

Characteristics of Prehospital Response to Terrorism: A Systematic Literature Review

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Abstract

Background: Terrorism is increasingly the aetiology of mass casualty incidents. Improved prehospital response capability targeted to the unique characteristics of high threat incidents is an area of urgent focus. Gaps in current knowledge coupled with inconsistent reporting and difficulties in accessing data create less than optimal conditions for capability enhancement.

Methods: A systematic literature review was conducted to describe the characteristics of prehospital response to terrorism from 2011 to 2017. Papers were included if they described a prehospital response to a terrorist incident, if they were in English or translatable to English and full text was available.

Results: 6115 records were located in the initial search of grey and published literature with 71 retrieved for full text after screening of title and abstract. 23 papers were included in the final analysis, describing 6 separate terrorist attacks. The majority of literature was published by physicians, all were from Western countries with advanced Emergency Medical Services (EMS) and a standard reporting template was not identified. The level of evidence was low to very low. Themes of tactical triage, coordinated activation and response, use of damage control resuscitation and tactical casualty care were common throughout the papers.

Conclusions: The paucity of high-level evidence and systematic reporting of lessons learned in the prehospital terrorism response field requires a renewed push for access to data and the establishment of reporting systems that are inclusive of all responders.

Keywords: Terrorism, Pre-hospital, Response, Tactical Emergency Casualty Care, Tactical Combat Casualty Care

Background

Unique characteristics of responding to terror attacks

The Global Database on Terrorism has reported a significant worldwide increase in terrorist attacks and related deaths and injuries since 2011 (Figure 1). (START, 2017) While the overwhelming majority of attacks have occurred in countries without any established or coordinated EMS, the lessons learned from response to such events could be of great benefit to medical and prehospital professionals to build high threat response capacity.

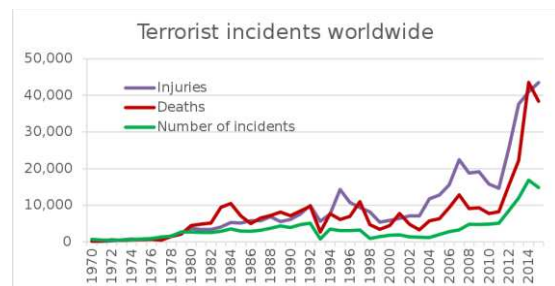


Figure 1: Terrorism incidents, deaths and injuries 1970-2015(START, 2017)

The benefits of self-analysis and reporting of the prehospital response to terrorist events include the ability to provide directed guidance to improve capacity and capability for future threats. Without the information that comes through After Action Reports (AAR), case reports and published literature on terrorism response the ability for EMS to appropriately improve and evolve is limited. This systematic review establishes the current baseline of recent open source literature available to EMS.

This systematic review purposefully focuses on the prehospital response to acts of terror. There are a large number of dynamic and hostile mass casualty events that fall outside of this definition, such as the 2017 Las Vegas shooting and the 2017 Bourke Street hostile vehicle attack in Melbourne. There are thorough AAR's, such as the report from the Aurora 'Batman' Theatre attack (*Aurora Century 16 Theatre Shooting: After Action Report for the City of Aurora*, 2014) and a 2017 systematic literature review on civilian public mass shootings (Turner, Lockey, & Rehn, 2016) that describe in detail the prehospital response to non-terrorist active violence incidents (AVI). It is the unique characteristics of terrorism and its medical response that narrows the focus of this review.

Terror attacks are events that necessitate a complex prehospital response, regardless of scale. Data on 160 AVI's in the United States describe short timeframe's to resolution (5 minutes or less in 69.8% of incidents where timeframes could be ascertained) and high rates of suicide (40%) by the offender. (*A Study of Active Shooter Incidents in the United States between 2000 and 2013*, 2013) Terror attacks differ from this in the mindset of the attackers, as their intent is to carry out maximum carnage and gain as much exposure to media as possible, thereby creating longer timeframes to resolution.

Australian Federal and State Governments are acutely aware of the unique characteristics of terrorist attacks and have made legislative change to ensure a swift and decisive law enforcement response to decrease casualties. Previous 'Contain and Negotiate' paradigms have shifted to 'Shoot to Kill' once the incident has been defined as a terrorist attack. (Parliament, 2017)

A knife attack by an individual such as the murder of drummer Lee Rigby in London in 2015 is no more medically complex for

prehospital clinician's than a stabbing at a weekend party. The complexity that arises in cases of terrorism involves the inherent mentality of using violence to promote a cause or message. By virtue of this, the response to an act of terrorism should always be predicated on the possibility of a dynamic, unsafe scene and secondary attacks on first responders, bystanders and victims.

The unique terror related characteristics of dynamic, dangerous scenes and potential for longer and more complicated responses require effective analysis of previous attacks to enable and inform the improvement of emergency medical response.

Knowledge and Data Gaps

Callaway recently identified a number of capability gaps in the provision of high threat care, the first of these being a data gap. (Callaway, 2018) Unless coordinated effort is instigated to ensure availability of quality data for research the ability to learn from experience is limited.

The Joint Theatre Trauma Registry (JTTR) has been extremely effective in collating medical data from battlefield casualties and translating the data into academic output. The large number of seminal studies that have come out of the JTTR have influenced and directed policy, training and equipping of Western militaries in particular through the guidelines of the Committee of Tactical Casualty Care (CoTCCC). (Eastridge et al., 2012) This influence has spilled into the civilian sector, with initial take-up by tactical police teams and tactical paramedics. There is, however, no similar system to analyse the trends and data from civilian terrorism incidents and other dynamic active violence events. A proposal to correct this in the United States with a National Trauma Registry has not seen significant progress. (Berwick, Downey, & Cornett, 2016)

Reviews of the literature, particularly when they are able to utilise a robust collection of data, are able to impart a significant effect on policy and practice. An example of the bridging of a data gap with reviews is the use of tourniquets, previously a taboo in civilian prehospital trauma response. The development of Tactical Combat Casualty Care (TCCC) saw them come back into widespread use in Iraq and Afghanistan, and retrospective reviews tapped into the wealth of data in the JTTR to ratify their lifesaving efficacy and low rate of complications.(Shackelford et al., 2014) Despite no evidence in the civilian specific environment, the push for wide spread use of tourniquets has been strong and backed by organisations such as the American College of Surgeons.(Bulger et al., 2014) A 2018 systematic review of civilian tourniquet use found that there is still huge inconsistency in reporting, poor standardisation of outcomes and low quality of research evidence.(Kauvar, Dubick, Walters, & Kragh Jr, 2018) The translation of battlefield data to civilian settings requires renewed enthusiasm for research in high threat response and a collaborative approach to data collection.

A knowledge gap currently exists in the unique setting of civilian intentional mass violence incidents. There is growing evidence that wound profiles may differ substantially in this setting from those documented in battlefield environments, with lower rates of preventable extremity haemorrhage and higher rates of torso and head injuries.(Sarani et al., 2018; Edward Reed Smith, Shapiro, & Sarani, 2016; E Reed Smith, Shapiro, & Sarani, 2018) This follows the logic that civilian victims of terrorist incidents are not wearing ballistic protection, taking up cover and firing positions or returning fire. Civilian populations also differ from the military in their population characteristics of paediatrics, geriatrics, anti-coagulant therapy and significant co-morbidities, all of which contribute to the need for an altered

approach in the medical prehospital response to AVI's.

The burden of repeated AVI's in the United States has pushed forward the establishment of civilian organisations such as the Hartford Consensus, Stop the Bleed Campaign and the Committee for Tactical Emergency Casualty Care (C-TECC), all of which are attempting to bridge data and knowledge gaps and advocate for greater capability to treat the victims of AVI's expediently. The United Kingdom (UK) has utilised some of the principles outlined by C-TECC and fused them with local considerations to implement a range of national and local strategies under the umbrella of Tactical Medical Operations (TMO) and Marauding Terrorist Firearms Attack (MTFA) response.(Chauhan, Conti, & Keene, 2018; Graham, 2018; Hooper, 2016)

Objectives

In light of the knowledge and data gaps in civilian prehospital response to terrorist attacks, what is the availability of reporting and analysis of injury profiles, response paradigms and lessons identified?

This systematic literature review also sets out to establish a baseline of the published literature in peer reviewed journals and government reports. The baseline allows for analysis of current gaps and trends in the publication of open access materials for EMS programs to use.

Methods

Search Strategy

The systematic literature review was conducted in line with the principles of the statement on Preferred Reporting Items for Systematic Reviews and Systematic Analyses (PRISMA).(Moher, Liberati, Tetzlaff, & Altman, 2009)

PRISMA principles ensure consistency in reporting and while designed for the systematic review of randomised trials,

they are equally applicable for qualitative research and its assimilation through systematic reviews.

The search strategy interrogated the MEDLINE, MEDLINE In-process, Cochrane, EMBASE, CINAHL and Google Scholar databases for Medical Subject Headings (MeSH) and keywords:

(terror* OR attack OR bombing OR mass casualty incident OR explosion OR shooting OR aggressive deadly behaviour OR hybrid targeted violence OR complex attack OR multi modal attack) AND (emergency medical services OR ambulance OR prehospital OR medical response OR health response)

The same search string was used in the Google search engine and the first 1000 results scanned for relevance.

For the terror attacks that were identified as appearing regularly through the initial database search, the following search string was used:

(Event and terror*) and (emergency medical services or prehospital or medical or health or response)



PRISMA 2009 Flow Diagram

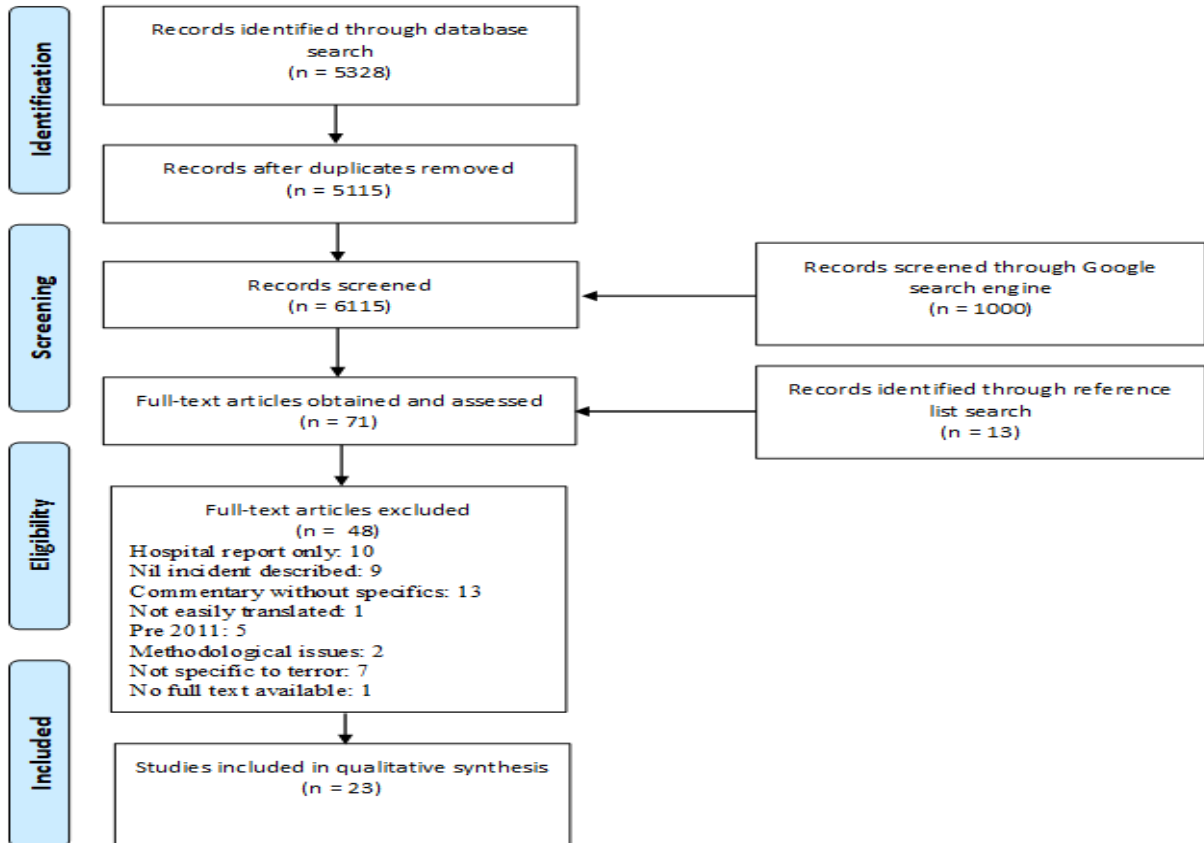


Figure 2: PRISMA Flow Diagram.

Eligibility Criteria

Papers that were published between 2011 to 2017 and described or discussed the prehospital response to a terrorist attack, as defined by the National Consortium for the Study of Terrorism and Responses to Terrorism's (START) Global Terrorism Database(START, 2017), were included. Figure 3 lists the inclusion and exclusion criteria utilised. Papers in languages other than English were translated through the online Google Translate multilingual machine translation service. If they were not able to be translated through this service papers were excluded.

All titles and abstracts of papers found in the search process were screened for inclusion and the final full text was obtained for manuscripts. Full text papers were read in full and reference lists were screened for further relevant papers.

The last search was conducted on 30 May 2017.

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> - Published between 2011 – 2017 - Subject of study is the prehospital medical response to an act of terrorism in the same time period. 	<ul style="list-style-type: none"> - Identified methodological or analytical flaws. - Full text not available. - Not in English or not easily translatable to English language. - Subject of study on the hospital medical response only.

Figure 3. Inclusion/Exclusion Criteria

Data Extraction

A data extraction tool was created using DeBacker et al., *Utstein Style Template for Uniform Reporting of Acute Medical Response in Disasters*.(Debacker et al., 2012)

Each of the 23 papers were read and qualitative and quantitative data assigned from them into the following *Utstein Style Template* prehospital headings:

1. Event Notification	5. Onsite Medical Care	9. Deactivation of DMMP
2. Activation of Disaster Medical Management Plan(DMMP)	6. Scene Casualty Clearance	10. Continuity of Care
3. Disaster Med Ops Coordination	7. Distribution of Survivors	11. Mortality
4. Onsite Triage	8. Responder Health & Safety	12. Injuries & Injury Profile

Figure 4. Data Extraction Elements

The use of the template allowed for the identification of themes as well as the recognition of completeness or otherwise of the data presented in each paper. A previous systematic review found that no universal template is being used for the reporting on prehospital medical management during major incidents.(Fattah, Rehn, Reierth, & Wisborg, 2013) None of the reporting templates assessed had undergone external validation.(Fattah et al., 2013) In the vacuum of a standard approach the 'Utstein Style Template' was chosen as it is specific to disaster medical response and identified in its dataset common themes relevant to terrorist incidents such as triage, disaster plan, onsite medical care and injury profiles.

Quality appraisal was conducted on each paper and assigned a relevant level of evidence (Figure 5). Each paper was also assessed against a pre-conceived checklist for biases, imprecision and methodological flaws. The checklist consisted of the following data elements:

- Type of study
- Risk of bias
- Publication bias

- Imprecision
- Inconsistency
- Indirectness
- Methodological flaws

Two papers were excluded for methodological flaws. Imprecision, inconsistency and indirectness was very rare; however, some level of bias was almost universal with the most common being the publication of papers in a short timeframe after the event occurred, giving the appearance of 'rushing' the reporting through while focus was still on the terror attack in the public consciousness.

Summary of Evidence

The Joana Briggs Institute 'New JBI Levels of Evidence and Grades of Recommendation' were used to assign each of the papers to a category to indicate it's strength of the evidence.(JBI, 2014) The 'JBI Levels' were chosen as a guide for evidence levels as they align with the pragmatic philosophies of meta-aggregation: the analysis of qualitative themes to recommend 'lines of action' as an outcome of research.(Hannes & Lockwood, 2011)

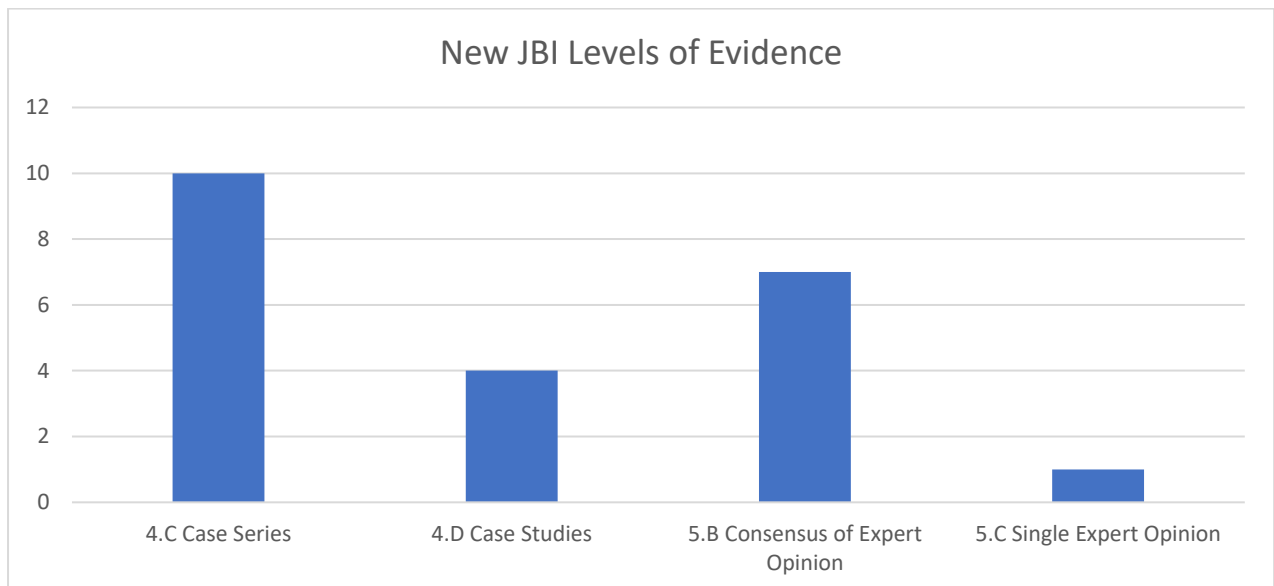


Figure 5. Levels of Evidence

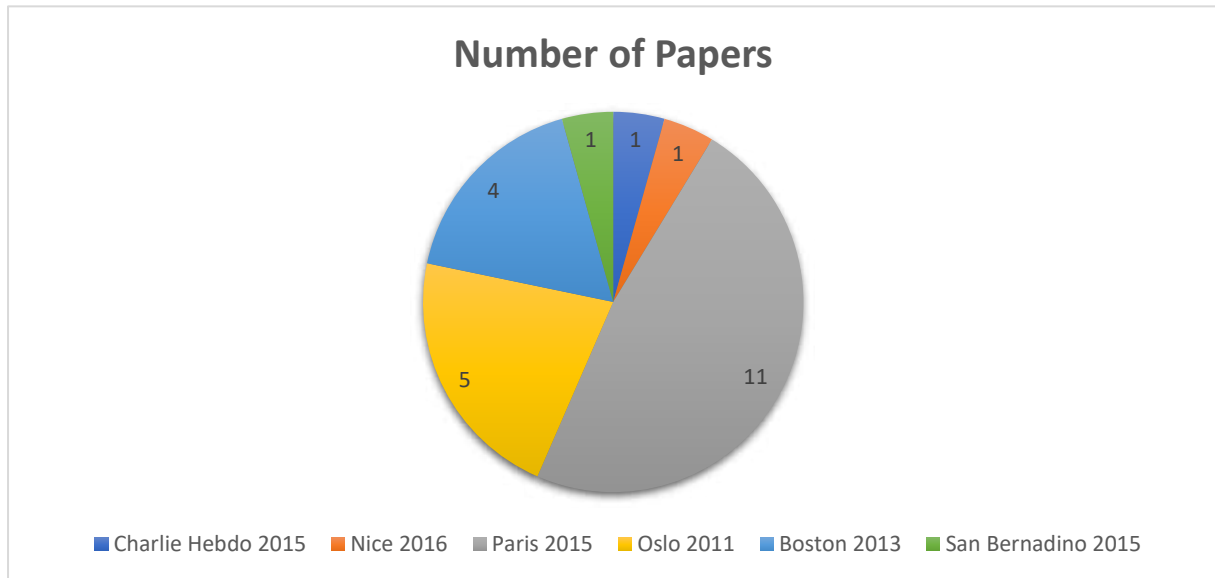


Figure 6. Incidents described in sourced literature

Results

The literature review obtained 23 papers which described the prehospital response to 6 separate terrorist attacks from 2011-2016. Figure 6 displays the attacks described in the literature sourced, with the November 2015 Paris terror attacks represented the most with 11/23 (48%) papers.

3 of the incidents were coordinated strikes using a variety of attack modalities, defined as complex, coordinated terror attacks (CCTA). In total 17/23 (74%) of the papers sourced described the response to CCTAs.

5/23 (22%) were reports or papers from the United States, with 18/23 (78%) from Europe. Of the European papers only 5/23 are left if the 2015 Paris series are removed.

A significant proportion of the papers located through the search are from countries with physician led EMS. Only 2/24 (9%) papers were written by non-physician prehospital responders.

Oslo/Utøya Island 2011

The medical response to the coordinated attacks by Andres Brevik in Norway was

analysed with 5 papers found during the literature search. 3 of these involved the same author and described incident command, decision making and prehospital response(Rimstad, Njå, Rake, & Braut, 2014; Rimstad & Sollid, 2015; Sollid et al., 2012), 1 was a comprehensive government review of all medical aspects(DoH, 2012) and the last was a report by the Swedish disaster medicine study organisation Kamedo.(Englund, Michel, Riddez, & Örténwall, 2012) Major themes were:

- The need for a 'warm zone' EMS capability
- Most of the critical decision making is made early, with incomplete information and by EMS commanders on scene
- Information technology systems were overwhelmed, and traditional means of communication were required within minutes of incident onset
- National major incident activation and coordination of EMS and medical resources is critical

- The need for a standard triage system

Boston 2013

Four papers were located from the 2013 Boston Marathon bombings, 2 government reports and 2 peer reviewed published papers. One paper described the use of improvised tourniquets by responders and had a thorough description of injuries and

prehospital treatment considerations. (King, Larentzakis, Ramly, & Boston Trauma, 2015) The remaining 3 looked at the overall response, 1 focusing on the hospital system with brief mentions of the prehospital response, 1 on the overall response and the last outlined the preparedness measures that contributed to the success of the response. (Boston, 2014; FEMA, 2013; Gates et al., 2014)

Data Extraction Element:	1	2	3	4	5	6	7	8	9	10	11	12
Carles <i>et al</i> ²¹	x	x				x	x				x	x
Carli, Nahon & Telion ²²		x				x						
Service médical du RAID ²³			x	x	x			x			x	
Hirsch <i>et al</i> ²⁴	x	x	x		x					x	x	x
Nahon <i>et al</i> ²⁵		x	x	x		x	x		x			
Service médical du RAID ²⁶	x		x	x	x	x						x
Frattini <i>et al</i> ²⁷			x	x	x			x				
Braun <i>et al</i> ²⁸	x	x	x						x	x		
Jost <i>et al</i> ²⁹	x	x	x	x	x	x		x				
Chollet-Xemard <i>et al</i> ³⁰					x							
Franchin <i>et al</i> ³¹			x	x	x	x		x			x	
Philippe <i>et al</i> ³²	x	x	x								x	
Service médical du RAID ³³	x	x	x	x	x	x	x					x
Rimstad <i>et al</i> ³⁴	x	x	x			x	x	x				
Rimstad & Solli ³⁵			x			x	x				x	
Sollid <i>et al</i> ³⁶	x	x	x	x	x	x	x	x	x		x	x
Kamedo ³⁷	x	x	x	x	x	x	x			x	x	x
Norwegian directorate of health ³⁸	x	x	x	x	x	x	x	x	x		x	x
Braziel <i>et al</i> ³⁹	x	x	x	x	x		x	x				
King, Larentzakis & Ramly ⁴⁰					x							
Gates <i>et al</i> ⁴¹		x	x	x	x	x	x	x			x	x
Trauma Centre Chief's Collaborative ⁴²		x	x	x	x		x			x	x	x
FEMA ⁴³		x	x									

Figure 7. Data Element Mapping.

Charlie Hebdo 2015

One paper in the systematic review was focused on the prehospital response to the Hypercacher supermarket siege resolution at Port De Vincennes in January 2015. (RAID, 2015b) Written by the responding tactical police unit Research,

Assistance, Interference, Deterrence (RAID), a unit which has embedded physicians to provide hot and warm zone medical care. The paper is a case series of the 6 patients injured during the

emergency action, and highlighted the importance of:

- Maintaining a single point of contact for police-EMS liaison
- Maintaining zoning of care to the level of threat
- Rapid triage and transport of patients with the implementation of prehospital damage control resuscitation (DCR).

Paris 2015

Eleven papers were located reporting on the November 2015 coordinated terror attack in Paris. 6/11 were published in a January 2016 Special edition of *Annales Françaises de Médecine d'urgence*. (Braun et al., 2016; Chollet-Xémard et al., 2016; Franchin et al., 2016; Frattini et al., 2016; Nahon, Poirot, Marx, Lejay, Tartière, Chastre, Fuilla, Pelloux, Vivien, & Telion,

San Bernardino 2015

The single paper sourced from the San Bernardino terror attacks perpetrated by Syed Farook and Tashfeen Malik in December 2015 was a government report undertaken by the Department of Justice that summarised internal AAR's and 3 site visits with interviews of responders and commanders. (Braziel et al., 2016) The 142-page report has less than 3 pages dedicated to the medical response. With 14 killed and 24 wounded in the attack the medical response is a considerable element of the overall response paradigm. Recommendations included increased medical training for law enforcement responders and high fidelity, reality-based training to prepare medical providers in high threat incidents.

2016; RAID, 2016a) The other 5 were editorials and viewpoint articles published during 2016. (Carli et al., 2016; Hirsch et al., 2015; Jost et al., 2016; J.-M. Philippe et al., 2016; RAID, 2016b) Common themes throughout the papers were:

- Activation of 'Plan Blanc' and 'Plan Camembert' for overall control of resources, preventing overcommitment to any one site, maintenance of a substantial reserve for further attacks and effective distribution of victims to appropriate hospitals
- The use of prehospital DCR and principles of tactical casualty care, particularly around zoning of care to the level of threat
- The use of simplified 'tactical' triage

Nice 2016

A number of hospital-based papers were published in the aftermath of the 2016 Bastille Day hostile vehicle terror attack, however only 1 described elements of the prehospital response. (Carles et al., 2016) This paper was predominantly focused on the hospital response; however, it outlines casualty clearance from the scene and the distribution to emergency departments. This paper was a 'correspondence' published in *The Lancet* and did not disclose sources of the statistics on prehospital transport. It was highlighted that many of the initial patients were taken to hospital in private cars, the next wave was taken to the nearest hospitals by the first ambulances on scene and then a triage system was established with an effective (only 3% secondary transfers) patient distribution.

Discussion

In the period of 2011 to 2017 that the attacks documented here occurred, there were 70,706 terror attacks carried out worldwide. ("Global Terrorism Database," 2016) Of all these attacks only 23 reports on the prehospital response were able to be found in this study. The lost opportunity that this represents is profound, with the potential for many more of these incidents to have response analysis and feedback for the international EMS community. Only 1 paper was excluded as it couldn't be translated and 1 other due to full text not being available, highlighting that there is not a wealth of literature in other areas that couldn't be accessed due to language or locality. With an overwhelming majority of these attacks occurring in developing countries (START, 2017), there is likely to be a lack of established, coordinated EMS response to report upon in the first place.

The confidential nature of counter terrorism and terrorism response has potentially limited the access to internal AAR's and other government or organisational reports, as many are held as internal documents or given security levels that prevent their public dissemination. With an unknown amount of data in this space it is impossible to know just how much more reporting is happening internally without information sharing spreading the lessons learned. Whilst the sensitive nature of response paradigms is clear, more effort is required to deliver retrospective analysis by responding agencies into the public domain. The majority of the published literature was physician led. This has a distorting effect on the results of the literature review as the majority of EMS in Australia, the UK and

- Communication
- Systematic activation
- Triage
- Tactical casualty care

North America are Paramedic led. It is logical that during their training physicians develop a good working knowledge of research and knowledge transfer and therefore take the lead on conducting both research and reporting.

A large number of papers were excluded by abstract and full text screening were solely hospital-based reports on terror incident response. The familiarity with publishing that physicians hold is likely an explanation for this factor also, highlighting the need for research education to be integrated into the training of all EMS.

The most comprehensive reviews of prehospital response were government based AAR's. Typically, these reports covered the entire spectrum of response and were particularly detailed, with the extensive use of primary sources to gather data.

Most of the papers (74%) described the response to CCTAs, suggesting that the higher end of response complexity stimulates more self-analysis and impetus to share lessons with the international community.

The objectives of this review were to establish a baseline for literature on prehospital terrorism response and assess the availability of reporting on terror attacks. While literature is scarce and evidence levels were low, the baseline is shown through the 23 identified papers. The most persistent themes throughout this baseline of reporting around response paradigms, lessons identified and the injury profiles were:

The overall low level of evidence of the papers collected by this review aligns with previous description of disaster reporting, particularly in the acute phase. (Birnbaum, Adibhatla, Dudek, & Ramsel-Miller, 2017;

E. Smith, Wasiak, Sen, Archer, & Burkle, 2009; Stratton, 2014)

The unpredictable nature of disaster events and the inability to provide control measures or randomisation in interventions used in the medical response means that high quality evidence is very difficult to obtain. Consistent with this Figure 5 displays each paper's assigned evidence level, with no higher than 4.C. All papers were either case series, case studies, expert opinion consensus or single expert opinion, falling into the categories of low and very low levels of evidence.

Gerdin et al., (Gerdin et al., 2014) made the case that we shouldn't accept the paucity of high level research in acute health disaster settings, and instead advocate for the use of systematic review's to achieve two aims:

- Collation and analysis of existing evidence to improve access and aid decision making.
- Identify knowledge gaps and areas for focus of future research.

This systematic review identifies a very low level of evidence in the published and grey literature, however the collation and analysis of these papers allows for improved access to information and highlights the need for future research.

The disaster health and prehospital fields are well known for difficulties in sourcing rigorous evidence on which to base practice. The dynamic, unpredictable and non-linear nature of terrorism response means that innovative approaches to research are required, with acceptance of potentially lower evidence levels. As Vu *et al* stated in making recommendations for Tranexamic Acid use in combat and tactical settings; that in the absence of definitive,

robust studies there is a need for "...the art of balancing what evidence there is with a mixture of basic science and opinion, contextualized by gradients of biological plausibility, and tempered by consensus of experts in the field."(Vu, Wan, Yeung, & Callaway, 2018)

Limitations

This review is by design limited to terror related incidents. This focus excludes non-terrorism related active shooter incidents, civilian public mass shootings and bombings from the same time period. The exclusion of this data may limit some conclusions. The level of evidence obtained through the systematic review was consistently low, hampering the viability of results.

Conclusions

Analysis and implementation of lessons learned from terror attacks is limited by the lack of quality data and widespread reporting by prehospital responders. Triage, communication, systematic activation and the use of tactical casualty care principles were highlighted as common themes in the available literature. Physician led, advanced EMS are well represented in reporting, although no standardised templates are currently being used. There is urgent need for access to quality data, standards in reporting and further research in the field of prehospital terrorism response.

Conflict of Interest

No conflicts of interest pertain to any of the authors.

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References

- Aurora Century 16 Theatre Shooting: After Action Report for the City of Aurora.* (2014). Retrieved from http://www.policefoundation.org/wp-content/uploads/2016/08/Aurora-Century-16-Theater-Shooting_AAR.pdf
- Berwick, D. M., Downey, A. S., & Cornett, E. A. (2016). A national trauma care system to achieve zero preventable deaths after injury: recommendations from a national academies of sciences, engineering, and medicine report. *Jama*, *316*(9), 927-928.
- Birnbaum, M. L., Adibhatla, S., Dudek, O., & Ramsel-Miller, J. (2017). Categorization and analysis of disaster health publications: an inventory. *Prehospital and Disaster Medicine*, *32*(5), 473-482.
- Boston, T. C. C. C. (2014). Boston marathon bombings: an after-action review. *The journal of trauma and acute care surgery*, *77*(3), 501.
- Braun, F., Ammirati, C., Auchères, G., Duché-Taillez, M., Goldstein, P., Jenvrin, J., . . . Roy, H. (2016). Retour d'expérience des attentats du 13 novembre 2015. Organisation des renforts par les Samu de province. *Annales françaises de médecine d'urgence*, *6*(1), 62-69.
- Braziel, R., Straub, F., Watson, G., & Hoops, R. (2016). *Bringing Calm to Chaos: A Critical Incident Review of the San Bernardino Public Safety Response to the December 2, 2015, Terrorist Shooting Incident at the Inland Regional Center*. Paper presented at the United States. Department of Justice. Office of Community Oriented Policing Services.
- Bulger, E. M., Snyder, D., Schoelles, K., Gotschall, C., Dawson, D., Lang, E., . . . Taillac, P. (2014). An evidence-based prehospital guideline for external hemorrhage control: American College of Surgeons Committee on Trauma. *Prehospital Emergency Care*, *18*(2), 163-173.
- Callaway, D. W. (2018). A review of the landscape: challenges and gaps in trauma response to civilian high threat mass casualty incidents. *Journal of trauma and acute care surgery*, *84*(6S), S21-S27.
- Carles, M., Levraut, J., Gonzalez, J. F., Valli, F., & Bornard, L. (2016). Mass casualty events and health organisation: terrorist attack in Nice. *The Lancet*, *388*(10058), 2349-2350.
- Carli, P., Nahon, M., & Télion, C. (2016). Attentats avec sites multiples—la stratégie du «camembert à Paris». *Journal Européen des Urgences et de Réanimation*, *28*(2-3), 109-111.
- Chauhan, R., Conti, B. M., & Keene, D. (2018). Marauding terrorist attack (MTA): prehospital considerations. *Emerg Med J*, *35*(6), 389-395.
- Chollet-Xémard, C., Lescot, T., Maggi, V., Nion, N., Raux, M., Pease, S., . . . Waldeck, O. (2016). Retour d'expérience des attentats du 13 novembre 2015: innovations. *Annales françaises de médecine d'urgence*, *6*(1), 70-73.
- Debacker, M., Hubloue, I., Dhondt, E., Rockenschaub, G., Rüter, A., Codreanu, T., . . . Halpern, P. (2012). Utstein-style template for uniform data reporting of acute medical response in disasters. *PLoS currents*, *4*.
- DoH. (2012). *Learning for Better Emergency Preparedness. The Medical Response to the Terrorist Incidents of 22 July 2011*. Norwegian Directorate of Health Oslo.
- Eastridge, B. J., Mabry, R. L., Seguin, P., Cantrell, J., Tops, T., Uribe, P., . . . Rasmussen, T. E. (2012). Death on the battlefield (2001–2011): implications for the future of combat casualty care. *Journal of trauma and acute care surgery*, *73*(6), S431-S437.
- Englund, L., Michel, P.-O., Riddez, L., & Örténwall, P. (2012). The bomb attack in Oslo and the shootings at Utøya, 2011:—Kamedo Report No. 97. In: Socialstyrelsen.
- Fattah, S., Rehn, M., Reierth, E., & Wisborg, T. (2013). Systematic literature review of templates for reporting prehospital major incident medical management. *BMJ Open*, *3*(8). doi:10.1136/bmjopen-2013-002658
- FEMA. (2013). Boston Marathon Bombings: Positive Effects of Planning and Preparedness on Response. Retrieved from

<https://emilms.fema.gov/IS0235c/assets/BostonMarathonBombingsPositiveEffectsOfPreparedness.pdf>

- Franchin, M., Frattini, B., Briche, F., Travers, S., Bignand, M., & Tourtier, J.-P. (2016). Feedback on Terrorist Attacks on November 13, 2015. First Aid Response and Interactions with Medical Teams. *Annales Francaises De Medecine D Urgence*, 6(1), 9-12.
- Frattini, B., Boizat, S., Travers, S., Bignand, M., & Tourtier, J.-P. (2016). Feedback on Terrorist Attacks on November 13, 2015. Prehospital Medical Care. *Annales Francaises De Medecine D Urgence*, 6(1), 13-15.
- Gates, J. D., Arabian, S., Biddinger, P., Blansfield, J., Burke, P., Chung, S., . . . Yaffe, M. B. (2014). The Initial Response to the Boston Marathon Bombing Lessons Learned to Prepare for the Next Disaster. *Annals of Surgery*, 260(6), 960-966. doi:10.1097/sla.0000000000000914
- Gerdin, M., Clarke, M., Allen, C., Kayabu, B., Summerskill, W., Devane, D., . . . Zachariah, R. (2014). Optimal evidence in difficult settings: improving health interventions and decision making in disasters. *PLoS medicine*, 11(4), e1001632.
- Global Terrorism Database. (2016). from National Consortium for the Study of Terrorism and Responses to Terrorism(START) <https://www.start.umd.edu/gtd>
- Graham, D. (2018). Marauding Terrorist Firearms' Attacks: A Practitioner's View of the UK's Emergency Service Initial Response Arrangements to Deal with an Active Shooter. *The RUSI Journal*, 1-9.
- Hannes, K., & Lockwood, C. (2011). Pragmatism as the philosophical foundation for the Joanna Briggs meta-aggregative approach to qualitative evidence synthesis. *Journal of Advanced Nursing*, 67(7), 1632-1642.
- Hirsch, M., Carli, P., Nizard, R., Riou, B., Baroudjian, B., Baubet, T., . . . Hlth Professionals, A. (2015). The medical response to multisite terrorist attacks in Paris. *Lancet*, 386(10012), 2535-2538. doi:10.1016/s0140-6736(15)01063-6
- Hooper, C. (2016). Clinical care in the warm zone: a responder's perspective upon clinical practice in support of UK tactical medical operations. *Journal of Paramedic Practice*, 8(6), 282-288.
- JBI. (2014). Supporting Document for the Joanna Briggs Institute Levels of Evidence and Grades of Recommendation. *The Joanna Briggs Institute*. Retrieved from <http://joannabriggs.org/assets/docs/approach/Levels-of-Evidence-SupportingDocuments.pdf>
- Jost, D., Travers, S., Carli, P., & Tourtier, J.-P. (2016). Preparation, adaptation, civism, complementarity and cohesion. *Anaesthesia, critical care & pain medicine*, 35(1), 3.
- Kauvar, D. S., Dubick, M. A., Walters, T. J., & Kragh Jr, J. F. (2018). Systematic review of prehospital tourniquet use in civilian limb trauma. *Journal of trauma and acute care surgery*, 84(5), 819-825.
- King, D. R., Larentzakis, A., Ramly, E. P., & Boston Trauma, C. (2015). Tourniquet use at the Boston Marathon bombing: Lost in translation. *Journal of trauma and acute care surgery*, 78(3), 594-599. doi:10.1097/ta.0000000000000561
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine*, 151(4), 264-269.
- Nahon, M., Poirot, N., Marx, J., Lejay, M., Tartière, S., Chastre, C., . . . Telion, C. (2016). Feedback on terrorist attacks on November 13, 2015. The medical zonal regulation. *Annales Francaises De Medecine D Urgence*, 6(1), 16-21.
- Nahon, M., Poirot, N., Marx, J., Lejay, M., Tartière, S., Chastre, C., . . . Télion, C. (2016). Retour d'expérience des attentats du 13 novembre 2015. La régulation médicale zonale. *Annales françaises de médecine d'urgence*, 6(1), 16-21.
- Terrorism Legislation Amendment (Police Powers and Parole) Bill 2017, (2017).

- Philippe, J.-M., Brahic, O., Carli, P., Tourtier, J.-P., Riou, B., & Vallet, B. (2016). French Ministry of Health's response to Paris attacks of 13 November 2015. *Critical Care*, 20(1), 85.
- Philippe, J. M., Brahic, O., Carli, P., Tourtier, J. P., Riou, B., & Vallet, B. (2016). French Ministry of Health's response to Paris attacks of 13 November 2015. *Critical Care*, 20. doi:10.1186/s13054-016-1259-8
- RAID, S. M. d. (2015a). Médicalisation de l'extrême-avant au cours d'une intervention des forces de l'ordre pour prise d'otages: principes régissant la prise en charge médicale et retour d'expérience du RAID. *Annales françaises de médecine d'urgence*, 5(3), 166-175.
- RAID, S. M. d. (2015b). Tactical Emergency Care during Hostages' Crisis: Care Principles and Feedback. *Annales Francaises De Medecine D Urgence*, 5(3), 166-175. doi:10.1007/s13341-015-0545-4
- RAID, S. M. d. (2016a). Feedback on terrorist attacks on November 13, 2015. Bataclan's terrorist attack management by the tactical medical support of the French police. *Annales françaises de médecine d'urgence*, 6, 3-8.
- RAID, S. M. d. (2016b). Tactical emergency medicine: lessons from Paris marauding terrorist attack. *Critical care (London, England)*, 20(1), 37.
- Rimstad, R., Njå, O., Rake, E. L., & Braut, G. S. (2014). Incident command and information flows in a large-scale emergency operation. *Journal of Contingencies and Crisis Management*, 22(1), 29-38.
- Rimstad, R., & Sollid, S. J. M. (2015). A retrospective observational study of medical incident command and decision-making in the 2011 Oslo bombing. *International Journal of Emergency Medicine*, 8(1). doi:10.1186/s12245-015-0052-9
- Sarani, B., Hendrix, C., Matecki, M., Estroff, J., Amdur, R. L., Robinson, B. R., . . . Smith, E. R. (2018). Wounding patterns based on firearm type in civilian public mass shootings in the United States. *Journal of the American College of Surgeons*.
- Shackelford, S. A., Butler Jr, F. K., Kragh Jr, J. F., Stevens, R. A., Seery, J. M., Parsons, D. L., . . . Bailey, J. A. (2014). *Optimizing the use of limb tourniquets in tactical combat casualty care: TCCC guidelines change 14-02*. Retrieved from
- Smith, E., Wasiak, J., Sen, A., Archer, F., & Burkle, F. M. (2009). Three decades of disasters: a review of disaster-specific literature from 1977–2009. *Prehospital and Disaster Medicine*, 24(04), 306-311.
- Smith, E. R., Shapiro, G., & Sarani, B. (2016). The profile of wounding in civilian public mass shooting fatalities. *Journal of trauma and acute care surgery*, 81(1), 86-92.
- Smith, E. R., Shapiro, G., & Sarani, B. (2018). Fatal wounding pattern and causes of potentially preventable death following the pulse night club shooting event. *Prehospital Emergency Care*, 1-7.
- Sollid, S. J. M., Rimstad, R., Rehn, M., Nakstad, A. R., Tomlinson, A.-E., Strand, T., . . . Collaborating, G. (2012). Oslo government district bombing and Utoya island shooting July 22, 2011: The immediate prehospital emergency medical service response. *Scandinavian Journal of Trauma Resuscitation & Emergency Medicine*, 20. doi:10.1186/1757-7241-20-3
- START. (2017). Global Terrorism Database. Retrieved from <https://www.start.umd.edu/gtd>"
- Stratton, S. J. (2014). Is there a scientific basis for disaster health and medicine? *Prehospital and Disaster Medicine*, 29(3), 221.
- A Study of Active Shooter Incidents in the United States between 2000 and 2013*. (2013). Federal Bureau of Investigation Retrieved from <https://www.fbi.gov/file-repository/active-shooter-study-2000-2013-1.pdf/view>.
- Turner, C. D., Lockey, D. J., & Rehn, M. (2016). Pre-hospital management of mass casualty civilian shootings: a systematic literature review. *Critical Care*, 20(1), 362.
- Vu, E., Wan, W., Yeung, T., & Callaway, D. (2018). Intramuscular Tranexamic Acid in Tactical and Combat Settings. *Journal of Special Operations Medicine*, 18(1), 62-68.