

**Understanding the Healthcare Impacts of Attacks on Infrastructure**

*Cara Taubman MD MPH<sup>1</sup>, Alexander Hart MD<sup>1,2</sup>, Attila Hertelendy PhD<sup>1,3</sup>, Derrick Tin MBBS<sup>1</sup>, Ryan Hata MD<sup>1</sup>, Gregory Ciottonne MD<sup>1,4</sup>*

1. BIDMC Disaster Medicine Fellowship, Boston, USA
2. Hartford Hospital, Hartford, USA
3. Florida International University, Miami, USA
4. Harvard Medical School, Boston, USA

**Introduction:** Healthcare provision depends on reliable infrastructure to power equipment, and provide water for medication and sanitation. Attacks on infrastructure limiting such functions can have a profound and prolonged influence on the delivery of care.

**Method:** A retrospective analysis of the Global Terrorism Database (GTD) was performed of all attacks occurring between 1970-2020. Data was filtered using the internal database search function for all events where the primary target was “Utilities”, “Food or Water Supply” and “Telecommunications.” For the purposes of this study the sub-type “Food Supply” was excluded. Events were collated based on year, country, region, numbers killed and wounded.

**Results:** The GTD listed 7,813 attacks on infrastructure with 6,280 attacks targeting utilities leading to 1,917 persons directly killed and 1,377 wounded. In total there were 1,265 attacks targeting telecommunications causing 205 direct deaths and 510 wounded. Lastly, 268 attacks targeted the water supply with 318 directly killed and 261 wounded. Regionally, South America had the most attacks with 2,236, followed by Central America and the Caribbean with 1,390. Based on infrastructure type, the most attacks on utilities occurred in El Salvador (1,061), the most attacks on telecommunications were in India (140) and Peru (46) had the most attacks on its water supply.

**Conclusion:** The regions with the highest number of total attacks targeting infrastructure have historically been in South America, with more attacks against power and utilities than other infrastructure. The numbers of persons directly killed and wounded in these attacks were lower than those with other target types. However, the true impacts these attacks have on lack of health care delivery are not accounted for in these numbers. By understanding the pattern and scope of these attacks, Counter-Terrorism Medicine initiatives can be created to target harden healthcare-related infrastructure.

*Prehosp. Disaster Med.* 2023;38(Suppl. S1):s5  
doi:10.1017/S1049023X23000602

**Terrorism-Related Attacks in East Asia from 1970 to 2020**

*HeeJun Shin MD, MS<sup>1,2</sup>, Attila Hertelendy PhD<sup>1,3</sup>, Alexander Hart MD<sup>4,5</sup>, Derrick Tin MBBS<sup>1,2</sup>, Fadi Issa MD<sup>1,2</sup>, Ryan Hata MD<sup>1,2</sup>, Gregory Ciottonne MD<sup>1,2</sup>*

1. BIDMC Disaster Medicine Fellowship, Department of Emergency Medicine, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, USA
2. Harvard Medical School, Boston, USA

3. Department of Information Systems and Business Analytics, College of Business, Florida International University, Miami, USA
4. University of Connecticut School of Medicine, Farmington, USA
5. Department of Emergency Medicine, Hartford Hospital, Hartford, USA

**Introduction:** This study aims to analyze and describe terrorism-related attacks in East Asia from 1970 to 2020. This descriptive analysis of terrorist attacks in East Asia will help first responders, emergency medical services (EMS), hospital-based medical providers, and policymakers establish a more refined hazard vulnerability assessment framework and develop a counter-terrorism medicine (CTM) mitigation, preparedness, response, and recovery plan.

**Method:** This descriptive observational study draws data from the Global Terrorism Database (GTD) from January 1, 1970, to December 31, 2020. Epidemiology outcomes included primary weapon type, primary target type, the country where the incident occurred, and the number of total deaths and injuries collected. Data from 2021 was not yet available at the time of this study. Results were exported into an Excel spreadsheet (Microsoft Corp.; Redmond, Washington USA) for analysis.

**Results:** There were 779 terrorism-related events in East Asia from 1970 to 2020. In total, the attacks resulted in 1,123 deaths and 9,061 persons injured. The greatest number of attacks (371; 47.63%) occurred in Japan and the second most occurred in China (268; 34.4%). Explosives were the most used primary weapon type (308; 39.54%) in the region, followed by incendiary devices (260; 33.38%). Terrorist attacks drastically diminished from their peak of 92 in 1990, but there were additional peaks of 88 in 1996, 18 in 2000, 20 in 2008, and 36 attacks in 2014.

**Conclusion:** A total of 779 terrorist attacks occurred from 1970 to 2020 in East Asia, resulting in 1,123 deaths and 9,061 injuries. Of those, 82.03% of attacks occurred in Japan and China. Terrorist attacks drastically diminished since their peak in 1996, but there is an overall uptrend in attacks since 1999.

*Prehosp. Disaster Med.* 2023;38(Suppl. S1):s5  
doi:10.1017/S1049023X23000614

**IBERO Protocol: A Multi-agency Coordination Framework for the Tactical Emergency Casualty Care Spanish System**

*Beatriz Gutiérrez PhD<sup>1,2</sup>, Isidoro Aguayo<sup>3,2</sup>, Belén García<sup>4,2</sup>*

1. Universidad Europea de Madrid, Villaviciosa de Odón, Spain
2. Subsecretaría de Sanidad Táctica, SEMES, Madrid, Spain
3. Ertzaintza, Bilbao, Spain
4. Cuerpo Nacional de Policía, Ávila, Spain

**Introduction:** Despite Spanish experience in counterterrorism, jihadism means new modus operandi, based on active mass casualty incidents, involving new injury patterns as mass bleeding ones. Therefore, the environment is completely different to first responders' structure. This change forced the revision of the tactical response model, led by the Spanish Association for Emergency Medicine's Tactical Care Secretary, who provides



a discussion forum to its members, reaching a joint framework document, IBERO, adapted to Spanish tactical emergency capabilities.

**Method:** Methodology was based on three parameters:

1) Literature revision, selecting three sources: Books and academic papers, TCCC and TECC guidelines, and Hartford Consensus, and AARs from the main active incidents with similarities to jihadist ones.

2) Formation of discussion groups: Threat definition, tactile response, and prehospital care, triage and evacuation systems.

3) A final group formed by representatives of each discussion group wrote the final document.

**Results:** The protocol defines a staged plan of action, adapted to Spanish legislation and institutions, following the acronym IBERO:

1) Information: threat intelligence and information transmitted to responders from the incident location and dispatchers.

2) Block the threat by perimeter, zonification and suppression of the threat.

3) Escalation of resources. Definition of areas of action according to direct threat, indirect threat and safe areas of action.

4) Response and Rescue. Extrication to safe areas, including different stages of triage and protection against secondary attacks.

5) Order and evacuation. Access to other emergency services, and psychological first aid.

**Conclusion:** The document proves the need for a coordinating framework of the Spanish emergency system to be fully adapted to these new threats. The discussion groups have identified the need for regular training on threat identification, zonification setting, mass bleeding control, extrication, and evacuation techniques during hostile situations. To achieve this goal, realistic training is mandatory.

*Prehosp. Disaster Med.* 2023;38(Suppl. S1):s5–s6

doi:10.1017/S1049023X23000626

### Injury Outcomes of the 2017 Charlottesville TARMAC Attack

James Phillips MD<sup>1</sup>, Jeffrey Young MD<sup>2</sup>, William Brady MD<sup>2</sup>

1. George Washington University, Washington, USA

2. University of Virginia, Charlottesville, USA

**Introduction:** Targeted Automobile Ramming Mass Casualty attacks (TARMAC) have occurred worldwide since 2010. The dramatic increase in incidence warrants special attention to the unique pattern of injury associated with such attacks as they are unlike any other type of intentional trauma. This study characterizes the resulting injuries from the 2017 Charlottesville, Virginia TARMAC attack.

**Method:** Patient records of victims were identified and analyzed for injuries, demographics, and surgical needs. The data were evaluated for patterns.

**Results:** Nineteen TARMAC victims were treated in the UVAHS Emergency Department. Most were female (68%). Average age was 29.4 years (range 13 – 72 years). Data showed seven ICU admissions, four standard admissions, and seven discharges. There was one fatality and the specific injury data was

unavailable. Most injuries were orthopedic: lower extremity fractures (n=7) [2 open], upper extremity fractures (n=7), axial skeleton fractures (n=6), and a facial fracture (n=1). Arterial injuries required interventional radiology (n=1) or observation (n=2). Organ injuries included a Grade 1 spleen laceration (n=1) and pneumomediastinum (n=1). Six victims required one or more operative interventions during admission: emergent procedures (n=6) and delayed procedures (n=4). In the Emergency Department, two bony reductions were performed, five lacerations were repaired, and one thoracotomy was performed. Injury Severity Scores were calculated (mean=11.5; median 6; range 1–75).

**Conclusion:** Due to the mechanism of injury, TARMAC attacks inflict a unique wounding pattern. Intentional mass blunt trauma is previously unknown to emergency medicine. Vehicle variables including weight, speed, and bumper height affect the injury location and severity. This vehicle, a low-height sports car, inflicted primarily lower extremity injuries. Mortality rates have been higher in attacks involving taller, heavier vehicles, as seen in France, Germany, and Sweden. Analysis of victim data from TARMAC attacks will help emergency medicine physicians, surgeons, and disaster medicine specialists to prepare, train, and mitigate against this increasingly frequent tactic.

*Prehosp. Disaster Med.* 2023;38(Suppl. S1):s6

doi:10.1017/S1049023X23000638

### Democratization of Terrorism: An Analysis of Vehicle-based Terrorist Events

Ryan Houser MHA, MPH, MS, EMPS, NRAEMT

George Mason University, Arlington, USA. Kings College London, London, United Kingdom

**Introduction:** The COVID-19 pandemic inspired social changes that promote outdoor activities including eating at restaurants, which may linger in a world hyperfocused on disease transmission prevention, increasing the vulnerabilities to vehicle-based terrorism. Vehicle ramming attacks started to transition from a relatively rare method of attack to one of the most lethal forms of terrorism prior to the emergence of COVID-19.

**Method:** This study aims to provide a historical analysis of the terrorism-based attacks using vehicles between 1970 and 2019 by retrospectively searching the Global Terrorism Database for terror events that used a vehicle as a means of attack—a methodology suggested by Tin et al.

**Results:** 257 recorded terror attacks involved some type of vehicle between 1970 and 2019. The attacks resulted in 808 fatalities and 1715 injuries when excluding the September 11 attacks. 76 events occurred in the West Bank and Gaza Strip, 25 in the USA, 16 in Israel, and 14 in the UK. Of the 257 terror incidents, 71% (183) occurred within the last 6-year span of inquiry.

**Conclusion:** By 2016, vehicle attacks were the most lethal form of attack comprising just over half of all terrorism-related deaths in that year. Large gatherings such as festivals, sporting events, and now outdoor seating at restaurants, leave a number of people highly vulnerable to vehicle ramming attacks depending on established countermeasures. The increased prevalence of