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### Policy code

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Resuscitation – Traumatic

Traumatic arrest refers to the patient presenting in cardiac arrest, or peri-arrest, due to trauma (force). There are four common causes of preventable early death in trauma which are the focus of traumatic resuscitation interventions:

**Reversible causes of traumatic arrest include:**
- Hypovolaemia
- Airway obstruction and inadequate ventilation
- Tension pneumothorax
- Cardiac tamponade

The response to these interventions is time critical and success depends on a well-established chain of survival, including advanced prehospital and specialised trauma centre care. The key areas of traumatic arrest interventions are:

**Control catastrophic external haemorrhage**

The priority in the traumatic arrest patient is the control of any catastrophic external bleeding through the use of techniques such as direct pressure, and arterial tourniquets.

**Haemorrhage control and fluid resuscitation**

The correction of hypovolaemia secondary to bleeding must be approached in a two-step manner. The first step involves aggressive fluid resuscitation of 20 mL/kg normal saline or preferably packed red blood cells with the aim of restoring circulating blood volume. Further fluid boluses of 5–10 mL/kg should be given if hypovolaemia is suspected as ongoing cause of persistent cardiac arrest. This step should be done in conjunction with approaches to prevent or minimise further blood loss including the application of bandages, pressure dressings and splints.

**Control airway and maximise oxygenation**

Hypoxia in the traumatic arrest patient is often the result of airway obstruction (partial or complete), asphyxia, and respiratory failure due to a lack of ventilatory drive. Efforts to correct this should focus on the placement of a definitive airway (ETT or LMA), with the most experienced clinician, responsible for this task.

**Impact Brain Apnoea**

Impact Brain Apnoea (IBA) is the cessation of breathing after traumatic brain injury. Patients who receive a concussive brain impact, sometimes with minimal initial brain injury, have been reported to have ceased breathing for several minutes. A shock to the brain stem is thought to cause temporary cessation of brain stem functions including swallowing, corneal reflexes and breathing. [1]

This effect has been replicated in animal studies, with higher energy impacts resulting in longer subsequent periods of apnoea and poorer spontaneous respiratory recovery. Severe IBA may cause the patient to stop breathing long enough to cause brain injury or even death from hypoxia, even though the initial trauma related brain injury is minimal. [2]

It is thought this phenomenon is rarely reported in head trauma patients because clinicians are rarely present during the first few minutes of injury, however, anecdotal examples from clinicians attending head injury patients within a few minutes of injury (e.g. clinicians in attendance at motor cycle sports events) have been reported. [3]

Early intervention through supported ventilations (and chest compressions if required) may dramatically alter the course of outcomes for these patients. Clinicians who arrive at an apnoeic patient within a few minutes of a trauma incident should consider the possibility of IBA and instigate ventilatory support without delay.
**Bilateral chest decompression**

A tension pneumothorax can be responsible for a critical reduction in cardiac output and is a factor associated with traumatic arrest, necessitating its rapid identification and reversal.

**Cardiac tamponade**

Cardiac tamponade occurs when there is bleeding into the pericardial sac causing a build-up of pressure from coagulated blood that impedes the pumping action of the heart.

The most common cause of cardiac tamponade is trauma (penetrating more so than blunt).

Penetrating injuries located anywhere in the torso should be treated seriously, as even small and seemingly benign puncture wounds with little external bleeding may mask serious underlying trauma including injury that can cause cardiac tamponade.

**Clinical features**

- **No signs of life:**
  - Unresponsive
  - Abnormal breathing
  - Pulse cannot be palpated within 10 seconds, OR

- **Signs of inadequate perfusion:**
  - Unresponsive
  - Pallor or central cyanosis
  - Pulse less than:
    - 60 bpm in an infant
    - 40 bpm in a paediatric 1–12 years/adult

**Risk assessment**

- Unless there are injuries or wounds that are incompatible with life, attempted resuscitation of all patients presenting with traumatic arrest should be attempted.

**Additional information**

- **Injuries inconsistent with traumatic arrest**
  A small minority of trauma patients will have a medical cause that precipitated the cardiac arrest. If the severity of injuries appears inconsistent with traumatic arrest, a medical cause (e.g. AMI) should be suspected and managed according to the general resuscitation guidelines.

- **External chest compressions**
  In cardiac arrest due to trauma, all the interventions are aimed at the correction of the underlying causes. There is no benefit from external cardiac compressions until blood volume is returned to a minimally sufficient quantity. However, if there are sufficient available resources, and there is no interference with essential interventions, CPR can occur simultaneously.

- **Adrenaline**
  There is no recommendation for the use of adrenaline within the context of the traumatic cardiac arrest until after the control and correction of reversible causes. Hypotension in the setting of ROSC is usually the result of hypovolaemia and should be initially treated with ongoing volume replacement. In the late phases of post-arrest care, vasodilation or myocardial depression may require adrenaline or other vasoactive agents.

- **Cessation of resuscitation**
  Continuation of advanced life support should continue in the traumatic cardiac arrest patient for 20 minutes following the satisfactory management of airway and ventilations, chest decompression, and haemorrhage control and volume replacement. After such time if there is no return of spontaneous circulation, all resuscitation efforts should cease.
Injuries incompatible with life (e.g. decapitation, massive head injury etc)

- Manage as per: CPG: ROLE

Consideration of non-traumatic cause of arrest?

- Manage as per appropriate CPG:
  - CPG: Resuscitation – Adult
  - CPG: Resuscitation – Paediatric

Control external catastrophic haemorrhage

- CONSIDER:
  - Arterial tourniquet
  - Arterial compression

Control airway and maximise oxygenation

- CONSIDER: LMA/ETT

Bilateral chest decompression

Fluid resuscitation and haemorrhage control

- IV/IO access
- 20 mL/kg PRBC or Sodium chloride 0.9%
- Further 5–10 mL/kg fluid boluses if indicated
- Pelvic binder
- Fracture immobilisation and splinting

ROSC?

- Manage as per: CPG: ROSC

Transport to hospital

Pre-notify as appropriate

These interventions are prioritised according to likely aetiology of the cardiac arrest and if possible should be performed simultaneously by a multimember team.

BLS/ALS can occur simultaneously with the listed interventions if this does not interfere with treatment priorities and sufficient resources are available.

Note: Clinicians are only to perform procedures for which they have received specific training and authorisation by the QAS.

* Reversible causes
  - Hypoxia
  - Hypothermia
  - Hypovolaemia
  - Tamponade

Continue resuscitation for 20 minutes after reversible causes have been addressed

- CONSIDER: CPG: ROLE