



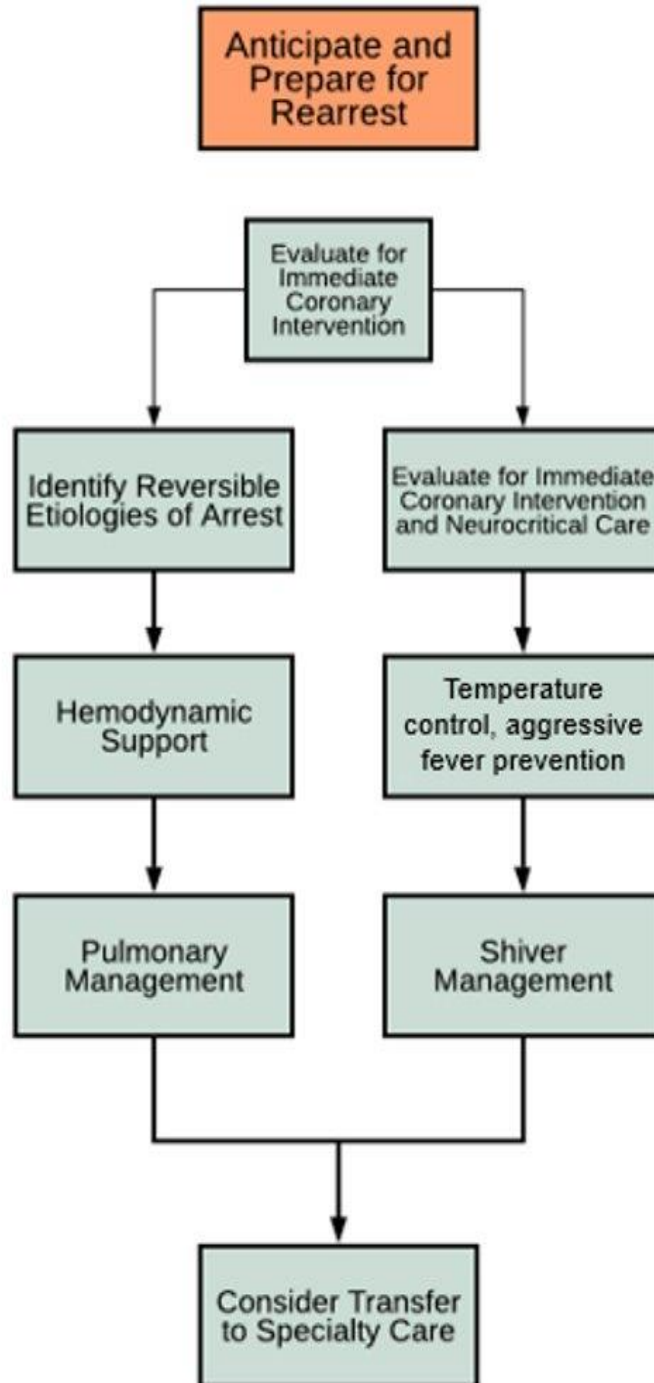
# **Emergency Neurological Life Support<sup>®</sup> Resuscitation Following Cardiac Arrest Protocol Version 6.0**

## **Authors**

Marc Babi, MD  
Kara Melmed, MD

**Last updated:** September 2024

# RESUSCITATION FOLLOWING CARDIAC ARREST ALGORITHM



## CHECKLIST

- Initiate hemodynamic and ventilator support
- Assess for common treatable causes of arrest and consider coronary angiography
- Determine targeted temperature management goal and strategy
- Begin induction to target temperature
- Consider transfer to specialty center with neurocritical care availability

## COMMUNICATION

- Patient age, pre-arrest circumstances
- Duration of cardiac arrest, medication administered and initial arrest rhythm
- Most likely etiology of arrest, if known
- Neurological examination on first assessment
- Percutaneous coronary intervention (PCI) eligibility
- Time targeted temperature management (TTM) started and target temperature
- Current core temperature
- Current drug infusions (especially sedative and vasoactive agents)

## ANTICIPATE AND PREPARE FOR POTENTIAL REARREST

Patients resuscitated from cardiac arrest are among the sickest encountered by most intensive care providers. During and immediately after a cardiac arrest, several parallel workflows are necessary to support successful resuscitation. Concurrently with cardiopulmonary resuscitation (CPR) and stabilization, providers should diligently search for the underlying etiology of arrest. In parallel with cardiopulmonary stabilization, efforts must be taken to minimize the risk of secondary brain injury. Patients who remain comatose following return of spontaneous circulation (ROSC) are likely to benefit from TTM. They may also benefit from transfer to specialty care with availability of neurocritical care management. This protocol addresses initial patient stabilization and assessment, induction of targeted temperature management in eligible patients, and shivering management. This protocol does not address the standard advanced cardiac life support protocols for cardiac resuscitation.

- Approximately 20% of patients rearrest within minutes of initial restoration of pulses.
- Even without frank rearrest, anticipate the likelihood of hemodynamic instability in the minutes after initial resuscitation.
- Patients resuscitated from cardiac arrest typically require intubation, mechanical ventilation, close cardiac and invasive hemodynamic monitoring, and attentive general critical care.
- Many patients will require titration of fluids, inotropes, vasopressors, administration of antiarrhythmic, etc.
- Blood pressure and oxygenation goals should be chosen to maintain cerebral perfusion and prevent secondary brain injury.

## IDENTIFY REVERSIBLE ETIOLOGIES OF ARREST

- Concurrently with CPR and stabilization, providers should diligently search for the underlying etiology of arrest
- Diagnostic evaluation after ROSC may include a focused history, physical examination, EKG and judicious imaging, and prioritize identification of those etiologies that require specific time-sensitive interventions beyond general resuscitative measures.
- Specific etiologies of arrest requiring emergent treatment include:
  - Acute coronary syndrome/myocardial infarction
  - Cardiogenic/obstructive shock
  - Arrhythmia
  - Intracranial hemorrhage
  - Pulmonary embolism
  - Trauma
  - Hypovolemic/hemorrhagic shock (e.g., GI bleed)
  - Toxicological causes/overdose
  - Septic shock
  - Anaphylaxis
  - Cardiac arrest during pregnancy/peripartum

## HEMODYNAMIC SUPPORT

### Maintain

- Identify and treat hypotension and keep mean arterial pressure >65 mmHg
- Volume resuscitation and blood pressure goals with cerebral perfusion and prevention of secondary brain injury in mind
- Rapid PCI when patient is identified as a candidate for intervention

## PULMONARY MANAGEMENT

- Secure airway
- Temperature correct ABG while patient is on TTM
- Rapidly identify and correct hypoxia
- O<sub>2</sub> Saturation goal > 94%
- PaCO<sub>2</sub> goal 35-45
- Avoid hyperoxia

## EVALUATE FOR IMMEDIATE CORONARY INTERVENTION

### Does the patient need coronary intervention?

- Coronary angiography should be considered for patients with clinical suspicion for an acute coronary syndrome based on EKG (e.g., ST segment changes) or history (e.g., initial shockable rhythm, no other obvious etiology of arrest).
- TTM is not a contraindication for coronary angiography.
- Use of antiplatelet or anticoagulant is not a contraindication
- PCI is associated with improved neurological outcome

## IF ELIGIBLE FOR TARGETED TEMPERATURE MANAGEMENT

### Rapid induction to 33° - 37.5°C

The patient is eligible for TTM to 33°-37.5°C if she/he:

- Suffered a cardiac arrest
- Has return of spontaneous circulation
- Does not follow commands.

Absolute contraindications to TTM 33°-36°C (Aggressive fever management may still be beneficial in these scenarios):

- Do Not Resuscitate/Physician Orders for Life-Sustaining Treatment indicating they would not want this level of treatment
- Following commands
- Patients who are more than 12 hours after cardiac arrest are less likely to benefit from TTM at 33°-36°C

TTM at 36°-37.5°C is preferred in case of:

- Active bleeding
- Greatly increased risk of bleeding (e.g., injury of the spleen or liver)
- Traumatic etiology of cardiac arrest
- Anticipated hemorrhagic diathesis
- Cardiac arrest more than 12 hours ago

If eligible for TTM: rapid induction to 33°-36°C

- Core temperature monitoring
- Combine several cooling induction methods, particularly if targeting 33°C, including cold saline and application of temperature control device\*
- Sedation
- Monitor for and management of shivering

\*Cold saline is **not** recommended in the prehospital setting

## SHIVER MANAGEMENT

- Monitor for shivering
- Treat shivering when present using a multi-modal approach
  - Skin counter-warming
  - Acetaminophen, magnesium, sedation
  - Intermittent dosing of paralytics may be considered if shivering is refractory to other treatment
- See ENLS protocol *Pharmacotherapy-Shivering Protocol*

## CONSIDER TRANSFER TO SPECIALTY CARE

- Post-arrest patients cared for at high-volume centers with neurocritical care management have improved short- and long-term outcomes.
- Transfer of comatose post-arrest patients to a specialty center offering PCI, cardiac critical care, TTM and neurocritical care may be prudent.
- Active engagement of a critical care transport physician should be considered when arranging interfacility transport of unstable patients resuscitated from cardiac arrest to ensure adequate resources are mobilized for patient transport.