ASPR TRACIE Technical Assistance Request

Request Receipt Date (by ASPR TRACIE): 3 September 2020
Response Date: 9 September 2020
Type of TA Request: Complex

Request:

The requestor stated that their hospital is working with their region's healthcare coalition on a trauma mass casualty incident (MCI) virtual tabletop exercise (TTX). They would like to use the industry site explosion that occurred in Beirut, Lebanon on August 4, 2020 as their TTX scenario. The requestor asked if ASPR TRACIE could help identify updated figures on the number of people injured and killed by the Beirut explosion and the mechanism of injuries from the incident to help with victimology for the exercise's scenario.

Response:

The ASPR TRACIE Team reached out to members of our Subject Matter Expert (SME) Cadre for more information. We also conducted a search online and reviewed existing ASPR TRACIE resources for relevant materials (namely the Active Shooter and Explosives, Chemical Hazards, Exercise Program, and Pre-Hospital Mass Casualty Triage and Trauma Care Topic Collections). Materials gathered can be found in the following sections.

NOTE: Due to the recent nature of this MCI, the ASPR TRACIE Team was unable to find many resources that specifically identified the types of injuries incurred as a result of the explosion. However, we provided other relevant resources in Section III of this document which include injuries that would be expected or are common following such an explosion.

I. Beirut Explosion Statistics

The ASPR TRACIE Team gathered the most current statistics available related to the Beirut explosion; information and the sources from which it was gathered are as follows:

- As of August 18, 2020, the death toll stands at 178 people.
  - The number of fatalities could reach up to 200.
- There are approximately 30 people missing.
- 6,568 people were injured.
- Three of Beirut's major hospitals had to close, and three others were partially damaged following the explosion.
  - Approximately 500 hospital beds were lost.
- Around 300,000 citizens were left homeless.

Resources:

- Geldi. M. (August 14, 2020). Death Toll in Blast-hit Beirut Rises to 177. Anadolu Agency.
- Sherlock, R. (September 2, 2020). After Beirut Explosion, Lebanon Sees A Spike in Coronavirus Infections. NPR.
- World Health Organization. (August 18, 2020). Lebanon Explosion. Current Situation and Impact on Health Sector.

II. Resources on Types of Injuries and Health Impacts from the Beirut Explosion

Aridi, R. (2020). 'Absolutely Horrendous.' Scientists Discuss Beirut's Blast and How They Are Coping with its Aftermath. Science.

The author of this article interviewed three scientists to discuss the health and environmental impacts of the explosion in Beirut. The interviewees noted that they were concerned about the dust and toxins that have been deposited over the city, which could lead to asthma, allergies, pulmonary disease, and other acute and chronic health issues. They were also concerned about the increase in COVID-19 cases and deaths due to residents' inability to access medical care.

Jerusalem Post Staff. (2020). Most Common Injuries Suffered at Explosions Such as One in Beirut.

This article addresses five types of injuries that can occur during explosions similar to the explosion in Beirut. The authors indicate that the first injury is damage to the body by shrapnel and flying or falling objects. The second type of injury is infections that occur when wounds and injuries are left untreated. The third cause of injury is caused by a blast's shock wave, which can send individuals airborne, then into buildings, walls, cars, or other objects. The fourth cause of injury is damage to the organs, intestines, sinuses, and blood vessels caused by air pressure or effects of the shock wave. Finally, the fifth cause of injury is damage to the auditory system (e.g., ruptured ear drums), from the sound and shock waves of the blast.

III. Other Relevant Resources (Not Directly Related to the Beirut Incident)

American College of Emergency Physicians. (2014). Bombings: Injury Patterns and Care.

This webpage contains resources to assist clinicians with treating victims of bombings and other explosive events. Included are fact sheets; training materials; and a link to a mobile application to assist in the response and clinical management of blast injuries.

ASPR TRACIE. (2020). Exercise Program Topic Collection.

The resources in this Topic Collection can help exercise designers, planners, researchers, and other interested individuals plan exercises with robust evaluation and in compliance

with Federal guidelines. **NOTE**: The Discussion-Based Exercise Templates: Mass Casualty Incident section may be particularly helpful for this request.

Burstein, J., Lacy, C., and Donovan, C. (eds.). (2017). Best Practices for Management of Explosive Incidents: Translating the US and Israeli Military and Civilian Experience for Use in US Civilian and Military Out-of-hospital and Hospital Health Care. (Abstract only.) Annals of Emergency Medicine. 69(1): Supplement.

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.

Cairns, B.A.,Stiffler, A.,Price, F. et al. (2005). Managing a Combined Burn Trauma Disaster in the Post-9/11 World: Lessons Learned From the 2003 West Pharmaceutical Plant Explosion. (Abstract only.) The Journal of Burn Care and Rehabilitation. 26(2):144-50.

The authors share lessons learned from a January 2003 chemical plant fire and describe the challenges associated with managing patients with combined burn and trauma injuries. Recommendations for future disaster responses are included.

Centers for Disease Control and Prevention. (n.d.). Explosions and Blast Injuries A Primer for Clinicians. (Accessed 9/4/2020).

This document provides information for clinicians on the unique pathophysiology of injuries associated with explosions. It provides tables to include the mechanism of blast injuries and the types of explosive-related injuries.

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.

Greater New York Hospital Association. (2013). Integrated Explosive Event and Mass Casualty Event: Response Plan Template.

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.

Gutierrez de Ceballos, J., Turégano-Fuentes, F., Perez-Diaz, D., et al. (2005). 11 March 2004: The Terrorist Bomb Explosions in Madrid, Spain– An Analysis of the Logistics, Injuries Sustained and Clinical Management of Casualties Treated at the Closest Hospital. Critical Care. 9(1):104-111.

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%).

Hamele, M., Poss, W.B., and Sweney, J. (2014). Disaster Preparedness, Pediatric Considerations in Primary Blast Injury, Chemical, and Biological Terrorism. World Journal of Critical Care Medicine. 3(1):15-23.

The authors review the presentation, pathophysiology, and treatment of pediatric victims of blast injury, chemical weapons, and biological weapons, with a focus on those injuries not commonly encountered in critical care practice.

Hitti, E.A., Cheaito, M.A., El Sayed, M.J., et al. (2020). Mass Casualty Management in the Emergency Department – Lessons Learned in Beirut, Lebanon - Part I. Mediterranean Journal of Emergency Medicine & Acute Care. 1(2).

The authors discuss several lessons that emergency physicians and other healthcare professionals have learned in Lebanon over the years having dealt with multiple MCIs.

Lance, R. (2020). The Tragic Physics of the Deadly Explosion in Beirut. Wired.

This article describes the physics behind the chemical explosion in Beirut, Lebanon along with other past examples, which help explain the patterns of trauma that occur after such explosions. She also goes into detail about the chemistry of ammonium nitrate, which was the chemical that caused the explosion in Beirut.

Lesperance, R.N. and Nunez, T.C. (2015). Blast Injury: Impact on Brain and Internal Organs. (Abstract only.) Critical Care Nursing Clinics of North America. 27(2):277-87.

Based on a literature review, the authors discuss some key points for the immediate care of blast injury victims. Specifically, they note that these patients should be treated as having multisystem trauma and managed according to Advanced Trauma Life Support guidelines, and damage control resuscitation should be practiced until definitive hemorrhage control has been achieved.

Smith, E.R. and Shapiro, G. (2012). Changing the Paradigm: Tactical Emergency Casualty Care Guidelines for High Risk Scenarios. Committee for Tactical Emergency Casualty Care.

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.

Weston, B., Simpson, N., Hart, D., et al. (2015). Multiple Casualty Scenario from a Bomb/Blast Injury. MedEdPORTAL Publications. 2015;11:10065.

This article describes in detail the simulation plan for a blast-related mass casualty incident exercise targeted to emergency medicine residents. All of the associated materials may be downloaded for free. All the supporting materials are available for free download.