

PERSPECTIVE

Preparedness for treating victims of terrorist attacks in Australia: Learning from recent military experience

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Abstract

The Australian health system is generally well prepared for mass casualty events. Fortunately, there have been very few terrorist attacks and these have involved low numbers of casualties compared with events overseas. Nevertheless, Australian health professionals need to be prepared to treat mass casualties with blast and ballistic trauma. The US military and its allies including Australia have had extensive experience with mass casualty management

in the Middle East and Afghanistan wars for more than a decade. To define their experience, they developed the Tactical Combat Casualty Care Guidelines that have saved many lives. It is now prudent to incorporate this knowledge and experience into civilian practice in Australia.

Key words: *explosions, mass casualty incidents, terrorism.*

In 2017, there were multiple mass casualty terrorist attacks worldwide.

Major incidents in countries with developed trauma systems, included three in the UK – the Westminster bridge attack (four killed, 49 injured), the Manchester arena bombing (23 killed, >500 wounded) and the London Bridge attack (eight killed, 48 wounded), one in Russia involving a suicide bomber on the St Petersburg metro (15 killed, >45 wounded), three separate attacks in Barcelona, Spain (15 killed, >136 wounded) and one in lower Manhattan, USA (eight killed, 11 wounded). Reflecting on such incidents, the overarching theme has been on the value of preparedness with emergency plans, simulation training and planning to adequately cope with the surge of patients to EDs.¹

Deaths from terrorism incidents in Australia in recent times have fortunately involved relatively lower numbers. There was one person killed and two wounded from a stabbing incident in Endeavour Hills, Victoria in 2014, two killed and four wounded in the 2014 Sydney Lindt café hostage, one killed in a shooting in Parramatta, NSW in 2015, one killed and three wounded in a stabbing in Queanbeyan, NSW in 2017 and two killed and three wounded during a siege at Brighton, Victoria in 2017.

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Mass casualty responses have nonetheless been tested; the 2009 bushfires resulted in 173 being killed and 414 ED presentations in Victoria. Two incidents of drivers targeting pedestrians with their vehicles resulted in seven killed and 36 wounded in January 2017 and one person killed and 16 wounded in December 2017. In addition, pre-hospital and hospital emergency surge capacity has been more strenuously tested by medical conditions. For example, in November 2016, the Melbourne 'thunderstorm asthma' epidemic led to nine deaths and more than 9900 people attending EDs. Reports suggest Victorian emergency services were well prepared for such challenging events.

There has been a focus on preparedness of Australian pre-hospital and hospital systems over the last decade, with regular mass casualty exercises coordinated by Health Departments of the States and Territories primarily involving pre-hospital emergency services. All Australian states now have comprehensive emergency plans that suggest pre-hospital services and EDs are at high levels of readiness for disaster response and mass casualties.

Disaster preparedness activities lead to improvements in knowledge, skills or attitudes. Most such activities have focused on disasters external to hospitals and preparedness of medical, nursing, public health or pre-hospital clinicians and primarily involving tertiary referral centres. The in-hospital component of mass-casualty response exercises is often a table top exercise such as Emergo Train (www.emergotrain.com), because of the difficulty in extending the immersive simulation into a busy hospital. A further gap appears to be the rest of the healthcare team, including allied health professionals and support staff,² and regional and rural hospitals. The Australian hospital system's preparedness for mass casualties following a potential terrorist attack was reported in 2005.³ Since then, military expertise in treating mass casualties due to blast and ballistic trauma has improved markedly. Principles for the in-hospital management of mass casualties developed by military have been found useful in civilian hospitals

overseas.⁴ These principles should be taught regularly in Australian hospitals, and exercises should involve co-ordination between ambulance services, specialist adult and paediatric trauma centres, and other EDs to ensure appropriate distribution and management of patients. Training should include burns management and the decontamination and treatment of chemical weapons victims. Everyone with responsibility for patient flow, staff and equipment availability, as well as direct clinical care, should be familiar with mass casualty plans. Mass casualty management should be part of the medical and nursing school curricula.

The key point is that, although integrated, inclusive trauma systems are well established in Australia,⁵ there is a low rate of penetrating – and in particularly blast and ballistic trauma.⁶ Based on personal and documented military observations, we believe that civilian health professionals not regularly exposed to blast or ballistic trauma would benefit from learning from recent military experience. Battlefield injuries cause severe trauma of a pattern frequently more challenging to manage than seen in peacetime, both clinically and at a hospital and health system level.⁷

Taught to Australian military personnel, the current Tactical Combat Casualty Care (TCCC) Guidelines are freely available (<http://cotccc.com/>), as are the guidelines of the Joint Trauma System (JTS) of the US Army Institute of Surgical Research (<http://www.usaisr.amedd.army.mil/cpgs.html>). TCCC was developed by the US Special Operations medical community in the mid-1990s, and has become the standard of care for pre-hospital battlefield medicine, saving many lives.⁸ Many of these guidelines are directly applicable to the Australian civilian context.

Military trauma care emphasises the 'Platinum 10 minutes', recognising that the procedures most likely to reduce mortality are required in the pre-hospital phase of the trauma care continuum. Consequently, early trauma care for a mass casualty event needs to emphasise treatment provided either by paramedics or by

non-medics with sufficient training in simple interventions such as haemorrhage control and ensuring airway patency. Early Management of Severe Trauma teaching emphasises Airway, Breathing, Circulation and neurological Disability (ABCD). In contrast, TCCC's 'MARCH' acronym (Massive haemorrhage, Airway, Respiration, Circulation, Hypothermia prevention and Head injury care) prioritises catastrophic haemorrhage, because preventable mortality in blast and ballistic trauma is more commonly due to haemorrhage than airway compromise. TCCC promotes the early and far forward use of blood and blood products and discourages the administration of crystalloids such as saline. The principles of permissive hypotension are strengthened with haemostatic resuscitation, whereby efforts are made to protect and enhance clot formation. TCCC also promotes the early and aggressive use of analgesia on the battlefield through the administration of ketamine.

Australian civilian practice is slowly adopting some military experiences with paramedics now trained and equipped to stop major haemorrhage using arterial windlass tourniquets and procoagulant dressings such as Combat Gauze (Z-Medica, Wallingford, CT, USA). Arterial windlass tourniquets are straightforward to apply and save lives of both military and civilian casualties.⁹ Tourniquets are now available on most Australian civilian ambulances. Ketamine is more commonly being used as analgesia in the pre-hospital and hospital setting. Hospital staff are becoming familiar with these practices.

The modern military paradigm encourages operative re-inspection of extremity wounds and laparotomies. The median number of surgical operations required by blast/ballistic casualties is 3.5.¹⁰ Such advances in the care of combat casualties on the battlefields of Iraq and Afghanistan have nearly halved case fatality rate,¹¹ but come at the expense of extended ICU stays and considerable operating theatre time.

Hospital staff who treated victims of recent terrorist attacks in Paris and Nice reported benefit from

military medical expertise.¹² The International Association for Trauma Surgery and Intensive Care (IATSI) runs 'Definitive Surgical/Anaesthetic/Perioperative Trauma Care' courses for senior clinicians (<https://dstc.com.au/>, accessed 7 Aug 2017), extending the principles of the Early Management of Severe Trauma course to the intra- and post-operative period. The DSTC Military Module, taught by Australian Defence Force experts, focusses specifically on blast and ballistic trauma and is open to civilians.

Critical to the management of mass casualties is the ability to rapidly expand the hospital system capacity to accommodate a sudden increase in demand. ED surge will be challenging given that most EDs in Australia find it difficult to manage everyday variations in load. In 2009, the Australian Surge Strategy Working Group developed multiple recommendations labelled as the start of what needs to be a long-term effort to validate and optimise surge management strategies in EDs.¹³ Successful surge management is a key aspect of disaster management, requiring the commitment of health and government leaders. While much work has been done on patient flow and reducing hospital overcrowding, in contrast to most deployed military hospitals, Australian civilian major trauma centres continue to operate routinely at levels of volume overload. Military-civilian hospital co-ordination exercises have been conducted overseas and such training is indicated in the Australian setting to integrate and support military-civilian operations during times of surge demand.

Finally, it is possible that hospitals themselves may be the target of terrorist attacks. An attack on a military hospital in Afghanistan in March 2017 by gunmen posing as doctors killed almost 50 people. In

the UK, such threats have been considered real, with NHS security officials providing guidance on scenarios of hospitals being targeted by terrorists. The TCCC provides guidelines for effective response in such scenarios, designed on the principles to provide care directed towards life-threatening haemorrhage only and delay all other treatment until the patient(s) can be moved to a more secure position.

Bringing order to chaos following a terrorist incident requires a disciplined and prepared team of health professionals with both clinicians and administrators working closely together. Highly functioning teams with clearly defined leadership is the key. It is time to formally evaluate the preparedness of our health system for mass casualty response in terrorist incidents secondary to blast and ballistic injuries. We believe that the lives of many innocent victims of a terrorist attack will be saved by applying the lessons that military healthcare professionals have learnt when saving the lives of severely wounded soldiers on the modern battlefield.

Competing interests

None declared.

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