Research indicates that both the nature and outcome of terrorist attacks and mass shootings are shifting from incidents larger in scale committed by a group to smaller attacks committed by a “lone wolf” or a relatively smaller group of attackers. ASPR TRACIE updated this Topic Collection to include recently released resources on lessons learned from actual events in the U.S. and abroad, guidance documents, research, and links to curriculum. These resources can help emergency medical professionals plan for and respond to the changing nature of mass shootings or explosive events.

Each resource in this Topic Collection is placed into one or more of the following categories (click on the category name to be taken directly to that set of resources). Resources marked with an asterisk (*) appear in more than one category.

**Must Reads**

**Education and Training**

**Guidance Documents**

**Lessons Learned**

**Pediatric Resources**

**Plans, Tools, and Templates**

**Treatment**

**Agencies and Organizations**

**Must Reads**


This webpage includes numerous links to information on blast injuries. Links to the course curriculum are located at the bottom of the page.


The authors describe a three-phase approach first responders can use when responding to a blast or active shooter event: Enter, Evaluate, and Evacuate, or 3 Echo.


The authors explain how the Boston-area medical community's prior emergency preparedness efforts and related exercises and drills contributed to their response to the Boston Marathon bombing. The authors highlight the presence of medical tents, the
mobilization of communications and additional resources, and the activation of hospital emergency plans as helpful contributing factors.


This guideline is a culmination of an extensive literature review on the use of tourniquets and hemostatic agents for managing life-threatening extremity and junctional hemorrhage. An expert panel examined the results of the literature review, then provided recommendations for emergency medical services care.


This supplemental issue of the Annals of Emergency Management highlights best practices in managing explosive incident scenes. This issue begins with an article featuring consensus statements and includes other pieces on blast physics, medical management of the scene, management in healthcare facilities, and the future of explosive scene management.


These guidelines were developed based on the principles of Tactical Combat Casualty Care but take into account variations in the civilian environment (e.g., resources allocation, different patient populations). The authors list the goals of Tactical Emergency Casualty Care and strategies for achieving those goals.


The author examines past terrorist bombing events and provides a summary of triage, treatment, and resource utilization differences.


This guide provides a comprehensive overview of issues and response to active shooters in the healthcare environment and includes response plan templates in the appendix.

The authors describe the medical response to the attacks from the perspectives of three medical professionals: emergency physician, anesthesiologist, and trauma surgeon.


The Hartford Consensus suggests that first responders to an active shooter scene apply the actions in the acronym THREAT: 1. Threat suppression, 2. Hemorrhage control, 3. Rapid Extrication to safety, 4. Assessment by medical providers, and 5. Transport to definitive care.


Every Boston Level 1 trauma center populated a database regarding specific injuries, extremities affected, prehospital interventions, and the like experienced by victims of the marathon bombings. The authors found that after the event, extremity exsanguination was either left alone or treated with an improvised tourniquet. The authors stress the need to share the military's approach to controlling severe extremity bleeding with "all civilian first responders."


This presentation takes participants through a blast injury scenario at a busy train station. The authors explain the differences between "traditional" attacks and the "new threat environment" (e.g., improvised explosives, lone wolf shooters) and strategies for related casualty care.


This report emphasizes the importance of (and lists recommendations related to) having an integrated response to active shooter events by incorporating lessons learned from first responder agencies who have responded to these types of events.

The principles of Tactical Combat Casualty Care (TCCC) can also be applied by first responders who are responding to bomb and mass shooting incidents. TCCC has three goals: 1) treat the casualty, 2) prevent additional casualties, and 3) complete the mission.

**Education and Training**


This webpage includes numerous links to information on blast injuries. Links to the course curriculum are located at the bottom of the page.


The authors describe a three-phase approach first responders can use when responding to a blast or active shooter event: Enter, Evaluate, and Evacuate, or 3 Echo.

* California Hospital Association. (2016). [Planning for Active Shooter Incidents](https://www.ca-ha.org). This webpage provides two pages of links to resources that can help hospitals and other healthcare facilities plan for active shooter incidents. It includes a checklist, plans, guidelines, educational videos, and other materials. Note: There are two pages of materials.

Centers for Disease Control and Prevention. (2008). *Blast Injuries: What Clinicians Need to Know*. The speaker provides a brief overview for healthcare providers on how to respond and care for persons injured by an explosion or blast event.

Centers for Disease Control and Prevention. (2010). *Blast Injuries: Crush Injuries and Crush Syndrome*. The authors define crush injury and crush syndrome, which are two injuries that could result from a bombing or explosion. Operational strategies for prehospital and hospital care settings are included.


This course is offered by the Emergency Management Institute and was designed to improve the ability of local jurisdictions to prepare for, protect against, and respond to complex coordinated attacks.

This course was designed for emergency responders caring for a large number patients after natural or human-caused incidents. Information on caring for patients exposed to chemical, biological, radiological, nuclear, or explosive (CBRNE) agents is also provided.

Hospital Association of Southern California. (2013). *Active Shooter Drill Materials*.

The Hospital Association of Southern California developed several documents that can help a healthcare facility plan for active shooter incidents and carry out an active shooter drill (e.g., checklists, participant releases, and pocket cards).

Los Angeles Sheriff's Department. (2015). *Surviving an Active Shooter*. (Requires access to YouTube.)

This video depicts active shooter scenarios and shares strategies for responding and surviving such events.

MESH Coalition. (2014). *Responding to an Active Shooter in a Healthcare Setting*.

This video provides information on preparing for and responding to an active shooter event in a healthcare setting.


This presentation explains when and how to use tourniquets or hemostatic gauze to control severe hemorrhage.


This webpage provides links to educational opportunities in various categories (e.g., bleeding control, Tactical Combat Casualty Care, and trauma first response) offered by the National Association of Emergency Medical Technicians.


This webpage provides links to educational material and guidance on caring for victims of active shooters. Information is categorized by topic, such as guidelines, curriculum, skill sheets, instructor guides, and reference documents.


This course can help healthcare professionals plan for and understand the terminology associated with explosive incidents. It also includes a section on pediatric patients.


This webpage contains links to information on the ALERRT curriculum, developed to help law enforcement and other first responders increase survivability of and improve response to active shooter events.

The City of Houston, Mayor’s Office of Public Safety and Homeland Security, Ready Houston. (2012). Run, Hide, Fight: Surviving an Active Shooter Event. (Requires access to YouTube.)

This video depicts active shooter scenarios and demonstrates how bystanders can increase their chances of survival.


The principles of Tactical Combat Casualty Care (TCCC) can also be applied by first responders to bomb and mass shooting incidents. TCCC has three goals: 1) treat the casualty, 2) prevent additional casualties, and 3) complete the mission.


This webpage highlights the national campaign that provides individuals with the ability to “act quickly and save lives” before emergency medical providers arrive on the scene.


This document incorporates lessons learned from the U.S. military experiences dealing with improvised explosive device and active shooter scenes and casualties. The guide includes a variety of scenarios and responses that can be used for tabletop exercises or general planning discussions.

This course is geared towards emergency medical service personnel and features modules on biological, radiological, incendiary, and explosive weapons. Modules on pre- and hospital decontamination are also included.

Guidance Documents

* California Hospital Association. (2016). Planning for Active Shooter Incidents. This webpage provides two pages of links to resources that can help hospitals and other healthcare facilities plan for active shooter incidents. It includes a checklist, plans, guidelines, educational videos, and other materials. Note: There are two pages of materials.


These guidelines were developed based on the principles of Tactical Combat Casualty Care but take into account variations in the civilian environment (e.g., resources allocation, different patient populations). The authors list the goals of Tactical Emergency Casualty Care and strategies for achieving those goals.

Committee for Tactical Emergency Casualty Care. (2015). Tactical Emergency Casualty Care (TECC) Guidelines. These guidelines were adapted from evidence-based studies from the battlefield and are applicable to high threat events such as active shooter situations.


Hick, J., Hanfling, D., Evans, B. et al. (2016). Health and Medical Response to Active Shooter and Bombing Events. This discussion paper examines some of the issues and potential best practices during responses to terrorist incidents, including mass shootings and bombings. Response
coordination and planning considerations are also discussed which could optimize patient outcomes.


This guide sets forth a new active shooter policy requirement for all nonmilitary federal facilities within the executive branch of the government and a set of recommendations to assist with implementing this policy.


The Hartford Consensus suggests that first responders to an active shooter scene apply the actions in the acronym THREAT: 1. Threat suppression, 2. Hemorrhage control, 3. Rapid Extrication to safety, 4. Assessment by medical providers, and 5. Transport to definitive care.


The authors emphasize the need for a paradigm shift in the emergency medical services field to accompany the changing nature of active shooter events.


This presentation takes participants through a blast injury scenario at a busy train station. The authors explain the differences between "traditional" attacks and the "new threat environment" (e.g., improvised explosives, lone wolf shooters) and strategies for related casualty care.


This report emphasizes the importance of (and lists recommendations related to) having an integrated response to active shooter events by incorporating lessons learned from first responder agencies who have responded to these types of events.

This factsheet provides information about active shooter/ hostile events and provides some general guidelines that can assist organizations plan for and respond to this threat.


The principles of Tactical Combat Casualty Care (TCCC) can also be applied by first responders who are responding to bomb and mass shooting incidents. TCCC has three goals: 1) treat the casualty, 2) prevent additional casualties, and 3) complete the mission.


This document gives healthcare facility emergency planners, executive leadership, and others involved in emergency operations planning assistance with planning for active shooter incidents.


This document incorporates lessons learned from the U.S. military experiences dealing with improvised explosive device and active shooter scenes and casualties. The guide includes a variety of scenarios and responses that can be used for tabletop exercises or general planning discussions.


This document highlights guidelines and concepts that can be incorporated into standard operating procedures to enhance the fire and emergency medical response to an active shooter/ mass casualty incident.

**Lessons Learned**


The authors combined an analysis of data contained in the Israeli National Trauma Registry with their firsthand experience caring for suicide bomb victims at the Hadassah University Hospital to provide an overview of lessons learned.

The authors synthesized comments from a series of expert panel meetings on identifying innovative strategies hospitals could adopt to address terrorism-related surge issues.


This article uses interactive graphics to illustrate the history of mass shootings in the U.S. in which four or more people were killed by a lone shooter (or two shooters in three cases).


The authors explain how the Boston-area medical community's prior emergency preparedness efforts and related exercises and drills contributed to their response to the Boston Marathon bombing. The authors highlight the presence of medical tents, the mobilization of communications and additional resources, and the activation of hospital emergency plans as helpful contributing factors.


In 2014, the Federal Bureau of Investigation initiated a review of active shooter incidents. This report includes data that can help law enforcement and other first responders plan for and respond to these events.


This supplemental issue of the Annals of Emergency Management highlights best practices in managing explosive incident scenes. This issue begins with an article featuring consensus statements and includes other pieces on blast physics, medical management of the scene, management in healthcare facilities, and the future of explosive scene management.

The authors compared the timing of social media reports against information shared through official emergency response channels after the Boston Marathon bombing. They suggest that first response agencies and healthcare providers can monitor social media to better tailor their response to an incident.


The authors examined emergency psychiatric treatment-seeking emergency room visits in the weeks after four events (the Oklahoma City Bombing, the Columbine High School shooting, the Wedgewood Baptist Church shooting, and the 9/11 terrorist attacks). They found that in the week following each event, there was minimal change in the number of visits.


The speakers in this webinar discuss lessons learned from public health and medical response to the fertilizer plant explosion on April 17, 2013 in West, Texas.


The authors of this study compared medical response capabilities for critical incidents in Newark (New Jersey's largest city), with those in Boston. The authors found significant disparities between the two locations, but concluded that because medical personnel in both sites had conducted exercises together often, Newark would likely be able to carry out an effective response to an incident like the Boston Marathon bombing.


This factsheet summarizes data as a result of a study into 160 active shooter incidents between 2000 and 2013.


The author examines past terrorist bombing events and provides a summary of triage, treatment, and resource utilization differences.

The author presents an overview of three studies on mass casualty terrorist attacks in Israel. He notes several distinctive characteristics of these incidents that go "far beyond the standard surgical training and experience:" the large number of victims; young victims; and the severity of injury.


The authors provide an overview of the medical response to the Boston Marathon bombing, and list the factors that contributed to positive outcomes.


In 2004, 10 bombs exploded in four commuter trains in Madrid, Spain. The authors provide an in-depth overview of the 250 patients with severe injuries and found the following injuries in patients: soft tissue and musculoskeletal injuries (85%), ear blast injury (67%), blast lung injury (63%), and head trauma (52%).


The author recounts an interview with several emergency medical care providers from Hôpital Saint Louis after the coordinated terrorist attack in Paris on November 13, 2015. They discussed their response and lessons learned from the attack, emphasizing the importance of planning and coordination.


The authors describe the medical response to the attacks from the perspectives of three medical professionals: emergency physician, anesthesiologist, and trauma surgeon.


This white paper describes some foundational principals related to implementing the concepts of integrated emergency services response to high-threat events, based on current best-practice operational models from Arlington, VA; Los Angeles, CA; and New York, NY.

The author describes the paradigm shift associated with the emergency medical response to an active shooter situation and other lessons learned from large mass casualty events.


The authors analyzed reports on acute care hospital shooting events in the U.S. from 2000-2011 and found 154 incidents in 40 states, resulting in 235 injured or dead victims. They provide additional demographic data (e.g., perpetrator characteristics, location of shooting).


The authors summarize three key points from the Boston bombing incident: the low mortality rate and related factors; the vital role played by bystanders who offered on-scene medical care; and the role the well-exercised disaster plan played in the successful response.


Every Boston Level 1 trauma center populated a database regarding specific injuries, extremities affected, prehospital interventions, and the like experienced by victims of the marathon bombings. The authors found that after the event, extremity exsanguination was either left alone or treated with an improvised tourniquet. The authors stress the need to share the military's approach to controlling severe extremity bleeding with "all civilian first responders."


The authors examined how psychiatric advanced practice nurses helped care for patients and their loved ones in the aftermath of the Boston Marathon bombing.


The authors explain that many victims of blast trauma will require significant blood transfusions. They then highlight the differences between damage control surgery and damage control resuscitation.

The authors examined an academic medical center's Department of Psychiatry's response during the week after the Boston marathon bombings and share lessons learned.


The authors share information on strategies used by the U.S. military to reduce morbidity and discuss possible implications for improving care in non-military/combat settings.


The authors (from a tertiary academic medical center) discuss the pharmaceutical response to the Boston Marathon bombing, which focused on staffing, supplies, and communication.


The author summarizes findings from a meeting of The Hartford Consensus on active shooter and mass casualty events. The group emphasizes the need for on-scene collaboration between emergency medical services and law enforcement, and highlights the supportive role that uninjured bystanders can also play in the response effort.


The authors describe the hospital response to the mass shooting at the Westgate mall in Nairobi, Kenya.


This book features chapters on a variety of emergency medical topics related to preparing for the 2004 Olympics, including the following: epidemiological surveillance; preparedness for deliberate use of biological or chemical agents, or radionucler materials; food and water safety; and emergency medical services preparedness.
Pediatric Resources


The authors discuss the results of an anonymous survey of American Pediatric Surgical Association members in 2007, which found that while 77% felt "definitely responsible" for assisting after a disaster, only 24% felt "definitely prepared" to do so. The authors listed factors associated with higher levels of preparedness and emphasized the need for more training.


The committee presents guidelines for caring for pediatric patients during certain types of emergency situations (e.g., active shooter, structure collapse).


This course can help healthcare professionals plan for and understand the terminology associated with explosive incidents. It also includes a section on pediatric patients.

Plans, Tools, and Templates


Pathology departments throughout the Boston area received amputated limbs and other specimens from trauma surgeries, which were not accompanied by clear examination guidelines. The authors of this study developed a protocol (reviewed and approved by experts in forensic evidence collection) that can be used by pathology departments in the aftermath of a disaster.


This webpage provides two pages of links to resources that can help hospitals and other healthcare facilities plan for active shooter incidents. It includes a checklist, plans, guidelines, educational videos, and other materials. Note: There are two pages of materials.

This template was developed to help hospitals in New York prepare to respond to explosive and mass casualty events. The templates can help facilitate coordination between various hospital departments and can be customized by healthcare facility emergency planners across the country.


This questionnaire can be used in two ways: 1) by states, localities, and multi-hospital systems to determine overall hospital emergency preparedness, or 2) by individual hospitals or healthcare facilities as a checklist of areas to consider as a facility creates or updates emergency preparedness and response plans.


This guide provides a comprehensive overview of issues and response to active shooters in the healthcare environment and includes response plan templates in the appendix.

**Treatment**


The authors combined an analysis of data contained in the Israeli National Trauma Registry with their firsthand experience caring for suicide bomb victims at the Hadassah University Hospital to provide an overview of lessons learned.


This document was developed by the Hartford Consensus (a team of healthcare leaders) and is a comprehensive compendium of resources and supporting documents that first responders can use to facilitate planning and training and enhance survivability from mass casualty and active shooter events.

This guideline is a culmination of an extensive literature review on the use of tourniquets and hemostatic agents for managing life-threatening extremity and junctional hemorrhage. An expert panel examined the results of the literature review, then provided recommendations for emergency medical services care.


This supplemental issue of the Annals of Emergency Management highlights best practices in managing explosive incident scenes. This issue begins with an article featuring consensus statements and includes other pieces on blast physics, medical management of the scene, management in healthcare facilities, and the future of explosive scene management.


The authors explain the nature of blast injuries, highlight strategies for stabilizing patients and determining the severity of injury, and discuss treatment approaches.


British researchers developed an expert consensus regarding the essential items and minimum quantities of clinical equipment necessary to care for 100 patients on the scene of a mass casualty explosion event.


The author presents an overview of three studies on mass casualty terrorist attacks in Israel. He notes several distinctive characteristics of these incidents that go "far beyond the standard surgical training and experience:" the large number of victims; young victims; and the severity of injury.


This template was developed to help hospitals in New York prepare for and respond to explosive and mass casualty events. The templates can help facilitate coordination between various hospital departments and can be customized by healthcare facility emergency planners across the country.
In 2004, 10 bombs exploded in four commuter trains in Madrid, Spain. The authors provide an in-depth overview of the 250 patients with severe injuries and found the following injuries in patients: soft tissue and musculoskeletal injuries (85%), ear blast injury (67%), blast lung injury (63%), and head trauma (52%).

The authors discuss injuries suffered as a result of an explosion at a manufacturing plant in North Carolina, and how pre-event preparedness and planning influenced the medical response.

Every Boston Level 1 trauma center populated a database regarding specific injuries, extremities affected, prehospital interventions, and the like experienced by victims of the marathon bombings. The authors found that after the event, extremity exsanguination was either left alone or treated with an improvised tourniquet. The authors stress the need to share the military's approach to controlling severe extremity bleeding with "all civilian first responders."

The authors explain that many victims of blast trauma will require significant blood transfusions. They then highlight the differences between damage control surgery and damage control resuscitation.

This presentation explains when and how to use tourniquets or hemostatic gauze to control severe hemorrhage.
This toolkit provides victim assistance resources for communities to include in their emergency response plans. There are links to resources on creating and maintaining partnerships, developing victim assistance protocols, and tools such as checklists, samples, a glossary, and a compendium of victim assistance resources.


The authors detail the medical response to the 2005 London public transportation bombing. They discuss the nature of injuries, how a treatment center was set up in a nearby hotel, and the process of handing burn patients over to a regional burn center.


The authors discuss best practices regarding the treatment of crush victims, both at the disaster field and upon admission to hospitals.


The authors (from a tertiary academic medical center) discuss the pharmaceutical response to the Boston Marathon bombing, which focused on staffing, supplies, and communication.

Agencies and Organizations

Note: The agencies and organizations listed in this section have a page, program, or specific research dedicated to this topic area.

Committee for Tactical Emergency Casualty Care.
NAEMT Education.
This ASPR TRACIE Topic Collection was updated by ASPR TRACIE in January 2017. It was comprehensively reviewed in June 2015 by the following subject matter experts (listed in alphabetical order): Scott Cormier, Vice President, Emergency Management, EC and Safety, Medxcel; Robert Dunne, MD FACEP, Program Director, EMS Fellowship, Medical Director, Detroit East Medical Control Authority, Associate Professor, Wayne State University; and John Hick, MD, HHS ASPR and Hennepin County Medical Center.

Additional assistance provided by James Paturas, Director, Center for Emergency Preparedness and Disaster Response, Yale New Haven Health System.