

Trauma Service and Emergency Department Guidelines

Title: Traumatic Cardiac Arrest Guideline

Developed by: D. Camilleri, K. Gumm, M. Walsh R. Judson, D. Williams, P. Morley & Advisory Committee on Trauma (ACT)

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Revised by: D. Camilleri, K. Gumm, M. Walsh R. Judson, D. Williams, P. Morley & ACT

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See Also: [TRM04.02 Emergency Department Thoracotomy Guideline](#)

Purpose

The purpose of this guideline is to assist staff in the assessment and management of trauma patients in **traumatic cardiac arrest (TCA)**, or in those who arrest soon after arrival (peri-cardiac arrest) due to **trauma**.

It **excludes** those who have injuries incompatible with life in whom attempts at resuscitation would be futile or those who have had no signs of life within the preceding 10 mins.¹

Background

Most deaths due to trauma occur in the first five minutes following the actual traumatic event, and most of these deaths cannot be prevented, even with skilled and timely treatment.¹

The common causes of preventable early death in trauma are:^{2,3}

- 60% haemorrhage
- 33% tension pneumothorax
- 10% cardiac tamponade
- 7% airway obstruction.

Immediate cardiopulmonary resuscitation (CPR) and Adrenaline do not increase survival in traumatic cardiac arrest and may hinder evidence-based treatments, so in this context they are considered secondary priorities.

Trauma arrest is associated with a worse prognosis, however several recent studies have shown a 5.1 to 7.5% survival to discharge rate^{4,6}, though the neurological recovery varied (2% to 6.6%).^{5,7}

Definitions¹

Traumatic Cardiac Arrest: coma, agonal or absent spontaneous respiration, and absence of carotid pulse

Trauma Peri-cardiac Arrest: hypotension, deteriorating conscious state; progression to full cardiac arrest is imminent.

Guideline

In traumatic cardiac arrest due to trauma priorities are different from conventional cardiac arrest due to medical causes.

Haemorrhage control, restoration of circulating blood volume, airway management and relieving of tension pneumothoraces have priority over conventional CPR (unless there is suspicion of a medical cause for cardiac arrest preceding the trauma). **However**, if there are sufficient resources (such as a full trauma team) these priorities can be met quickly and CPR can **proceed imminently**.¹

Do Not Resuscitate if:

- injuries incompatible with life
- no signs of life for > 10 mins

Priorities of Treatment in Trauma Arrest

Any trauma should be approached with the following in mind:¹

- stop the bleeding
- open the airway and assist the breathing
- decompress the chest (finger thoracostomy)
- ensure adequate intravenous (IV) or intraosseous (IO) access and fluid resuscitation with aim systolic blood pressure (SBP) > 90mmHg (110mmHg in head injury) and/or consciousness (damage control resuscitation)

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- early damage control surgery.

Aim is to Simultaneously Address Reversible Causes of Trauma Arrest

Stop the bleeding: Rapid assessment of external bleeding sources and treatment, including splinting, compression or tourniquet if necessary.

Direct pressure: This is the fastest and most effective way to stop bleeding, apply firm pressure using hands/pad. Do not remove imbedded objects. ^{9, 10}

Tourniquet: Only to be used in life threatening bleeding from a limb which cannot be controlled by direct pressure. Apply tourniquet (or wide 5cm bandage) 5-7cm above the bleeding point. Tighten until circulation to injured limb is stopped. Note time of application. ^{9, 10}

Open the airway: and decompress the chest: TCA patients with suspected chest trauma who are not responding to airway manoeuvres and volume restoration should undergo chest decompression. Bilateral finger thoracostomies should be undertaken (initially on most affected side of chest). Make 3-4cm incision at the 4th intercostal space anterior to the mid-axillary line, followed by blunt dissection to pleura to allow introduction of the finger into the pleural space. There is no urgency to insert chest drains as the patient is on positive pressure ventilation (via BVM, ETT or LMA). Once return of spontaneous circulation (ROSC) is established the intercostal catheters can be inserted and the drains connected. ^{1,8}

IV access: Damage control resuscitation should be rapidly commenced; therefore IV access should be established as soon as possible. If peripheral access is difficult due to shocked state insertion of rapid infusion catheters (RIC) should be the undertaken. ¹

IO access: Intraosseous is a temporary measure if unable to gain other IV access. The first insertion site preference is the humeral head which can achieve more rapid fluid administration than the tibia.

Fluid Resuscitation: hypovolaemia due to blood loss is one of the leading causes of traumatic cardiac arrest. Initial fluid resuscitation 20ml/kg of crystalloid should be given as rapidly as possible, quickly followed by a 1:1:1 blood product infusion ration ([See TRM 08.01 Massive Blood Transfusion Guideline](#)). ¹

Emergency Department Thoracotomy ¹¹

Emergency department thoracotomy (EDT) should be considered **only if** there is a reversible cause of arrest e.g. to release cardiac tamponade; all other indications should be discussed with the surgical team [see TRM TRM04.02 Emergency Department Thoracotomy Guideline](#).

Conventional CPR

Basic Life Support (BLS)/Advanced Life Support (ALS) can occur simultaneously with suggested interventions, **but only** if it doesn't interfere with their application, and it does not divert staff from other more effective duties.

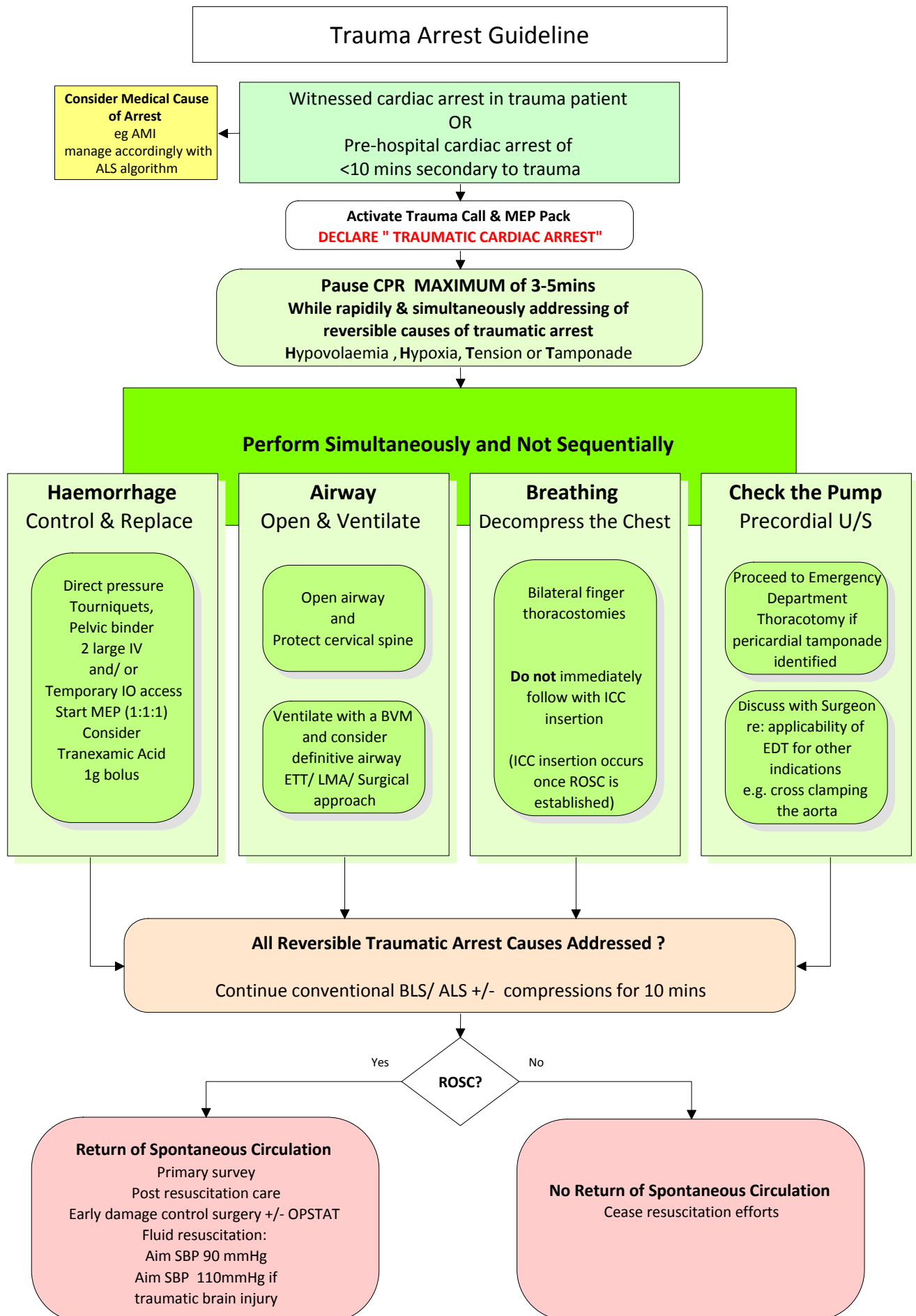
In Traumatic Cardiac Arrest, chest compressions may not be effective in a hypovolaemic patient; therefore they take less of a priority than other more easily reversible causes of arrest (e.g. tension, tamponade, hypoxia, hypovolaemia). CPR will not be of benefit until circulating volume has been restored.

External chest compressions may exacerbate haemorrhage and cardiac tamponade. Chest compressions should be commenced as a secondary priority after airway opening, chest decompression and assessment, and correction of tamponade. In the setting of a major trauma service with a trauma team, these priorities will most likely occur simultaneously and CPR can then occur imminently.

Cessation of Resuscitation

Cessation must be considered in patients who are not responding to the interventions:

- no ROSC after reversible causes have been addressed
- no detectable cardiac activity on eFAST



Authors

D. Camilleri, Emergency Physician
K. Gumm, Trauma Program Manager
R. Judson, Director of Trauma
M. Walsh, Emergency Physician
D. Williams, Anaesthetist
P. Morley, Intensivist
Advisory Committee on Trauma 2018

References

1. ANZCOR. *Management of Cardiac Arrest due to Trauma; ANZCOR Guideline 11.10.1*: Australian and New Zealand Council of Resuscitation April 2016.
2. Kleber C, Giesecke M, Linder T, Haas N, C B. Requirement for structured algorithm in cardiac arrest following major trauma: Epidemiology, management errors, and preventability of traumatic deaths in Berlin *Resuscitation*. 2014;85:405-410.
3. Champion H, Bellamy R, Roberts P, Leppaniemi A. A Profile of Combat Injury. *Journal of Trauma and Acute Care Surgery*. 2003;54(5):S13-S19.
4. Lockey D, Crewdson K, Davies G. Traumatic Cardiac Arrest: Who Are the Survivors? *Annals of Emergency Medicine*. October 2004;48(3):240-244.
5. Leis C. Traumatic cardiac arrest: should advanced life support be initiated? . *Journal of Acute Care Surgery*. 2013;74:634-638.
6. Deasy C, Bray J, Smith K, et al. Traumatic out of hospital Cardiac Arrests in Melbourne, Australia *Resuscitation* 2014;83(4):465-470
7. Gräsner J, Wnent J, Seewald S, et al. Cardiopulmonary resuscitation traumatic cardiac arrest - there are survivors. An analysis of two national emergency registries. *Critical Care*. 2011;15.
8. Victoria A. *MFP Pleural Decompression with Finger Thoracostomy* 22 August 2016.
9. Victoria A. *Haemorrhage control using the combat application tourniquet (CAT)* 26 August 2016.
10. ANZCOR. *Principle for the Control of Bleeding for First Aiders: ANZCOR Guideline 9.1.1* Australian and New Zealand Council of Resuscitation January 2016.
11. Gumm K, Liersch K, Judson R, et al. *TRM04.02 Emergency Department Thoracotomy Guideline* Melbourne: The Royal Melbourne Hospital; June 2015.