N01: Peri-Arrest Management

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Introduction

The peri-arrest period is the time either before or immediately following a full cardiac arrest, when the patient's condition is unstable. Paramedics and EMRs/FRs caring for a patient in the peri-arrest period (the so-called "crashing patient") have an opportunity to significantly improve outcomes in comparison to patients in cardiac arrest, provided they are able to recognize and respond to signs of imminent deterioration.

Essentials

A significant body of research demonstrates that many patients exhibit signs of clinical deterioration before experiencing cardiac arrest. The following features indicate that a patient is at high risk of being peri-arrest:

- Shock/hypotension (systolic blood pressure < 90 mmHg); pallor; sweating; cold, clammy extremities; confusion or impaired consciousness; poor oxygenation
- Syncope: transient loss of consciousness due to global reduction of blood flow to the brain
- Myocardial ischemia: typical ischemic chest pain and/or evidence of myocardial ischemia on 12-lead ECG
- Heart failure: pulmonary edema and/or raised jugular venous pressure
- Cardiac arrhythmias (relatively common in the peri-arrest period)

Additional Treatment Information

The specific clinical findings will dictate the need for appropriate immediate treatment in the peri-arrest period. Depending on the nature of any underlying arrhythmia and clinical status of the patient, in particular the presence or absence of adverse features, immediate treatment options for patients in the peri-arrest period can be divided into four categories:

1. No treatment needed
2. Simple clinical interventions (e.g., Vagal maneuvers)
3. Pharmacological therapies
4. Electrical therapies (e.g., cardioversion or pacing)

Most drugs act slowly, and less reliably, than electrical treatments, so defibrillation or cardioversion is generally preferred for unstable patients with adverse features. Once treated, paramedics must continue to assess and monitor the patient to detect any additional abnormalities that may require treatment.

Advanced Care Paramedics and above may consider the use of prophylactic antiarrhythmics following the successful termination of ventricular fibrillation or ventricular tachycardia. Although there are no studies that demonstrate improvement in long-term survival, the continued use of antiarrhythmic agents (particularly in cases where one was used to terminate a lethal arrhythmia) may be beneficial in maintaining a stable, perfusing rhythm and is supported by current American Heart Association Emergency Cardiovascular Care guidelines.

General Information

Non-technical skills such as leadership, teamwork, communication, and situational awareness, enables a more effective response to the deteriorating patient and are critical to ensuring an appropriate response to patients in the peri-arrest period.

If the patient is palliative or otherwise at the end of their life, treat in accordance with relevant clinical practice guidelines.

Interventions

First Responder

- Position patient supine, if appropriate; warning: do not ambulate the patient
- Supplemental oxygen as required:
  - → A07: Oxygen Administration
  - The maximum flow of a nasal cannula should be 5 L/min. The maximum flow of a non-rebreather mask should be 15 L/min. A nasal cannula may be placed under an NRB, CPAP, or BVM when flow rates above 5 L/min are required.
- Position defibrillator electrodes in anticipation of cardiac arrest

Emergency Medical Responder – All FR interventions, plus:

- Use vital signs and patient observations to recognize deterioration, and to guide decision-making
- Supplemental oxygen as required to maintain $SpO_2 \geq 94\%$:
  - → A07: Oxygen Administration
  - Paramedics and EMRs should use the lowest oxygen flow rate possible to achieve an SpO_2 of ≥ 94%. The maximum flow of a nasal cannula should be 5 L/min. The maximum flow of a non-rebreather mask should be 15 L/min. A nasal cannula may be placed under an NRB, CPAP, or BVM when flow rates above 5 L/min are required.
- Initiate conveyance to nearest emergency department with notification
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Treat presenting symptoms per relevant BCEHS Clinical Practice Guidelines:
  - → D01: Shock

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Treat presenting symptoms per relevant BCEHS Clinical Practice Guidelines:
  - → C02: Bradycardia
  - → C03: Narrow Complex Tachycardia
  - → C04: Wide Complex Tachycardia

References

1. Massey D, et al. What factors influence ward nurses' recognition of and response to patient deterioration? An integrative review of the literature. 2017. [Link]
2. Panchal AR, et al. 2018 American Heart Association focused update on advanced cardiovascular life support use of antiarrhythmic drugs during and immediately after cardiac arrest: An update to the American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. 2018. [Link]

N02: Adult Cardiac Arrest

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Reviewed: May 01, 2024

Introduction

Sudden cardiac arrest (SCA) and sudden cardiac death (SCD) refer to the sudden cessation of cardiac activity and subsequent hemodynamic collapse. Victims of SCA manifest one of four electrical rhythms: ventricular fibrillation (VF), pulseless ventricular tachycardia (pVT), pulseless electrical activity (PEA), and asystole.

Ventricular fibrillation represents a disorganized electrical activity in the ventricles. Pulseless ventricular tachycardia is an organized electrical activity of the ventricles; neither VF nor pVT have any meaningful cardiac output. Pulseless electrical activity, as a term, encompasses a heterogeneous group of organized electrical rhythms that are associated with either an absence of mechanical activity, or mechanical activity that is insufficient to generate a detectable pulse. Asystole (more specifically ventricular asystole) represents the absence of detectable ventricular electrical activity, with or without atrial electrical activity.

Survival from these rhythms requires both effective basic life support (BLS) and a system of advanced cardiovascular life support (ACLS) with integrated post-cardiac arrest care. An understanding of the importance of diagnosing and treating underlying causes is fundamental to the management of all cardiac arrest rhythms. During a cardiac arrest, paramedics and EMRs/FRs should apply a systematic approach in searching for any factors that may have caused the arrest, or that may be complicating resuscitation efforts.

Essentials

- High quality chest compressions:
  - Paramedics, emergency medical responders, and first responders should use a ratio of 30:2 for compressions and ventilations when ventilating with a pharyngeal airway and bag-valve mask only
  - Continuous compressions may be used when an advanced airway is in place (i.e., supraglottic airway or endotracheal tube)
- Early rhythm analysis & defibrillation if indicated
- Appropriate airway management
- Recognition & correction of reversible causes:
  - Hypovolemia
  - Hypoxia
  - Hydrogen ion (acidosis)
  - Hypo/Hyperkalemia
  - Hypothermia (→ I01: Hypothermia)
  - Tension pneumothorax
  - Tamponade, cardiac
  - Toxins (including anaphylaxis)
  - Thrombosis, pulmonary
  - Thrombosis, coronary

Additional Treatment Information

- Once the absence of a pulse is established and chest compressions are started, subsequent pulse checks must only be done during periods of analysis, or if signs of spontaneous circulation are observed, such as coughing, movement, or normal breathing.
- Where clear signs of prolonged cardiac arrest are present, or where paramedics consider continued resuscitation futile, R02: Discontinuing Resuscitation should be consulted for additional guidance.

Referral Information

All patients in the cardiac arrest period should be treated in place with a consideration for immediate conveyance when reasonable.

General Information

- Available evidence suggests that several therapies or interventions, which have historically been used in resuscitation, should no longer be used routinely:
  - Atropine during PEA
  - Sodium bicarbonate
  - Calcium
  - Magnesium
  - Vasopressin (offers no advantage over epinephrine)
  - Fibrinolysis
  - Electrical pacing
  - Cricoid pressure
  - Precordial thump (associated with a delay in starting CPR and defibrillation)
  - Crystalloid infusion outside of specific reversible causes
- A rhythm change to one of organized electrical activity on the monitor is not an indicator for paramedics to pause chest compressions and assess for a pulse.
- Changes in $EtCO_2$ or signs of life are better indicators of a return of spontaneous circulation.
- During cardiac arrest, the provision of high quality CPR and rapid defibrillation are the primary goals. Drug administration is a secondary consideration.
  - After beginning CPR and attempting defibrillation as required, paramedics can attempt to establish vascular access, either intravenously or intraosseously - this should be performed without interrupting chest compressions
  - The primary purpose of IV/IO access during cardiac arrest is to provide drug therapy; it is reasonable for providers to establish IO access if IV access is not readily available
  - If IV or IO access cannot be established, epinephrine, vasopressin, and lidocaine may be administered endotracheally during cardiac arrest
  - For vascular access in cardiac arrest:
    - A proximal IV is the preferred vascular access site for cardiac arrest resuscitation
    - Tibial IO is the only available site for PCP placement
    - ACP For cases when an IV cannot be established, humeral IO is the next best option
    - Tibial IO should only be placed due to failure or delay in obtaining IV or humeral IO access
    - Consider external jugular cannulation where possible
  - Cardiac arrests related to opioid overdose are likely to be hypoxic in nature. Effective oxygenation, ventilation, and chest compressions are particularly critical for these patients. Naloxone is unlikely to be beneficial, and its use in cardiac arrest is not supported by current evidence.
  - Special consideration must be given to hypothermic patients without a pulse. As hypothermia progresses, the patient's respiratory and heart rate slow significantly. For this reason, breathing and pulse checks must be sufficiently long (60 seconds) to register very slow rates.
    - "Circum-rescue collapse" is a term that describes a death that occurs shortly before, during, or soon after rescue from exposure to a cold environment, usually cold water immersion. It often presents as an apparently stable, conscious patient who suffers ventricular fibrillation and cardiac arrest shortly thereafter.
    - A patient with a core body temperature below 30°C will most likely develop arrhythmias with progression to ventricular fibrillation.
    - Medications are more slowly metabolized in hypothermic patients; limit vasopressors to a maximum of 3 doses; refer to → I01: Hypothermia for additional information
  - Refer to N03: Return of Spontaneous Circulation for additional details on post-cardiac arrest care.

Interventions

First Responder

- Initiate high quality CPR:
  - Rate (100-120/min), **30:2 compression:ventilation ratio**
  - Depth: at least 5 cm (2 inches)
  - Ensure full chest recoil
  - Minimize interruptions in compressions
  - Relieve compressor every 2 minutes, or sooner if fatigued
  - → PR06: High Performance CPR
- Defibrillation: Perform CPR while the defibrillator pads are being applied
  - Perform CPR while the defibrillator charges; as soon as energy is delivered, resume CPR for 2 minutes prior to reassessing rhythm
- Ventilation: Avoid excessive ventilation
  - Administer high-flow O_2 to patients requiring CPR
  - Consider appropriate airway adjunct
  - → A07: Oxygen Administration
  - → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

- CliniCall consultation required, when possible, to discuss treatment plan.
- See also → R02: Discontinuing Resuscitation for additional information on resuscitation decision-making

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider placement of supraglottic airway when appropriate
  - → PR08: Supraglottic Airway
  - If required, the airway should be managed using an iGel with a viral filter pre-connected before insertion or 2 person bag-valve mask ventilation using a viral filter and a tight mask seal
  - Primary Care Paramedics are now permitted to use a modified approach to the in-built suction port available on all iGel supraglottic devices to provide pharyngeal suction during cardiac arrest
  - Where possible, do not interrupt chest compressions to enable placement of a supraglottic airway
  - With supraglottic airway in place, switch to continuous chest compressions where practical (ventilate every 6 seconds)
- Vascular access: Consider IV or IO access when appropriate
  - → D03: Vascular Access
  - → PR12: Intraosseous Cannulation

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

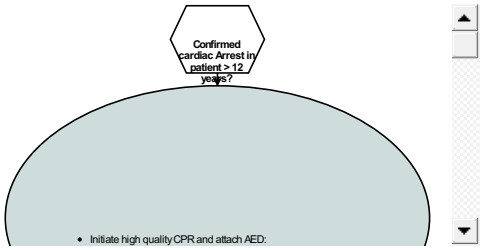
- CPR quality: Quantitative waveform capnography
  - If $ETCO_2$ < 10 mmHg, attempt to improve CPR quality
- Advanced airway: Consider advanced airway or front of neck access (FONA) if appropriate
  - Where possible, do not interrupt chest compressions to enable placement of a supraglottic airway
  - Waveform capnography or capnometry to confirm and monitor ETT placement
  - With endotracheal tube or supraglottic airway in place, switch to continuous chest compressions where practical (ventilate every 6 seconds)
- Vascular access: Consider IV/IO access when appropriate
  - → D03: Vascular Access
  - → PR12: Intraosseous Cannulation
  - → PR13: External Jugular Cannulation
- Drug therapy
  - EPINEPHrine: administer EPINEPHrine early in cases of asystole or PEA; defer EPINEPHrine administration until after the first defibrillation in VF/pVT
  - Amiodarone: administer amiodarone/lidocaine following the *second* defibrillation in VF/pVT

- Lidocaine
- In the event of CPR induced consciousness, consider sedation
  - MIDAZOLam

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider additional reversible causes such as malignant hyperthermia, complications with anesthesia, and/or auto-PEEP
- Consider the use of ultrasound in patients receiving CPR to help assess myocardial contractility and to help identify potentially reversible causes of cardiac arrest such as hypovolemia, pneumothorax, pulmonary thromboembolism, or pericardial tamponade

Algorithm



Evidence Based Practice

General Cardiac Arrest Care

Supportive

- ACDC
- ACLS
- BCLS
- Bystander CCC
- Dispatch assisted CCC
- EMS provided CCC
- ETCO2 to determine ROSC
- Impedance Threshold Device
- ITD and ACDC
- NaHCO3-after long arrest
- Standard CPR
- Bystander CPR
- Continuous Oxymetry Monitoring
- Critical care life support
- Early epinephrine
- ETCO2 evaluation of ventilation
- ETCO2 for compression evaluation
- Family Involvement in Resuscitation
- Passive Oxygen Administration
- POCUS
- Redirect to ECMO facility

- Team based resuscitation
- Termination Resuscitation ALS
- Termination Resuscitation BLS
- Fluid Resuscitation

Neutral

- Chest Compression devices
- Compressions directly after Defib
- CPR feedback device
- Epinephrine
- Fibrinolysis
- High Dose Epi.
- Hypertonic Saline
- Intra-Arrest Cooling
- NaHCO3
- PAI-CPR/Defib
- Vasopressin
- ECG
- Precordial Thump
- Transport to an ECMO capable facility
- IV access
- Mechanical Intraosseous Insertion
- Prehospital Lactate

Against

- ETT Drug Admin.
- Manual Intraosseous Insertion

References

1. American Heart Association. 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care. 2015. [Link]
2. American Heart Association. 2020 American Heart Association guidelines for CPR and ECC. 2020. [Link]

Practice Updates

- 2023-12-19: removed COVID-related restrictions; reintroduced continuous chest compressions

N03: Return of Spontaneous Circulation

Kevin Hons

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Reviewed: December 19, 2023

Introduction

Return of spontaneous circulation (ROSC) is the resumption of sustained perfusing cardiac activity following cardiac arrest. Regardless of the cause of the cardiac arrest, the hypoxemia, ischemia, and reperfusion that occur during cardiac arrest and resuscitation may damage multiple organ systems. The severity of this damage can vary widely among patients, and even among organ systems within individual patients.

Effective post–cardiac arrest care consists of identification and treatment of the precipitating cause of cardiac arrest, combined with the assessment and mitigation of ischemia and reperfusion injury to multiple organ systems. In the out-of-hospital environment, ROSC management is oriented towards maintaining appropriate oxygenation, ventilation, and hemodynamics, while attempting to identify the precipitating cause, and initiating rapid conveyance to hospital for further diagnostics and interventions.

Essentials

- Target oxygenation and ventilation to an SpO_2 of 92-98% and $EtCO_2$ of 30-40 mmHg.
- Avoid hypotension; the target systolic blood pressure is > 90 mmHg (or a mean arterial pressure > 65 mmHg).
- Limit fluid bolus to a maximum of 20 mL/kg unless treating suspected hypovolemia.
- Allow approximately 10 minutes of perfusion before attempting to acquire a 12-lead ECG.
- Elevate the head of cot to 30° where possible.
- Allow passive cooling via minimal blankets and using room temperature saline when fluid bolus is required; do not allow passive cooling in cases of traumatic cardiac arrest.
- Manage dysrhythmias in accordance with the appropriate CPG.
- Consult the Post Arrest Checklist for additional guidance.
- Consider the etiology of the cardiac arrest and treat according to appropriate CPG.

Additional Treatment Information

- Manage the airway in a staged approach based upon license level.
  - If the patient is able to maintain adequate oxygenation and is ventilating effectively, provide supplemental oxygen only. Titrate oxygen flow rates to the minimum required to maintain $SpO_2 \geq 94\%$. If pulse oximetry is unreliable because of peripheral perfusion deficits, use the highest available oxygen concentration.
  - Patients who remain comatose following a return of spontaneous circulation may have an advanced airway (either a supraglottic device or an endotracheal tube) placed. Maintain $EtCO_2$ between 30-40 mmHg.

    Monitor the patient for changes in level of consciousness, and consider the need for sedation or removal of the airway device should a gag reflex return.
- Hypotension may be managed with normal saline boluses up to 20 mL/kg as required. Large volumes of saline are associated with poor outcomes; paramedics should aim to maintain a systolic blood pressure of 100 mmHg (or a mean arterial pressure of 65 mmHg).
- EPINEPHrine is the preferred vasopressor in post-arrest care.
- The initial post-arrest phase can have bizarre and atypical cardiac rhythms. Treat sustained dysrhythmias in accordance with the appropriate guidelines. Allow at least 10 minutes following the return of spontaneous circulation for the rhythm to stabilize prior to acquiring a 12-lead ECG.
- Except in cases of traumatic cardiac arrest, allow for passive cooling.
- Elevating the head of bed to 30° promotes cerebral drainage and reduces the incidence of cerebral edema and aspiration.
- Check blood sugar and treat hypoglycemia accordingly.

Referral Information

Patients who have been resuscitated from cardiac arrest and who have an identified STEMI on 12-lead ECG, or who have a suspected cardiac cause of their arrest, should be conveyed to the closest PCI centre. If there is no PCI centre within a reasonable conveyance time, the closest hospital must be selected.

Post-arrest patients with suspected non-cardiac causes should be conveyed to the closest hospital.

General Information

- In patients who achieve ROSC after out-of-hospital cardiac arrest, subsequent morbidity and mortality are due largely to the cerebral and cardiac dysfunction that accompanies prolonged systemic ischemia. This syndrome, called the post cardiac arrest syndrome, comprises anoxic brain injury, post cardiac arrest myocardial dysfunction, systemic ischemia/reperfusion response, and persistent precipitating pathology.
- In-hospital treatment for post cardiac arrest syndrome will vary depending on the length of the cardiac arrest, the cause of the arrest, and the pre-existing co-morbidities of the patient.
- In a series in which consecutive post–cardiac arrest patients with a suspected cardiovascular cause were taken to coronary angiography, a coronary artery lesion amenable to emergency treatment was found in 96% of patients with ST elevation and in 58% of patients without ST elevation.
- Although targeted temperature management has been shown to be beneficial in post-arrest care in the hospital environment, there is no evidence to suggest that active out-of-hospital cooling has a positive effect on either survival or neurological recovery. Evidence has demonstrated that large infusions of cool normal saline can adversely affect outcomes.
- Hypothermia < 35°C has a negative effect on the clotting cascade and therefore should be avoided in ROSC following a traumatic cardiac arrest.
- The clamshell can be an excellent tool in extricating the non-traumatic post-arrest patient. Once the patient has been extricated to the stretcher, the clamshell should be removed to allow 30° head up positioning.

Interventions

First Responder

- OPA/BVM/O_2 as required
  - → A07: Oxygen Administration
  - Airway management by EMR and FR licensed responders who cannot insert an iGel should provide a tight seal with the BVM using a 2-person technique where possible; an inline viral filter should be used between the mask and the bag-valve device

Emergency Medical Responder – All FR interventions, plus:

- Oxygenation and ventilation
  - OPA/BVM/O_2 as required to maintain SpO_2 92-98%
    - → A07: Oxygen Administration
    - → B01: Airway Management
    - Airway management by EMR and FR licensed responders who cannot insert an iGel should provide a tight seal with the BVM using a 2 person technique where possible; an inline viral filter should be used between the mask and the bag-valve device.
- Head up 30° on cot
- Passive cooling
- Rapid conveyance
- Refer to Post-Arrest Checklist

Primary Care Paramedic – All FR and EMR interventions, plus:

- Oxygenation and ventilation
  - Consider Supraglottic Airway (SGA)
    - → PR08: Supraglottic Airway

        - If required, the airway should be managed using an iGel with a viral filter pre-connected before insertion or 2 person bag-valve-mask ventilation using a viral filter and a tight mask seal
- Hypotension
    - Establish IV access and administer fluid bolus
        - → D03: Vascular Access
- Refer to Post-Arrest Checklist

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Oxygenation and ventilation
    - Consider intubation early if not already done
    - Target SpO_2 to 92%-98%
    - End tidal CO_2 monitoring ($EtCO_2$): 35-45 mmHg
- Hypotension
    - Push dose EPINEPHrine
        - Target systolic blood pressure > 90 mmHg
        - Target mean arterial pressure > 65 mmHg
- Dysrhythmia
    - Treat as per appropriate CPG
- Perform 12-Lead ECG (minimum 10 minutes post-ROSC)
    - → PR16: 12-Lead ECG
- Refer to Post-Arrest Checklist

Evidence Based Practice

Post-Cardiac Arrest Care

Supportive

- Inotrope
- Antiarrhythmic - Class I (Na+ channel blockers)
- Optimal Trip Destination

Neutral

- Oxygen
- Oxygen-titrated
- Post-arrest cooling
- Post-Arrest Cooling (CCT)
- 12-Lead ECG

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Callaway CW, et al. Part 8: Post–cardiac arrest care: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care. 2015. [Link]
3. Stub D et al. Post cardiac arrest syndrome: A review of therapeutic strategies. 2011. [Link]

Practice Updates

- 2023-12-19: removed COVID-related restrictions

N04: Traumatic Cardiac Arrest

Adam Greene and Scott Haig

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Reviewed: December 19, 2023

Introduction

A traumatic cardiac arrest is a cardiac arrest that occurs secondary to either blunt or penetrating trauma. The most common cause of traumatic cardiac arrest is hemorrhage. Other causes include tension pneumothorax, cardiac tamponade, and hypoxemia. Although traumatic cardiac arrest has a high mortality rate, the neurological outcomes are better in those who survive compared to other causes of cardiac arrest. Patients who have some signs of life upon the arrival of paramedics or EMRs/FRs, or who initially present in pulseless electrical activity, and who subsequently achieve a return of spontaneous circulation, have the greatest probability of survival to hospital discharge.

Successful resuscitation requires simultaneous attention to assessment, airway management, and hemorrhage control.

Essentials

- Consider underlying medical causes of the cardiac arrest.
- Prioritize treatment of reversible causes over chest compressions in order of clinical precedence.
- Simultaneously attempt to identify and treat:
  - Hypovolemia
  - Hypoxemia
  - Tension pneumothorax
- Consider special circumstances.
- Consider discontinuing resuscitation efforts if interventions do not result in a return of spontaneous circulation.
- CliniCall consultation required to discuss treatment plan or early conveyance options.

Additional Treatment Information

- Interventions in traumatic cardiac arrests should be prioritized based on clinical relevance. Paramedics and EMRs/FRs should focus initially on controlling major hemorrhage through the appropriate use of direct pressure, tourniquets, and wound packing.
- Advanced airway management should not delay conveyance in urban areas where the traumatic arrest is the result of penetrating chest trauma, the presenting rhythm is PEA, and the time from loss of pulses to a trauma centre is less than 15 minutes (20 minutes in the Vancouver Coastal-Urban region).
- Bilateral needle thoracentesis should be performed on all traumatic arrests with blunt or penetrating chest trauma. The preferred site for needle thoracentesis is the 5th intercostal space in the mid-axillary line. An alternative site is the 2nd intercostal space on the mid-clavicular line, although this requires catheters longer than 5 cm.
- Obtain large-bore intravenous (or intraosseous) access and administer a bolus of 20 mL/kg.
- In blunt force cardiac arrest, a pelvic binder may be applied after addressing other reversible causes. If a pelvic fracture is suspected of being a significant contributing factor, the binder should be placed earlier.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.

General Information

- The primary etiologies targeted by out-of-hospital treatments include hypoxia, obstructive shock (specifically

tension pneumothorax), and hypovolemia.

- Patients frequently present in an organized electrical rhythm on the monitor with no palpable pulses. It has been shown that in these situations, there is often a low perfusion state due to hypovolemia or vascular and cardiac obstruction preventing adequate perfusion. For management of major hemorrhage, volume replacement with large NS bolus or bilateral chest decompression may result in ROSC.
- Traumatic cardiac arrests with an initial rhythm of asystole or wide complex PEA of less than 40 beats per minute, are generally associated with poor outcomes. It is reasonable to consider early discontinuation of resuscitation if there is no response to treatment.

Interventions

First Responder

- Airway management by EMR and FR licensed responders who cannot insert an iGel should provide a tight seal with the BVM using a 2 person technique where possible. Chest compressions should pause for ventilations using a 30:2 ratio. An inline viral filter should be used between the mask and the bag-valve device.
- Simultaneous on-scene correction of reversible causes:
  - Hypovolemia: control external hemorrhage, splint pelvis/fractures
  - Oxygenation: consider appropriate airway adjunct; maximize oxygenation
    - → A07: Oxygen Administration
- High quality CPR when practical:
  - Rate (100-120/min) continuous compressions
  - Depth: At least 5 cm (2 inches)
  - Ensure full chest recoil
  - Minimize interruptions of compressions
  - Relieve compressor every 2 minutes, or sooner if fatigued

Emergency Medical Responder – All FR interventions, plus:

- Consider primary medical cause – see N02: Adult Cardiac Arrest
- Prioritize treatment of reversible causes over chest compressions based on clinical need:
  - Tension pneumothorax (see H06: Chest Trauma)
  - Hypovolemia (see D01: Shock and D02: Bleeding)
  - Cardiac tamponade
- Consider recognition of life extinct – see R03: Recognition of Life Extinct
- Discontinue in cases of obvious death:
  - Transsection
  - Decapitation
  - Incineration
  - Cranial and cerebral destruction

For blunt traumatic cardiac arrest:

- Carefully review the history of the event. It can be difficult to determine if a medical event preceded the traumatic injury, or if severe trauma resulted in the cardiac arrest. Resuscitation is unlikely in patients with signs of major trauma, and the absence or loss of pulses and respiration (whether after the initial assessment and rapid trauma survey, or during conveyance). Contact CliniCall to discuss discontinuation instructions.
- Consider the possibility of an underlying medical cause in traumatic arrests that present with injuries consistent with lower levels of blunt force.

For penetrating traumatic cardiac arrest:

- This is a unique scenario where rapid surgical intervention may allow for control of a bleeding site and subsequent resuscitation. Time is critical: transport to a Lead Trauma Hospital *or* the closest emergency department if time of loss of pulse/respiration is **less than 15 minutes**. In cases where transport time is greater than 15 minutes, consult with CliniCall for discontinuation instructions.

If CliniCall is unreachable, and transport times exceed 15 minutes, discontinuation of resuscitation is appropriate regardless of whether the traumatic injuries are blunt or penetrating.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Simultaneous on-scene correction of reversible causes:
  - Hypovolemia
    - Establish vascular access, consider 20 mL/kg fluid bolus
      - → D03: Vascular Access
  - Oxygenation:
    - Consider supraglottic device
      - → PR08: Supraglottic Airway
    - If required, the airway should be managed using an iGel with a viral filter pre-connected before insertion or 2 person bag-valve mask ventilation using a viral filter and a tight mask seal

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Simultaneous on-scene correction of reversible causes:
  - Oxygenation
    - Consider supraglottic device, endotracheal intubation, or surgical airway
  - Tension pneumothorax
    - Bilateral needle thoracentesis

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Simultaneous on-scene correction of reversible causes:
  - Hypovolemia
    - Consider blood product resuscitation
  - Tension pneumothorax
    - Bilateral needle thoracostomy.
  - Pericardial tamponade
    - Pericardiocentesis

Evidence Based Practice

Traumatic Arrest

Supportive

- BVM
- Hemorrhage control
- HEMS
- Needle Decompression
- Thoracostomy
- Thoracotomy

Neutral

- Advanced airway
- Termination of Resuscitation (Blunt)
- Termination of Resuscitation (Penetrating)

Against

- Epinephrine

- Spinal immobilization

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. American College of Surgeons. Advanced Trauma Life Support Student Course Manual. 10th Edition. 2018. [Link]
3. Sinz E, et al. ACLS for Experienced Providers: Manual and Resource Text. 2015.

Practice Updates

- 2021-10-20: Added discontinuation and conveyance criteria to EMR interventions.
- 2023-12-19: removed COVID-related restrictions