

## Emergent Resuscitative Thoracotomy (ERT) Guideline

### **Purpose:**

Provide decision support guideline for determining appropriate patients for emergent resuscitative thoracotomy in the acute trauma setting. This guideline aims to better standardize the approach to the in-arrest trauma patient in order to optimize outcomes and avoid futile procedures.

### **Background:**

Emergency Resuscitative Thoracotomy (ERT) is a potentially lifesaving intervention for patients who develop or have impending post-injury cardiovascular collapse from a potentially reversible cause.

The purposes of this procedure are:

- Control of intrathoracic hemorrhage
- Release of cardiac tamponade
- Internal cardiac massage
- Aortic occlusion to control infra-diaphragmatic hemorrhage and to maximize cerebral and coronary perfusion

Exsanguinated patients with profound hypotension or in hemorrhagic shock do not improve with external chest compressions. Thus, the team should quickly determine if an in-arrest trauma patient is a candidate for ERT or is non-salvageable and the patient pronounced with cessation of resuscitative efforts. It is prudent to ensure an adequate airway has been established and both pleural spaces decompressed to rule out other potentially reversible causes of arrest (hypoxia, tension physiology) before cessation of resuscitative efforts in those patients that do not meet criteria for ERT.

There are multiple published guidelines from the leading trauma organizations that have informed this ERT guideline. These include guidelines from the Western Trauma Association (WTA), Eastern Association for the Surgery of Trauma (EAST) and the Department of Defense's Joint Trauma System (JTS).

The EAST guidelines are particularly helpful as the group analyzed 72 relevant studies to assess the strength of evidence for ERT in specific patient scenarios. They defined 'signs of life' as presence of any of the following: pupillary reactivity, spontaneous breathing, palpable carotid pulse, measurable blood pressure, motor movement, or organized cardiac electrical activity. They identified 6 pre-defined patient categories depending on 3 conditions (penetrating vs blunt mechanism, thoracic or extra-thoracic location, presence of signs of life) and made the following recommendations:

1. Penetrating thoracic trauma with signs of life but pulseless on arrival (Strong Recommendation **for** ERT)
2. Penetrating thoracic trauma without signs of life and pulseless on arrival (Conditional Recommendation **for** ERT)

3. Penetrating extra thoracic trauma with signs of life but pulseless on arrival (Conditional Recommendation **for** ERT)
4. Penetrating extra thoracic trauma without signs of life and pulseless on arrival (Conditional Recommendation **for** ERT)
5. Blunt injury with signs of life but pulseless on arrival (Conditional Recommendation **for** ERT)
6. Blunt injury without signs of life and pulseless on arrival (Conditional Recommendation **AGAINST** ERT)

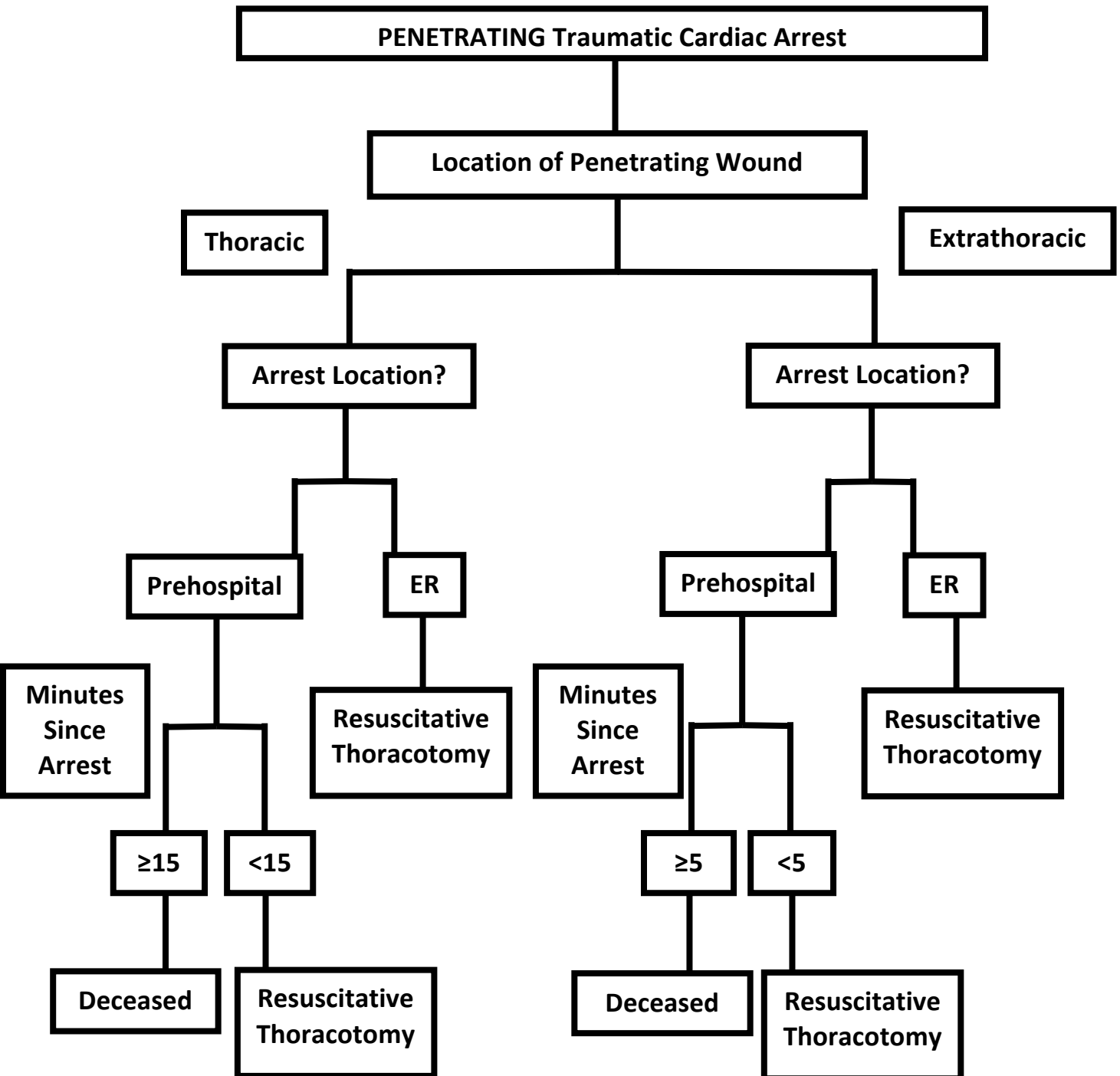
The Traumatic Arrest decision tree provided below is based on the integration of the best evidence based guidelines available from these trauma organizations.

**Technique:**

The steps of the ERT are as follows:

1. Left anterior-lateral thoracotomy incision
  - a. Generous curvilinear incision at approximately 4<sup>th</sup> intercostal space (nipple line in males, inframammary fold in females)
2. Open the pericardium
  - a. Open longitudinally at least one finger breadth anterior to the phrenic nerve
  - b. Deliver the heart partially out of the pericardium to inspect for injury
3. Control any cardiac injury if present
  - a. Digital pressure for smaller injuries with definitive repair in OR
  - b. Other options include skin stapler or foley catheter for temporary control
4. Temporarily control active lung bleeding if present
5. Cross-clamp the descending aorta
  - a. Utilize an OG/NG to help differentiate from esophagus
  - b. Open the mediastinal pleura
  - c. Place aortic cross clamp just above the diaphragm
6. Internal cardiac massage and defibrillation
  - a. Electric shock with internal paddles should be delivered at 20 Joules

# Traumatic Arrest – Penetrating Injury



# Traumatic Arrest – Blunt Injury

