Guideline

Traumatic Cardiac Arrest

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Version No.	2.0	**Standard 8** Recognising and Responding to Acute Deterioration	
Risk Rating	High		
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Applicable to	CHQ medical surgical and nursing staff in ED, ORS, PICU	**Review date**	03/07/2027

HUMAN RIGHTS

This governance document has been human rights compatibility assessed. No limitations were identified indicating reasonable confidence that, when adhered to, there are no implications arising under the *Human Rights Act 2019.*

PURPOSE

The Paediatric traumatic cardiac arrest (TCA) algorithm addresses the need to immediately treat potential reversible causes of traumatic cardiac arrest. This includes the resuscitative thoracotomy in cases of penetrating chest trauma.

- The absence of cardiac activity should trigger a paediatric TCA algorithm. The management of the reversible causes of TCA should take priority with standard APLS, including establishing a patent airway with cervical spine precautions, cardiac compressions, adrenaline and defibrillation where indicated.
- Using point of care ultrasound e-FAST real time scans can be used if a sonographer / accredited operator is available and the scans and sonographer notes are documented on ieMR. Useful indications are pericardial fluid collection, pleural fluid collection, pneumothorax, free fluid in abdomen plus cardiac tamponade and cardiac standstill.
- It is vital that a medical cardiac arrest (induced by drowning, asphyxia, hypoglycemia) is not diagnosed as a traumatic cardiac arrest.
- Cardiac arrest due to isolated head injury, crush syndrome and commotio cordis are special circumstances necessitating specific therapies.

SCOPE

This guideline applies to all medical and nursing CHQ staff including surgical medical officers working in the Emergency Department (ED) Operating Room Suites (ORS) or paediatric Intensive Care Unit (PICU), to guide their management of children suffering from traumatic cardiac arrest (TCA).

A paediatric traumatic cardiac arrest is a high acuity, low frequency event that carries a high mortality rate. Survival with good neurological outcome from effective cardiopulmonary resuscitation (CPR) has been reported when the reversible causes such as hypovolaemia, hypoxia, hypothermia, tension pneumothorax, and massive haemothorax are actively sought and excluded, or treated immediately, using a standardised approach to resuscitation such as Advanced Paediatric Life Support (APLS).

Interventions include but are not limited to endotracheal intubation (to maximize oxygenation and ventilation), unilateral or bilateral thoracostomies (for evolving pneumothorax), high-volume intravascular filling (for hypovolemia) keeping the patient warm (prevent hypothermia) and effective advanced paediatric life support.

GUIDELINE

Recognise Paediatric Traumatic Cardiac Arrest – trauma patient with no signs or life / no palpable pulse. Call for help – activate a Trauma Respond Call / Ensure Surgical Consultant is aware. The surgical registrar will contact the general surgical SMO. The surgical registrar or general surgical SMO will escalate as appropriate / contact cardiac-surgical SMO. If required, call the Duty Anaesthetist in hours, or anaesthesia registrar (24/7) out of hours on ext. 4511. Exclude medical cardiac arrest (drowning, asphyxia, hypoglycaemia). Consider activation of Trauma Red Blanket for immediate transfer to the operating room if exsanguination of trauma patient.

Commence APLS while simultaneously addressing reversible causes:

- Control external catastrophic haemorrhage – direct pressure / limb tourniquets.
- Establish a patent airway and protect the C spine.
- Ensure oxygenation (via an endotracheal tube or supraglottic laryngeal mask airway (LMA) device).
- Provide ventilatory support as this improves survival.
- Decompress the chest – bilateral thoracostomies – ideally a large bore cannula inserted in the pleural cavity, or a scalpel and forceps is a more assured way to provide a thoracostomy in a child < 8 years old.
- If resuscitation continues, needle chest decompression of a pneumothorax is normally followed by a formal insertion of an intercostal catheter / drain.
- Thoracotomy in penetrating trauma improves survival – consider thoracotomy if <10 mins since traumatic cardiac arrest.
- Thoracotomy considerations: Is there expertise available? Is the appropriate equipment available? Where is the most appropriate environment to undertake the procedure? Whether a clam-shell or anterolateral approach is best will be determined by the pattern of injury and the available surgical expertise.
- Rapid volume replacement - blood 2 unit of 0 neg immediately available at Queensland Children's Hospital (QCH) / activate massive hemorrhage protocol (MHP) / warmed fluids improve survival.

- Apply pelvic binder in blunt trauma.
- Consider analgesia and sedation requirements.
- Keep the patient warm.

The duration of arrest in paediatric TCA is helpful in determining the value of continued resuscitation. If all invasive procedures have been completed and there is no return of spontaneous circulation, this is helpful in determining the futility of continued resuscitation. Cardiac standstill on ultrasound is helpful in determining the futility of continued resuscitation, in the presence of appropriate resources and a trained operator.

ALERT

Accredited operator / sonographer should be available for eFAST scans and familiar with interpreting images in the arrest paediatric patient.

PAEDIATRIC TRAUMATIC CARDIAC ARREST ALGORITHM

Cardiac Arrest
No sign of life
No palpable pulse

Traumatic Cardiac Arrest

No → Medical cause - hypoxia / drowning / asphyxia

Activate Trauma Respond

Standard Paediatric Advanced Life Support Algorithms

CPR / adrenaline
Identify and treat any shockable rhythm

Simultaneously address reversible pathology

Hypovolaemia Control external haemorrhage

Hypoxia - Basic / advanced airway management with C Spine protection
Maximise oxygenation & ventilation

Tension pneumothorax - Decompress chest
Bilateral thoracostomies

Hypovolaemia - IV/ IO crystalloid / blood bolus
Massive Haemorrhage Protocol
Apply pelvic binder

Tamponade on ultrasound, pericardiocentesis

Hypothermia Keep warm, aim for >30C

Consider Thoracotomy especially in penetrating trauma
? Elapsed time < 10 mins since arrest
? Expertise / Equipment / Environment

ROSC?
Return of spontaneously circulation

NO → **No** – Decision to stop resuscitation
Duration of arrest
Lack of response to treatment
Persistently low ETCO2
+/_ Cardiac standstill on U/S

Yes - Supportive and Definitive care
Damage Control Surgery
+/- CT imaging
Transfer to PICU

SUPPORTING DOCUMENTS

PROCEDURES, GUIDELINES, PROTOCOLS

- CHQ-PROC-62440 Trauma Team Activation
- CHQ-PROC-02908 Blood and Blood Products: Massive Haemorrhage Protocol (MHP)
- CHQ-PROC-62442 Trauma Red Blanket
- CHQ-PROC-17023 Management of the Unknown Patient at QCH Emergency Department

FORMS AND TEMPLATES

- Potentially Critical Pre-Arrival Notification
- Trauma Assessment Admission Form

CONSULTATION

Key stakeholders who reviewed this version:

• Director of Trauma • General Surgeons • Cardiac Surgeons • ED - Director	• PICU - Director • ORS – NUM • Anaesthesia - Director

DEFINITIONS

Term	Definition
APLS	Advanced Paediatric Life Support
CPR	Cardiopulmonary Resuscitation
ETCO2	End tidal CO2
ECMO	Extracorporeal membrane oxygenation
FAST	Focussed Assessment Sonography in Trauma
iEMR	Integrated Electronic Medical Records
LMA	Laryngeal Mask Airway
MHP	Massive Haemorrhage Protocol
U/S	Ultrasound
SMO	Senior Medical Officer
TCA	Traumatic Cardiac Arrest

REFERENCES

No.	Reference
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GUIDELINE REVISION AND APPROVAL HISTORY

Version No.	Modified by	Amendments authorised by	Approved by	Comments
1.0 29/03/2022	Trauma Nurse Manager	Director of Trauma	A/Divisional Director of Surgery	
2.0 03/07/2025	Trauma Nurse Manager	Divisional Director Surgery	A/Executive Director Clinical Services	Scheduled review

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