

Penetrating Trauma Arrest Algorithm - Selective Resuscitation

While external chest compressions (ECC) have been a mainstay of treatment in traumatic cardiac arrest, recent analysis and expert opinion highlight that ECC interferes with life-saving interventions of higher priority, particularly in patients with penetrating mechanisms. The basic premise in the paradigm shift away from ECC in penetrating cardiac arrest is that the patient has likely exsanguinated with the exceptions of tension pneumothorax and cardiac tamponade. ECC interferes with chest decompression, venous access, resuscitative thoracotomy and crowds the bedside with unnecessary personnel. Once adequate access has been established and two units of packed red blood cells (PRBC) or O+ whole blood (WB) have been administered restoring some oxygen carrying capacity, ECC maybe initiated if the patient is not already receiving internal cardiac massage.

- **Selective Resuscitation** → ECC are *not* a primary priority; instead, focus is on surgical and procedural interventions that directly reverse the cause of arrest.

Algorithm Steps

1. Immediate Assessment

- Confirm **mechanism** (penetrating vs blunt). If blunt mechanism, proceed with ECC as indicated.
- Penetrating trauma arrest → assess for signs of life (SOL) - pupillary response, spontaneous movement/respirations, cardiac activity on Point of Care Ultrasound (POCUS) or palpable pulse.
- Pulseless organized cardiac activity (PEA) is not considered a SOL per se but portends better survival than asystole and may be considered an indication for proceeding with resuscitative efforts in absence of SOL.
- If **no SOL for >10 minutes prior to arrival**, terminate resuscitation. Must include absence of cardiac activity on POCUS as a final determinant of death.
- If **no SOL for ≤ 10 minutes** or PEA → **proceed with selective resuscitation**

2. Selective Resuscitation

- **Chest compressions are withheld** - if no SOL are present DO NOT perform ECC; focus on volume replacement and immediate vascular access.
 - Immediately transfuse 2 units of PRBC or WB
 - If immediate access is needed for volume, consider humeral IO placement, right subclavian vascular access and/or femoral cutdown
 - Only PGY 3 or greater may independently perform femoral cutdown

3. Life-Saving Interventions (before ECC) to Address Reversible Causes

- **Hypovolemia:** Control external bleeding, MTP activation
- **Oxygenation:** Secure airway, provide ventilation; if no SOL, intubate without sedative/analgesics
- **Tension Pneumothorax:** bilateral finger thoracostomies
- **Resuscitative Thoracotomy** → relieve tamponade, control intrathoracic bleeding, cross-clamp aorta, internal cardiac massage.

5. Termination of Efforts

- No ROSC after rapid thoracotomy and interventions
- On-going assessment indicates injuries incompatible with survival

American Heart Association CPR & ECC Guidelines

Billings Clinic Traumatic Arrest Clinical Practice Guideline

SUNY Upstate Medical University Traumatic Arrest Guidelines

Western Trauma Association Penetrating Chest Trauma Algorithm