



# TRACIE

HEALTHCARE EMERGENCY PREPAREDNESS  
INFORMATION GATEWAY

Pre-Hospital/Emergency Medical Services  
Topic Collection  
5/4/2016

## Topic Collection: Pre-Hospital/Emergency Medical Services

The moments between either the onset of illness due to a public health emergency or an illness/injury as a result of any type of incident are critical and often determine the difference between survival, serious illness or injury, or death. Prehospital providers are an important resource to support preparedness, response and recovery. It is important to note that the prehospital scope of practice varies from state to state and prehospital providers rely on medical protocols or online medical direction as part of patient care or treatment in the field.

The resources in this Topic Collection include information on both traditional and evolving pre-hospital roles (e.g., mobile prehospital care and community paramedicine). We note that during a disaster, the community paramedicine framework has the potential for broad use in shelter-based care, home visits, home triage/treatment, and other roles, reducing the burden on more traditional emergency medical services. Included are research articles, fact sheets, algorithms, and templates that describe the role of emergency medical services in disasters and public health emergencies and can help first responders prepare for and respond to a variety of events.

More specific information can be found in the following ASPR TRACIE Topic Collections: [Fatality Management](#), [Responder Safety and Health](#), [Burn](#), [Explosives \(e.g., bomb, blast\) and Mass Shooting](#), [Mental/Behavioral Health \(non-responders\)](#), [Pre-Hospital Victim Decontamination](#), [Alternate Care Sites](#), Mass Gathering Medicine (forthcoming), [Mass Patient Care](#), [Pediatric](#), and [Trauma Care and Triage](#).

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.

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[Lessons Learned](#)

[Pediatric Issues](#)

[Plans, Tools, and Templates](#)

[Agencies and Organizations](#)

## Must Reads

American College of Surgeons. (2015). [See Something, Do Something: Improving Survival Strategies to Enhance Survival in Active Shooter and Intentional Mass Casualty Events: A Compendium](#). Bulletin of the American College of Surgeons. 100(15).

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.

Boone, C., Avery, L., and Malone, T. (2015). [A Research Study of Ambulance Operations and Best Practice Considerations for Emergency Medical Services Personnel](#). Department of Homeland Security, Science and Technology Directorate.

This document summarizes a study and provides guidelines and promising practices for designing ambulance patient compartments for crashworthiness, ensuring patient safety and comfort, and enhancing responder safety.

Bulger, E., Snyder, D., Schoelles, K., et al. (2014). [An Evidence-Based Prehospital Guideline for External Hemorrhage Control: American College of Surgeons Committee on Trauma](#). Prehospital Emergency Care. 18(2):163-173.

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.

California Emergency Medical Services Authority. (2010). [Ambulance Strike Team \(AST\)/ Medical Task Force \(MTF\) System Manual](#).

This document defines Ambulance Strike Teams and their role in the state of California.

Catlett, C., Jenkins, J.L., and Millin, M.G. (2011). [Role of Emergency Medical Services in Disaster Response: Resource Document for the National Association of EMS Physicians Position Statement](#). Prehospital Emergency Care. 15(3):420-5.

The authors expand upon the position statement released by the National Association of EMS Physicians (also included in this collection) regarding the role of emergency medical services personnel in disasters.

Duncan, E. Colver, K., Dougall, N., et al. (2014). [Consensus on Items and Quantities of Clinical Equipment Required to Deal with Mass Casualties Big Bang Incident: A National Delphi Study](#). BMC Emergency Medicine. 14: 5.

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.

Federal Emergency Management Agency. (2012). [Operational Templates and Guidance for EMS Mass Incident Deployment](#).

The goal of this detailed report is to share model policies and practices across a variety of disciplines and provider types and help the emergency medical services (EMS) field deploy more effectively to planned and spontaneous mass care incidents. Case studies and event templates are included that can help EMS planners develop related policies and templates.

Federal Interagency Committee on EMS. (2014). [National Implementation of the Model Uniform Core Criteria for Mass Casualty Incident Triage](#).

This report summarizes the Model Uniform Core Criteria for mass casualty triage and highlights strategies and action steps member agencies can take to support national implementation of the criteria.

Hanfling, D., Hick, J., and Stroud, C. (2013). [Crisis Standards of Care: A Toolkit for Indicators and Triggers](#). Institute of Medicine, Washington, DC: National Academies Press.

This toolkit contains key concepts, guidance, and practical resources to help individuals across the emergency response system develop plans for crisis standards of care. Chapter 7 includes sample indicators, triggers, and sample tactics for use in the transition from conventional surge to contingency surge to crisis surge, and a return from crisis response to conventional response (detailed specifically for emergency medical services using slow-onset and no-notice scenarios).

Loma Linda University Children's Hospital. (2013). [Pediatric/Neonatal Disaster Reference Guide: Bridging the Gap Between EMS and Hospital Care](#).

This guide was created to help emergency managers, coordinators, and hospitals in their efforts to develop their own specific departmental Emergency Operations Plan that addresses the special needs of children and infants.

National Conference of State Legislatures. (2016). [Beyond 911: State and Community Strategies for Expanding the Primary Care Role of First Responders](#).

This website highlights resources and case studies in the field of Community Paramedicine which may assist others with implementing this type of pre-hospital care.

National Highway Traffic Safety Administration. (2007). [National EMS Scope of Practice Model](#).

This model explains the four levels of emergency medical services licensure: Emergency Medical Responder, Emergency Medical Technician, Advanced EMT, and Paramedic. The role, skills, and necessary knowledge base are highlighted for each level.

Schenk, E., Wetunge, G., Mann, C., et al. (2014). [Epidemiology of Mass Casualty Incidents in the United States](#). Prehospital Emergency Care. 81(3).

The authors report on characteristics and frequency of mass casualty incidents in the U.S. during 2010 (as reported by emergency medical services personnel).

Steve, S., Rebecca, L., Rhonda, D., et al. (2007). [Prehospital Preparedness for Pediatric Mass-Casualty Events](#). Pediatrics. 120(4). (Abstract only.)

The authors examined the preparedness levels of U.S. emergency medical services agencies specific to the care of children who are involved in mass-casualty events. Less than 15% reported pediatric-specific mass casualty plans, and while almost 70% reported participating in local disaster drills within the past year, fewer than half of those drills included pediatric victims.

U.S. Chemical Safety Board. (2016). [West Fertilizer Explosion and Fire](#).

This report details the 2013 West (Texas) Fertilizer Company fire and explosion which resulted in 15 deaths (12 emergency responders) and more than 260 injuries. The emergency response is detailed in Section 7 of the report.

U.S. Fire Administration. (2013). [Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents](#). Federal Emergency Management Agency.

This white paper includes checklists and step-by-step considerations for active shooter event planning and response by pre-hospital providers, and references the framework suggested by the Hartford Consensus.

Wolf-Fordham, S., Twyman, J., and Hamad, C. (2014). [Educating First Responders to Provide Emergency Services to Individuals with Disabilities](#). Disaster Medicine and Public Health Preparedness. 8(6):533–540.

The authors measured the effectiveness of an online program to increase emergency responder knowledge, planning, and response surrounding children and adults with disabilities. They found significant levels of gains in participant knowledge and simulated applied skills.

## Community Paramedicine

Amadi-Obi, A., Gilligan, P., Owens, N., et al. (2014). [Telemedicine in Pre-Hospital Care: A Review of Telemedicine Applications in the Pre-Hospital Environment](#). International Journal of Emergency Medicine. 7(29).

The authors examined 39 studies related to telemedicine that met their inclusion criteria and determined that telemedicine can have a positive effect on emergency medical care.

Bigham, B., Kennedy, S., Drennan, I., et al. (2013). [Expanding Paramedic Scope of Practice in the Community: A Systematic Review of the Literature](#). (Abstract only.) Prehospital Emergency Care. 17(3).

The authors undertook an extensive literature review to help gain a clear understanding of the emerging research surrounding the concept of community paramedicine. Results were promising, but research is limited.

Heightmand, A.J. (2013). [Envisioning Community Paramedicine](#). Journal of Emergency Medical Services. Journal of Emergency Medical Services.

The author summarizes findings from a March 2013 meeting of emergency medical services (EMS), healthcare, and government stakeholders who discussed "how to best categorize, formalize and maximize the value and integration of EMS into our current and future healthcare system." Participants came to consensus on several points regarding community paramedicine.

Iezzoni, L., Dorner, S., and Ajayi, T. (2016). [Community Paramedicine — Addressing Questions as Programs Expand](#). The New England Journal of Medicine. 374:1107-1109.

The authors provide an overview of community paramedicine in the United States and abroad and highlight several areas for more research.

Kizer, K., Shore, K., and Moulin, A. (2013). [Community Paramedicine: A Promising Model for Integrating Emergency and Primary Care](#). California HealthCare Foundation and California Emergency Medical Services Authority.

This report provides a brief history of emergency medical services and community paramedicine in California including some recommendations for further exploration of the field to meet community health needs in the future.

National Conference of State Legislatures. (2016). [Beyond 911: State and Community Strategies for Expanding the Primary Care Role of First Responders](#).

This website highlights resources and case studies in the field of Community Paramedicine which may assist others with implementing this type of pre-hospital care.

Patterson, D. and Skillman, S. (2012). [National Consensus Conference on Community Paramedicine: Summary of an Expert Meeting](#).

This report provides a summary of topics covered by the 2012 National Consensus Conference on Community Paramedicine (CP) attendees. The report is divided into six main sections: Education and Expanded Practice Roles; Integration of CP Providers with Other Health Providers; Medical Direction and Regulation; Funding and Reimbursement; Data, Performance Improvement, and Outcome Evaluation; and Community Paramedicine Research Agenda.

## **Education and Training**

Chaput, C.J., Deluhery, M.R., Stake, C.E., et al. (2007). [Disaster Training for Prehospital Providers](#). *Prehospital Emergency Care*. 11:458–65.

The authors describe findings from a survey of prehospital healthcare providers to determine mass casualty event (MCE) training knowledge retention, self-assessed levels of preparedness for MCEs, and preferred educational formats.

Clawson, A., Menachemi, N., Kim, U., and Brooks, R.G. (2007). [Are We Ready for Terrorism? Emergency Medical Technicians' and Paramedics' Training and Self-perceived Competence Since September 11](#). (Abstract only.) *American Journal of Disaster Medicine*. 2:26–32.

The authors surveyed thousands of emergency medical technicians and paramedics in the state of Florida regarding terrorism-specific training and competencies.

Cone, D.C., Serra, J., Burns, K., et al. (2009). [Pilot Test of the SALT Mass Casualty Triage System](#). (Abstract only.) *Prehospital Emergency Care*. 13:536–40.

The authors examined how quickly trained paramedics could triage using the SALT (sort–assess–lifesaving interventions–treat/transport) method. While the method appeared promising, there was overtriage, and the authors indicated the need for more research.

Federal Emergency Management Agency. (n.d.). [Recommended Training by Discipline: Emergency Medical Services \(EMS\)](#). (Accessed 4/22/2016.)

This webpage includes links to various courses (geared towards EMS providers, emergency management, and others responsible for disaster planning and response).

Gershon, R.R., Vandelinde, N., Magda, L.A., et al. (2009). [Evaluation of a Pandemic Preparedness Training Intervention for Emergency Medical Services Personnel](#). (Abstract only.) *Prehospital Disaster Medicine*. 24:508-11.

The goal of the study was to determine the effectiveness of course followed by a skill-based drill on pandemic preparedness. Pre and post-tests indicated significant increases in knowledge.

Reilly, M.J., Markenson, D., and DiMaggio, C. (2007). [Comfort Level of Emergency Medical Service Providers in Responding to Weapons of Mass Destruction Events: Impact of Training and Equipment](#). (Abstract only.) *Prehospital Disaster Medicine*. 22:297–303.

The authors surveyed emergency medical services (EMS) providers across the U.S. and found that hands-on training was related to increased EMS provider comfort in responding to mass casualty events.

Wolf-Fordham, S., Twyman, J., and Hamad, C. (2014). [Educating First Responders to Provide Emergency Services to Individuals with Disabilities](#). *Disaster Medicine and Public Health Preparedness*. 8(6):533–540.

The authors measured the effectiveness of an online program to increase emergency responder knowledge, planning, and response surrounding children and adults with disabilities. They found significant levels of gains in participant knowledge and simulated applied skills.

### **Emergency Medical Services Triage**

Barnett, A., Wang, N., Sahni, R., et al. (2013). [Variation in Prehospital Use and Uptake of the National Field Triage Decision Scheme](#). *Official Journal of the National Association of EMS Physicians and the National Association of State EMS Directors*. 17(2):135–148.

The objective of this study was to compare the use of field triage criteria by emergency medical services personnel in six regions. The researchers ultimately found a large variation between the frequency and type of field triage criteria used and suggested opportunities for incorporating updated guidelines.

Federal Interagency Committee on EMS. (2014). [National Implementation of the Model Uniform Core Criteria for Mass Casualty Incident Triage](#).

This report summarizes the Model Uniform Core Criteria for mass casualty triage and highlights strategies and action steps member agencies can take to support national implementation of the criteria.

Newgard, C., Mann, N., Hsia, R., et al. (2014). [Patient Choice in the Selection of Hospitals by 9-1-1 Emergency Medical Services Providers in Trauma Systems](#). *Academic Emergency Medicine: Official Journal of the Society for Academic Emergency Medicine*. 20(9): 911–919.

This retrospective study examines the reasons cited by emergency medical services providers for selecting hospital destinations based on criteria such as injury severity, field triage status, and patient or family choice. The authors found that hospital selection was most influenced by patient or family choice.

Sasser, S., Hunt, R., Faul, M., et al. (2013). [Guidelines for Field Triage of Injured Patients: Recommendations of the National Expert Panel on Field Triage, 2011](#). Centers for Disease Control and Prevention.

This document can help pre-hospital care providers recognize injured patients who are most likely to benefit from specialized trauma center resources. This document is not intended as a mass casualty triage tool.

## Guidance

American College of Emergency Physicians. (2014). [EMS and Disaster Preparedness](#).

This webpage features links to disaster preparedness resources geared towards emergency medical service providers.

American College of Surgeons. (2015). [See Something, Do Something: Improving Survival Strategies to Enhance Survival in Active Shooter and Intentional Mass Casualty Events: A Compendium](#). Bulletin of the American College of Surgeons. 100(15).

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.

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This toolkit contains key concepts, guidance, and practical resources to help individuals across the emergency response system develop plans for crisis standards of care. Chapter 7 includes sample indicators, triggers, and sample tactics for use in the transition from

conventional surge to contingency surge to crisis surge, and a return from crisis response to conventional response (detailed specifically for emergency medical services using slow-onset and no-notice scenarios).

Hodge, J., Orenstein, D., and Weidenaar, K. (2014). [Expanding the Roles of Emergency Medical Services Providers: A Legal Analysis](#). Association of State and Territorial Health Officials.

This document highlights potential methods to increase opportunities to engage emergency medical services (EMS) providers for day-to-day activities in communities across the United States. The report summarizes a review and analysis of the existing legal environment that either facilitates, or imposes barriers to, expanded roles of EMS.

Loma Linda University Children's Hospital. (2013). [Pediatric/Neonatal Disaster Reference Guide: Bridging the Gap Between EMS and Hospital Care](#).

This guide was created to help emergency managers, coordinators, and hospitals in their efforts to develop their own specific departmental Emergency Operations Plan that addresses the special needs of children and infants.

National Highway Traffic Safety Administration. (2007). [National EMS Scope of Practice Model](#).

This model explains the four levels of emergency medical services licensure: Emergency Medical Responder, Emergency Medical Technician, Advanced EMT, and Paramedic. The role, skills, and necessary knowledge base are highlighted for each level.

The Joint Committee to Create a National Policy to Enhance Survivability from Mass Casualty Shooting Events. (2013). [Active Shooter and Intentional Mass-Casualty Events: The Hartford Consensus II](#). Bulletin of the American College of Surgeons.

This resource 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.

U.S. Department of Health and Human Services. (2007). [Public Health Emergency Response: A Guide for Leaders and Responders](#).

The U.S. Department of Health and Human Services created this document to help public officials and first responders understand their role during a public health emergency.

\*U.S. Fire Administration. (2013). [Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents](#). Federal Emergency Management Agency.

This white paper includes checklists and step-by-step considerations for active shooter event planning and response by pre-hospital providers, and references the framework suggested by the Hartford Consensus.

### **Infectious Disease (e.g., Ebola, pandemic influenza)**

Centers for Disease Control and Prevention. (2014). [EMS \(Emergency Medical Services\) and Ebola: Field Experience with Transporting Patients.](#)

Speakers from Emory University and the University of Nebraska Medical Center share EMS field experiences with two patients in this 2014 webinar. The session provides information on patient transport, training, equipment, policy, and procedures, and how to identify partners in planning for the transport of patients. Slides and a transcript are available.

Centers for Disease Control and Prevention. (2015). [Identify, Isolate, Inform: Emergency Medical Services \(EMS\) Systems and 9-1-1 Public Safety Answering Points \(PSAPs\) for Management of Patients Who Present with Possible Ebola Virus Disease \(Ebola\) in the United States.](#)

This algorithm provides the steps that emergency medical service providers can take when providing patient care in the field to those with Ebola. The resource also lists steps for decontaminating transport vehicles.

Centers for Disease Control and Prevention. (2015). [Interim Guidance for Emergency Medical Services \(EMS\) Systems and 9-1-1 Public Safety Answering Points \(PSAPs\) for Management of Patients under Investigation \(PUIs\) for Ebola Virus Disease \(EVD\) in the United States.](#)

This guidance was developed to ensure that emergency medical services providers and other first responders are safe and patients are appropriately managed while handling inquiries and responding to patients under investigation.

Centers for Disease Control and Prevention. (2015). [Q&A's about the Transport of Pediatric Patients \(< 18 years of age\) Under Investigation or with Confirmed Ebola.](#)

This webpage provides first responders with helpful information specific to protecting themselves, younger patients, and patients' family members by answering the frequently asked questions about Ebola and transporting young patients.

Centers for Disease Control and Prevention. (2016). [Guidance for Developing a Plan for Interfacility Transport of Persons Under Investigation or Confirmed Patients with Ebola Virus Disease in the United States.](#)

This guidance was developed for personnel engaged in planning for the ground/air transport of persons under investigation or patients with confirmed Ebola virus disease.

Additional guidance is provided on developing standard operating procedures for patient handoff between facilities and air-to-ground patient handoff.

Centers for Disease Control and Prevention and the U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2014). [Detailed Emergency Medical Services \(EMS\) Checklist for Ebola Preparedness](#).

This checklist was designed to help emergency medical services personnel “prepare to detect,” “prepare to protect,” and “prepare to respond” to patients with Ebola.

Emergency Medical Services Authority, Emergency Medical Directors’ Association of California, and Emergency Medical Services Administrators’ Association of California. (2014). [Recommended Policy and Procedures for Emergency Medical Services \(EMS\) Personnel for the Contact, Management, and Transport of Potential Ebola Virus Disease \(EVD\) Patients](#).

This document provides guidance for development of local policies and protocols for the effective management of patients with Ebola and the safety of EMS personnel. This information is intended for: Managers of 9-1-1 Public Safety Answering Points (PSAPs), local emergency medical services agencies (LEMSAs), EMS Systems, law enforcement agencies and fire service agencies, as well as individual EMS providers (including emergency medical technicians, paramedics, and medical first responders).

Lowe, J., Jelden, K.C., Schenarts, P.J., et al. (2014). [Considerations for Safe EMS Transport of Patients Infected with Ebola Virus](#). Prehospital Emergency Care. 19(2).

The authors discuss the coordinated response between the Nebraska Biocontainment Unit (through the Nebraska Medical Center in Omaha) and Omaha Fire Department's EMS to transport patients with confirmed Ebola virus from West Africa from the airport to the high-level isolation unit. Three critical areas have been identified from their experience and are addressed in this article: ambulance preparation, appropriate selection and use of personal protective equipment, and environmental decontamination.

National Highway Traffic Safety Administration. (2007). [EMS Pandemic Influenza Guidelines for Statewide Adoption](#).

This guidance document highlights two tasks assigned to the Department of Transportation in the National Strategy for Pandemic Influenza: 6.1.13.6 (emergency management services-specific pandemic influenza guidelines) and 6.1.4.2 (protocols for 9-1-1 centers and public safety answering points).

New Hampshire Division of Public Health Services, and New Hampshire Bureau of Emergency Medical Services. (2015). [Ebola Preparedness for Emergency Medical Services](#).

This document is intended to provide interim guidance to EMS providers to prepare for a suspect Ebola virus disease patient. It includes information on steps that EMS personnel should take immediately as preventative measures, how to screen suspect cases, how to use personnel protective equipment, and steps to take to environmentally clean ambulances and medical equipment.

New York State Department of Health, and New York State Emergency Medical Services. (2014). [Ebola Virus Disease \(EVD\) In-Service EMS Training Outline](#).

This document provides information on Ebola (e.g., how it is transmitted, signs and symptoms), and several recommendations to EMS personnel including use of personal protective equipment, cleaning EMS transport vehicles after transporting a patient with suspected or confirmed Ebola, follow-up and/or reporting measures by EMS personnel after caring for a suspected or confirmed Ebola patient, among others.

\*Spectrum Health. (n.d.). [Pre-ED Triage Matrix](#). (In Caring for the Community: Preparing for an Influenza Pandemic.) (Accessed 4/22/2016.)

This matrix lists steps for emergency medical services, from dispatch to transport, by pandemic severity level and includes suggested triage decisions for calls based on the operational situation.

Spectrum Health. (n.d.). [Pre-ED Triage Development Committee](#). (In Caring for the Community: Preparing for an Influenza Pandemic.) (Accessed 4/22/2016.)

This report is a summary of a committee meeting, whose goal was to provide the necessary information to the community to minimize the demand on the healthcare system, including emergency medical services. The committee developed a pre-emergency department treatment matrix and a related template for community and healthcare system education.

U.S. Department of Health and Human Services. (2006). [Emergency Medical Service and Non-Emergent \(Medical\) Transport Organizations Pandemic Influenza Planning Checklist](#).

This checklist was created to help emergency medical services and non-emergent (medical) transport organizations measure and improve their preparedness for responding to pandemic influenza.

## Lessons Learned

Bulger, E., Snyder, D., Schoelles, K., et al. (2014). [An Evidence-Based Prehospital Guideline for External Hemorrhage Control: American College of Surgeons Committee on Trauma](#). Prehospital Emergency Care. 18(2):163-173.

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.

Hick, J.L., Ho, J.D., Geegaard, W.G., et al. (2008). [Emergency Medical Services Response to a Major Freeway Bridge Collapse](#). *Disaster Medicine and Public Health Preparedness*. 2(S1): S17-S24.

The authors discuss the emergency medical services response to the bridge collapse, noting the successes and lessons learned (e.g., patient tracking, communications).

Kearns, R.D., Myers, B., Cairns, C.B., et al. (2014). [Hospital Bioterrorism Planning and Burn Surge](#). *Biosecurity Bioterrorism*. 12(1):20-8.

This article discusses how using an all-hazards approach to bioterrorism response planning helped to prepare hospitals in the Raleigh/Durham, NC area to care for casualties from a plant explosion in June 2009. The rescue, response, and resuscitation of survivors by first responders and first receivers, as well as efforts to develop burn surge, are described.

National Association of State EMS Officials. (2016). [Domestic Preparedness: Best Practices/Lessons Learned](#).

This webpage includes links to reports on scene safety best practices and lessons learned by emergency medical service providers during recent events (the Ebola outbreak and the Boston Marathon bombing).

Pereira, B., Morales W., Cardoso, R., et al. (2013). [Lessons Learned From a Landslide Catastrophe in Rio de Janeiro, Brazil](#). (Abstract only.) *American Journal of Disaster Medicine*. 8(4):253-8.

The authors discuss lessons learned from this flood and landslide event in 2011, with a focus on pre-hospital and hospital organization and management of patients. They also describe the most common injuries treated (injuries were to the extremities, most requiring only wound cleaning, debridement, and suture), and note that the primary cause of death was from asphyxia due to drowning or mud burial.

Ramme, A.J., Vira, S., and McLaurin, T.M. (2015). [Superstorm Sandy's Forgotten Patient: A Lesson in Emergency Preparedness in Severe Obesity](#). *Obesity*. 23(2):253-4.

The authors describe the challenges associated with evacuation of a morbidly obese patient during Superstorm Sandy, and how those challenges influenced the decision not to evacuate the patient, even in the absence of power and running water.

Rankin, J. (2016). [These are War Wounds: Brussels Hospitals Treat Terror Attack Victims](#). *The Guardian*.

The author describes the revisions to hospital emergency plans since the Paris terror attacks and the types of injuries treated by staff from Erasmus Hospital in Brussels.

Redhead, J., Ward, P., and Batrick, N. (2005). [The London Attacks--Response: Prehospital and Hospital Care](#). The New England Journal of Medicine. 353:546-547.

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.

Schenk, E., Wetunge, G., Mann, C., et al. (2014). [Epidemiology of Mass Casualty Incidents in the United States](#). Prehospital Emergency Care. 81(3).

The authors report on characteristics and frequency of mass casualty incidents in the U.S. during 2010 (as reported by emergency medical services personnel).

Stambaugh, H. and Cohen, H. (2007). [I-35W Bridge Collapse and Response](#). U.S. Department of Homeland Security, United States Fire Administration, National Fire Programs Division.

This report explains the response to the I-35W bridge collapse in Minneapolis (e.g., firefighting and rescue operations, perimeter control and security maintenance, fatality management, and handling hazardous materials). The authors also discuss how support was provided to families of the dead and how emergency management staff worked at the emergency operations center. The report includes best practices.

Sugerman, D. and Armstrong, J. (2013). [Prevention and Treatment of Injuries Following Hurricanes and Tornadoes](#). Centers for Disease Control and Prevention.

This one-hour webinar covers the provision of pre-hospital care; the patterns of injury seen after hurricanes and tornadoes, including appropriate initial management; appropriate emergency risk communication messages; and the importance of data collection to improve messaging and response efforts.

U.S. Chemical Safety Board. (2016). [West Fertilizer Explosion and Fire](#).

This report details the 2013 West (Texas) Fertilizer Company fire and explosion which resulted in 15 deaths (12 emergency responders) and more than 260 injuries. The emergency response is detailed in Section 7 of the report.

U.S. Department of Homeland Security. (2015). [Homeland Security Information Network \(HSIN\)](#). (Free registration required.)

Registered users can access Sensitive but Unclassified information on this site that includes lessons learned, after-action reports, situational awareness tools, and other resources for emergency healthcare responders.

## Pediatric Issues

*(Note: this is a sampling of related resources; please visit the comprehensively developed [Pediatric Topic Collection](#) for more information.)*

Foltin, G., Tunik, M., Treiber, M., et al. (2009). [Pediatric Disaster Preparedness: A Resource for Planning, Management and Provision of Out-of-Hospital Emergency Care](#). Children's National Health System, Emergency Medical Services for Children National Resource Center.

The authors discuss practical and essential elements of pediatric prehospital emergency care in emergency medical services (EMS) system planning. Recommendations are included on a variety of topics for EMS providers and others engaged in pediatric prehospital care during a disaster.

Lowe, C.G. (2009). [Pediatric and Neonatal Interfacility Transport Medicine After Mass Casualty Incidents](#). (Abstract only.) *The Journal of Trauma*. 67(2 Suppl): S168-71.

A mass casualty incident can present major challenges for a critical care transport team, which is essential for the safe interfacility movement of critically ill patients. The author reviews the capabilities and limitations of pediatric and neonatal critical care transport teams and factors that hindered the evacuation of pediatric and neonatal patients after Hurricane Katrina to provide recommendations to improve the efficiency and efficacy of interfacility transport of pediatric patients.

Sinz, B., Westlake, D., Tharratt, R.S., et al. (2010). [EMSC \(Emergency Medical Services for Children\) Pediatric Disaster Preparedness Guidelines: LEMSAs \(Local Emergency Medical Services Agencies\)](#). California Emergency Medical Services Authority.

This guide (which is in the process of being updated) was created for emergency medical service providers in California, and shares child-centric approaches related to triage, treatment, and decontamination. It includes detailed guides and checklists on topics such as medications, mental health concerns, considerations for children with special needs, and disaster drills.

Steve, S., Rebecca, L., Rhonda, D., et al. (2007). [Prehospital Preparedness for Pediatric Mass-Casualty Events](#). *Pediatrics*. 120(4). (Abstract only.)

The authors examined the preparedness levels of U.S. emergency medical services agencies specific to the care of children who are involved in mass-casualty events. Less than 15% reported pediatric-specific mass casualty plans, and while almost 70% reported participating in local disaster drills within the past year, fewer than half of those drills included pediatric victims.

## Plans, Tools, and Templates

*(Note: It is critical that the operational features of comprehensive plans such as those highlighted in this collection be available to responders as job aids; base plans are not intended for field/responder use, but can serve as an overall policy reference. These plans were selected by subject matter experts as samples; the content in its entirety may not necessarily represent best practices.)*

Bucks County Emergency Health Services. (2010). [Mass Casualty Response Plan](#).

This plan includes a county-specific resource table (that lists equipment by capability) and an appendix dedicated to responding to school bus accidents.

California Emergency Medical Services Authority. (2010). [Ambulance Strike Team \(AST\)/ Medical Task Force \(MTF\) System Manual](#).

This document defines Ambulance Strike Teams and their role in the state of California.

Contra Costa Health Services. (2012). [Emergency Medical Services Multi-Casualty Incident Plan](#).

This county mass casualty plan lists responsibilities for a variety of roles (e.g., helicopter providers, law enforcement, and communications centers) and includes checklists and a CHEMPACK mobilization plan as appendices.

County of Santa Clara, Emergency Medical Services. (2014). [EOA Emergency Ambulance Staffing Contingency Plan](#).

The plan was designed for managers of the Santa Clara County Emergency Medical Service System to help them manage staffing shortages of any cause within the county's 911 Exclusive Operation Area. It is separated into phases and includes sections on public information and messaging and a variety of checklists.

Duncan, E. Colver, K., Dougall, N., et al. (2014). [Consensus on Items and Quantities of Clinical Equipment Required to Deal with Mass Casualties Big Bang Incident: A National Delphi Study](#). BMC Emergency Medicine. 14: 5.

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.

Federal Emergency Management Agency. (2012). [Operational Templates and Guidance for EMS Mass Incident Deployment](#).

The goal of this report is to share model policies and practices across a variety of disciplines and provider types and help the emergency medical services (EMS) field

deploy more effectively to mass care incidents. The information in this document can help EMS planners develop related policies and templates.

Hanfling, D., Hick, J., and Stroud, C. (2013). [Chapter 3. Toolkit Components: Emergency Medical Services](#). (In Crisis Standards of Care: A Toolkit for Indicators and Triggers.) Institute of Medicine, Washington, DC: National Academies Press.

This toolkit can help medical response agencies at multiple tiers focus discussions on indicators and triggers that guide transitions along the continuum of disaster emergency healthcare.

Metropolitan Emergency Services Board (MN). (2012). [Mass Casualty Incident Response Plan](#).

This fact sheet (developed for agencies in Minnesota) lists considerations and steps for emergency medical services (EMS) to take during a mass casualty incident. Information is provided for ambulance operators (focused on loading patients and leaving the scene), EMS command, EMS operations, and transportation supervisors.

Oregon State Area Trauma Advisory Board # 6 and Washington State Southwest Regional EMS. (2012). [Mass Casualty Incident Plan Initial Response Guide](#).

This plan was prepared to ensure successful coordination between more than one pre-hospital agency and more than one hospital in the state trauma region.

Paramedic Protocol Provider. (n.d.) [EMS Protocols](#). (Accessed 4/22/2016).

This webpage includes links to many state and county emergency medical services protocols including incident response and mass casualty incident plans.

Rappahannock EMS Council. (2013). [Regional Mass Casualty Incident \(MCI\) Plan](#).

This plan was developed to help emergency medical services providers in a specific region in Virginia provide a patient care via a unified, coordinated and immediate mutual aid response to any type of mass casualty incident including activation of regional / coalition coordinating entities. Two unique feature of this plan are its sections on training and exercise and air operations.

\*Spectrum Health. (n.d.). [Pre-ED Triage Matrix](#). (In Caring for the Community: Preparing for an Influenza Pandemic.) (Accessed 4/22/2016.)

This matrix lists steps for emergency medical services, from dispatch to transport, by pandemic severity level and includes suggested triage decisions for calls based on the operational situation.

State of Florida, Department of Health. (2012). [Florida Ambulance Deployment Standard Operating Procedure](#).

This document outlines steps for marshalling and deploying ground and air emergency medical services during a disaster. The Concept of Operations section includes considerations for notice and no-notice events, communications, and resource management. Duties and responsibilities for select roles are also specified.

Texas Department of State Health Services. (2012). [Ambulance Strike Team Standard Operating Guidelines](#).

This standard operating guideline was developed to facilitate the deployment of "ambulance strike teams" (supplemental medical transportation) during large scale patient movements or other special circumstances.

\*U.S. Fire Administration. (2013). [Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents](#). Federal Emergency Management Agency.

This white paper includes checklists and step-by-step considerations for active shooter event planning and response by pre-hospital providers, and references the framework suggested by the Hartford Consensus.

Utah Department of Health, Bureau of EMS and Preparedness. (2011). [Utah Mass Casualty Incident Plan](#).

This section of the state's emergency operations plan can help emergency medical providers develop mass casualty incident plans and is an example of a state-driven format. It includes sections on triage, tracking, treatment, and transport and mutual aid and exercise, as well as appendices that contain guidelines and templates.

Virginia Office of Emergency Medical Services and Virginia Department of Health. (2007). [Emergency Medical Services \(EMS\) Surge Planning Template and Toolbox for Mass Casualty Incidents \(MCI\) in Virginia](#).

This planning tool can help emergency medical service (EMS) providers develop their own mass casualty incident plans. Several annexes are included under the section "EMS Mutual Aid and Surge Tool Box List."

## Agencies and Organizations

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

American College of Emergency Physicians. [EMS and Disaster Preparedness](#).

American Trauma Center. [Trauma Information Exchange Program \(TIEP\)](#).

[Emergency Medical Services for Children.](#)

[EMSWORLD.](#)

[Emergency Nurses Association.](#)

[Federal Interagency Committee on EMS.](#)

[International Academies of Emergency Dispatch.](#)

[National Association of Emergency Medical Technicians.](#)

[National Association of State EMS Officials.](#)

[National EMS Information System.](#)

National Highway Traffic Safety Administration. [NHTSA EMS.](#)

Paramedic Protocol Provider. [EMS Protocols.](#)

U.S. Department of Health and Human Services, [Office of the Assistant Secretary for Preparedness and Response.](#)

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