehicle alongside their Kevlar helmet. Many deputies have built an active shooter vest that they can throw on prior to forming a Contact Team and going in on the threat. Those officers mount their issued IFAK on that vest.

All San Diego Police Department (SDPD) officers are offered an on-duty four-hour TCCC class once a month. At the conclusion of training, they’re issued a tourniquet they can wear at all times.

All officers are also issued a mini IFAK containing hemostatic gauze and a simple compression bandage that stretches and adheres to itself with Velcro strips. The mini IFAK is shrink-wrapped in a tear-open package that can be carried in their shirt pocket or in the ceramic plate pocket of their body armor.

Fire/EMS RTF Equipment
There are currently two main models for outfitting line fire/EMS personnel to form RTFs with their line LEOs. Both models require that the fire/EMS personnel have the same body armor.
as LEOs. Both models also have fire/EMS personnel carrying enough medical supplies in their self-contained waist packs or attached to their body armor to treat numerous trauma victims.

The first model places the body armor on the outside of their fire/EMS personnel with special uniforms that blend in with their local LEOs. Slightly more expensive, this provides a much lower profile for these personnel and possibly detracts an active shooter from aiming at the most visually attractive target.

The second model places the body armor underneath the fire/EMS personnel’s normal medical response uniform which clearly identifies them to perimeter officers in the initial stage of ASIs/MCIs. It’s never intended for these personnel to enter the hot zone where there’s an active shooter.

**Conclusion**

The paradigm shift of training first responding LEOs in forming contact teams and “moving to the sound of the shooting” prior to the arrival of a full SWAT team happened several years ago. It may be the same with the RTF concept. Some fire/EMS personnel may choose to participate on an ASI/MCI RTF and some may not.

It’s important to use existing tactical medics and law enforcement agencies in the development and implementation of tactical medic core skills training if they’re experienced and qualified tactical medical instructors (e.g., NAE-MT, Specialized Tactics for Operational Rescue and Medicine, NTOA, CONTOMS).

The key to instilling first responder confidence in these critical situations is the repetitive practice of core skills: tactical movement with cover officers, rapid application of medical skills under pressure and effective interoperable extraction techniques.

**Michael Meoli, EMT-P,** is a firefighter/paramedic with the San Diego Fire & Rescue Department and a certified tactical paramedic for SDPD SWAT and other government teams. He’s a retired U.S. Navy SEAL operator chief/advanced tactical practitioner and is currently training manager and cofounder of the San Diego Special Tactics & Rescue Team as well as CEO of Tactical Rescue Options LLC. He can be reached at mmeoli@sandiego.gov.

**David Rathbun,** EMT-P, retired after 35 years as a deputy from the Los Angeles County Sheriff’s Department (LASD), where he still serves as a reserve deputy. For the last 31 years of his career he served as a member of LASD’s emergency services detail. Rathbun was the TEMS chairman for the National Tactical Officers Association from February 2002 to June 2013.

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**Bonus Content:** See the web version of this article for additional content, including “The History of Tactical Medicine,” pictures of the latest tactical medical equipment, and recent violent incident case studies with positive outcomes at www.jems.com/tecc.

**References**


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Celox RAPID

Celox RAPID addresses tactical hemostasis by working rapidly and requiring minimal time holding pressure on a product-packed wound. It therefore serves as a medical force multiplier at high-speed “treat and move” situations.

With rapid packing and minimal compression, Celox RAPID’s 5’ Z-fold packs faster than other 12’ competitive gauzes, requires minimal post-application compression and can produce hemostasis in less than a minute, allowing responders and rescuers to treat and move on rapidly. It’s also been shown to have decreased secondary blood loss and able to achieve 100% successful transport without rebleeding. The positively charged activated chitosan in Chito-R rapidly absorbs blood and create a robust gel plug over the bleeding source independent of the body’s intrinsic clotting cascade.

Celox RAPID maintains its volume and adhesion to wet tissue during use and also has a four-year shelf life; saving you money in restocking expenses.

Celox-A Accelerated Celox Delivery Device

Celox-A is the first high-speed hemostatic delivery system for gunshot, blast or stab wounds. The applicator gives the caregiver a simple and effective tool to apply Celox to the source of severely bleeding wounds.

Celox Gauze

When placed directly into a bleeding wound and subjected to pressure, Celox Gauze absorbs blood and forms a muco-adhesive gel that seals the wound to stop the flow of blood. In a recent Navy study, Celox Gauze outperformed competitors in several areas, such as hemostasis (< 3 minute compression period), post-application blood loss and, most notably, survival.

Advanced Circulatory Systems
www.advancedcirculatory.com
info@advancedcirculatory.com
877-737-7763

Celox-A Accelerated Celox Delivery Device

BioStat LLC
www.biostatlcc.com
844-246-7828
info@biostatlcc.com
iTClamp Hemorrhage Control System

The iTClamp is a small, lightweight hemorrhage control device developed by a special forces physician that can be used in austere conditions to rapidly control bleeding from the extremities, axilla, inguinal and scalp. It’s especially useful in situations where tourniquet use isn’t possible.

It can be applied in seconds with minimal pain to the patient. The device features eight 21-gauge sterile needles that allow you to clamp and seal the edges of a wound to create a stable clot to mitigate further blood loss until the wound can be surgically repaired.

Preclinical trials showed the iTClamp to be superior to wound packing in terms of patient survival, survival time and total blood loss. It’s an exceptional device to use in conjunction with wound clot gauze or dressings packed into an active bleeding area.

Level IIIA Rescue Task Force Package

The level IIIA rescue task force (RTF) package is intended to provide ballistic personal protective equipment to EMS personnel assigned to rescue task forces (RTFs) when responding to a mass casualty incident involving active shooters.

The package consists of two main elements: The first is level IIIA soft body armor in an external carrier which is manufactured by Point Blank, one of the leading manufacturers of body armor.

The carrier features multiuse pouches, side-closure and adjustable shoulder straps for maximum versatility. It’s available in red, EMS blue, navy or black with a choice of custom department or agency identification placards.

The RTF package also includes a ballistic helmet manufactured by United Shield Armor. The helmet is certified for level IIIA protection and is styled similar to the U.S. military’s PASGT (personnel armor system for ground troops) helmets.
Rapidly deployable products for TECC & active shooter incidents

Combat Application Tourniquet (CAT)
The Combat Application Tourniquet (CAT) is the official tourniquet of the United States Army and has been proven by the U.S. Army’s Institute of Surgical Research to be 100% effective in stopping blood flow in both lower and upper extremities. It’s recommended by the Committee on Tactical Combat Casualty Care (CoTCCC).

It features a reinforced windlass and clip, a red elliptical tip to aid in locating and threading the tourniquet during application, and a highly visible security tab which includes a writeable area to record the time of application. It also features a dual securing system that prevents the CAT from loosening due to movement during casualty evacuation.

Hyfin Vent Twin Pack Chest Seal
The Hyfin Vent Chest Seal Twin Pack provides two vented chest seals in one package for treatment of both entry/exit or multiple penetrating injuries to the chest. Its three-vented channels prevent airflow into the chest cavity during inspiration while allowing air to escape through the vent channels during exhalation. Each HyFin Vent Chest Seal has a large, red tip pull tab for single-step peel-and-apply application and allows for the burping of the wound if necessary. Superior adhesion is obtained in even the most adverse conditions, including on sweaty or hairy casualties.

Emergency Evacuation Litter (EEL)
The Emergency Evacuation Litter (EEL) is a lightweight, compact and cost-effective casualty evacuation platform that features a durable nylon construction with a load carriage capacity of 700 lbs. It features eight easy-to-grasp carry handles, a nylon storage pouch that attaches to a tactical-type vest via MOLLE/PALS-style connectors and a quick deploy handle that allows the EEL to be removed rapidly from its storage pouch.

Emergency Medical Response to the Active Shooter Incident
Specialty training in the medical response to an active shooter/dynamic threat incident is the key to saving lives. This eight-hour course is designed for street medical providers and law enforcement personnel that would first respond to these events, with a concentration on forcing forward urgent medical care to the victims. This course involves didactic and hands-on educational activities, with a strong emphasis on student participation.

Basic Tactical Medicine
The Basic Tactical Medicine course provides all interested emergency responders—medical and law enforcement—with the necessary tools and training to operate in a tactical environment. Core material taught during this 24-hour course include: hemorrhage control, airway management, management of penetrating trauma, casualty evacuation and triage, toxicology/drugs of abuse, excited delirium, preventive medicine, medical intelligence, pain control, team movements, ballistics/explosives injuries, gear considerations and sports medicine. Morning didactic sessions are complemented by afternoon hands-on and scenario-based training experiences.

Emergency Preparedness Consulting
Tac-Med offers consulting and training services to colleagues in education, business and the civilian sector. These activities include reviewing, updating or developing safety and emergency plans, disaster readiness and planning, first aid training for staff members and students, and coordinating with local emergency responders in the command and medical aspects of an active shooter/dynamic threat response.
**SWAT-Tourniquet**

The SWAT-Tourniquet (SWAT-T) is a multipurpose hemorrhage control device that can be used as a tourniquet, a pressure dressing or as an elastic bandage. The name of this product conveniently explains how to use it: Stretch, Wrap, And Tuck. It features detailed, easy-to-follow instructions printed on the bandage itself that help the user to determine how much stretching is required to achieve either tourniquet or pressure dressing results.

Unlike many tourniquets, the SWAT-T can be used as a primary tourniquet in areas such as the groin or axilla. It can also be used as a pressure wrap, providing hands-free, direct pressure wherever needed.

The SWAT-T also works well in other medical situations including securing ice packs in place, wrapping a head wound or slinging a shoulder. It has also been used on injured K9s where traditional windlass tourniquets are not as easily applied. It’s affordable, compact and versatile.

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**QuikClot EMS**

The QuikClot EMS product line utilizes the same proven construction and hemostatic agent as the original Combat Gauze and Combat Gauze LE.

Available in a four-ply 4” x 4” (three individually wrapped per pack) and a rolled gauze 3” x 48”, the EMS line uses the same Kaolin hemostatic agent as found in the Combat Gauze products chosen as the “Hemostatic Agent of Choice” by the U.S. military.

The packaging features a high-visibility yellow stripe across the top for easy visualization when packed into ambulance cabinets and trauma jump bags.

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**Bleeding Control Bag**

The Bleeding Control Bag, a component of the Large Event Kit, is integral in responding to any active shooter or mass casualty incident (MCI). It’s also ideal for schools, commercial buildings, malls, hospitals or any location where the potential exists for an active shooter, IED or other MCI.

The contents include medical components proven effective in military combat and used daily both overseas and domestically. Designed for use by medically trained providers, this bag should be a part of every emergency response plan.

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**Wound Packing Trainer**

The Wound Packing Trainer (WPT) provides an easy and effective method of teaching wound packing and pressure application utilizing biofeedback.

It has a wireless sensor embedded in the wound simulator along with the WPT App on your smartphone or tablet to provide real-time feedback on a student’s performance. The app gives a PSI graphic measurement of the force being applied to the source of bleeding and the results can be saved and used for further training or to certify competency.
Why train with Tac-Med?

Experience: Our training experience is unmatched. We have trained providers from over 200 agencies and have coordinated over 30 dynamic threat / active shooter drills in the past seven years. Our clients have included federal, state, regional, and local agencies.

Education: We train all levels of emergency service personnel... law enforcement officers, EMTs, firefighters, paramedics, security officers, and members of the armed forces. We train civilian personnel in the tenets of basic emergency response as well.

Mobility: Our training courses are mobile and can be brought to any region or agency. We will provide the necessary training and equipment. All courses are approved for continuing education credit, and are supervised by two physician medical directors. Our teaching utilizes established guidelines, and is based on real-life experience and scenarios.

Flexibility: Our courses are flexible and adaptable and can be tailored to the needs of any region or agency. You define the goals of training and we will ensure your personnel receive the highest level of education on the topics of your choosing.

What We Offer...

Emergency Medical Response to the Active Shooter
Training in the medical response to an Active Shooter incident is key to saving lives. This course is designed for EMS and law enforcement personnel with a concentration on forwarding urgent medical care to the victims.

Basic Tactical Medicine
Our Basic Tactical Medicine course is designed to provide all interested emergency responders with the tools necessary to operate in a tactical environment.

Operator’s Self Aid / Basic Tactical Aid
The Operator’s course was designed for the non-medical law enforcement, security or military operator, but also is of educational benefit for civilian EMS personnel.

Continuing Education
- Excited Delirium
- Chemical Assisted Suicides
- Drugs of Abuse
- Ballistics and Explosives
- Chest Trauma
- Abdominal Trauma
- Capnography and Ventilation
- The Special Needs Patient
- Summer Emergencies
- Scene Safety for EMS providers
- And much more...

Dynamic Incident Response Priorities

1  Situational Awareness
2  Establish Joint Incident Command
   - Police, Fire, EMS, Civilian Sector
3  Designate Casualty Collection Area in a safe location
4  Establish an Evacuation Sector to access patients
   - Sort — Walking vs. Incapacitated, Alive vs. Dead
     (Tag apparent dead “purple” = expectant)
     To cover / concealment if needed
   - Move — Direct walking wounded to casualty collection point
   - Treat — Immediate life threats only
   - Evacuate — Ambulance / police car for immediate transport
   - Secondary Sweep — Re-tag “purple” to “black” if no signs of life,
     Look for victims that have sheltered in place or are hidden
5  Evacuate injured to the Casualty Collection Point
   - Ongoing care & rapid transport to trauma care
   - Serves both triage & treatment purposes

YOU SHOULD KNOW...

In a Dynamic MCI (Mass-Casualty Incident)
consider alternate methods to tag patients during triage...

- Colored Markers
  (use blue in lieu of yellow as yellow is not opaque enough)
- Colored Duct Tape
- Colored Electrical/Rigging Tape
- Colored Ribbons

REMEMBER
Basic emergency treatments must occur during triage & evacuation.
- Bleeding control
- Basic airway control
- Needle chest decompression
- Occlusive dressings
In need of other options? Call us today for a custom medical solution for you & your team...

Available in Red, Hi-Viz Yellow, Black & Coyote

- 308 Responder Level III Rifle Plates (Front/Back) available separately
- Rescue Responder Soft Side Armor Set (Optional)
- Medical Chest Pouch with MED patch (Contents Inside)
- 187 sq. in. NIJ 0101.06 Level IIIA front/back panel soft armor
- C-A-T Holders (Left & Right)
- 6 in. ETDS
- 5-Rolled Gauzes
- HyFit® Vest Twin Pack
- Naso Airways
- Triage Cards
- Permanent Marker
- Pair of Trauma Shears
- BearClaw™ Nitrile Gloves
- Scissor Leash

True one-size-fits-most Personal Protective Ballistic Vest combined with Point-of-Wounding Trauma Equipment

Ideal solution for personnel responding to high-threat situations to include Active Shooters & Mass Casualty Incidents

Available as a complete system or individual components

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