



PRE-HOSPITAL CARE STANDARD OPERATING PROCEDURE
NON-TRAUMATIC CARDIAC ARREST AND QUALITY CPR

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AIMS

To outline the additional care that the HEMS team can provide when treating non-traumatic cardiac arrest on scene and to outline post-resuscitation care in the event of return of spontaneous circulation (ROSC).

BACKGROUND

Between 2008 and 2009, Essex and Herts HEMS were tasked to around 100 non-traumatic cardiac arrests. This is approximately two patients per week across the two counties. In addition to running standard ALS protocols, HEMS carries specialist equipment to improve the quality of CPR. The use of an active compression-decompression device (CardioPump) along with an impedance threshold device (ResQPOD) aims to optimise coronary and cerebral perfusion during the resuscitation attempt. The ETCO₂ value can be used as an indication of the quality of CPR that is in progress. Survival from out-of-hospital cardiac arrest is more likely if ROSC occurs on scene and prior to transport to hospital. In the event of ROSC, HEMS will induce therapeutic hypothermia, which has been shown to improve the likelihood of a neurologically intact survival in patients with out-of-hospital VF arrest to discharge from hospital, with a number needed to treat of six. The attendance of HEMS may also alter the triage decision as certain patients may be suitable for transport to a PPCI centre.

POLICY

Active compression-decompression device (Ambu CardioPump)

1. Apply the device immediately upon confirmation of cardiac arrest
2. Position the device in the centre of the chest (the chest may need to be dried if wet)
3. Grab the device handle with both hands, placing the heels of the hands near the gauge with the wrists bent
4. Compress and decompress with shoulders directly over the patient, arms outstretched and elbows locked, Use large muscles of the thigh to lift and compress, bending at the waist

5. Compress the chest 1-2 inches and note on the force gauge how much that depth translates to. The red arrow tip indicates the force being applied. Diagrams adjacent to the force gauge represent a soft compliant chest, a chest of average compliance and a rigid non-compliant chest. Once the amount of force required to achieve optimal compression has been identified, use this force for all subsequent compressions.
6. Decompress the chest by lifting upwards immediately following each compression until the red arrows on the force gauge registers between -20 and -30 lbs of force. If the suction cup dislodges during decompression, reposition it with the next compression
7. Use an equal amount of time for decompression as is used for compression.
8. The CardioPump has an internal metronome. Use the metronome as a guide for compressing and decompressing at a rate of 80 per minute. This is a slower rate than is recommended for standard CPR to allow sufficient time for blood to return to the chest during the active decompression phase of the cycle
9. Swap the user of the CardioPump every 3-5 minutes, or earlier if the quality of CPR is deteriorating due to fatigue
10. Clean the CardioPump after each use with antimicrobial wipes. Do not immerse the device in water

Impedance threshold device (ResQPOD)

1. Begin using the ResQPOD as soon as cardiac arrest is confirmed. It can be used with facemask ventilation, with the laryngeal mask airway (LMA), and with an endotracheal tube (ETT)
2. ResQPOD with an ETT or LMA
 - a. Confirm ETT or LMA placement as per SOP and secure
 - b. Connect the ResQPOD directly to the ETT or LMA
 - c. Connect the ventilation circuit to the ResQPOD (circuit: EasyCap, HME filter, catheter mount, mainstream ET_{CO}₂ detector) and to the ventilation source
 - d. Remove the clear plastic tab from the ResQPOD and ventilate asynchronously at a rate of 6-8 breaths per minute
 - e. Perform continuous chest compressions with the CardioPump (see above) and follow ALS protocols
3. ResQPOD with facemask ventilation (secure a definitive airway as soon as possible)
 - a. Connect the ResQPOD directly to the facemask

- b. Open the airway and place airway adjuncts
 - c. Connect the ventilation source to the ResQPOD, perform 2-person bag-valve-mask ventilation at a rate of 30:2 using the Cardipump, and follow ALS protocols
4. The ResQPOD is a single-use device and should be discarded after use
5. Unless positive pressure ventilation with no synchronised breathing is immediately instigated, remove the ResQPOD when ROSC is achieved. For most HEMS patients who have ROSC, the ventilator circuit (including the ResQPOD) may be left intact as the patient will be cooled, sedated, and paralysed prior to onwards transport

Post-ROSC care

Therapeutic hypothermia should be induced during the resuscitation attempt or immediately after ROSC, regardless of the initial cardiac rhythm (see SOP: therapeutic hypothermia). A 12-lead ECG should be obtained (see SOP: acute coronary syndromes).

Triage and transfer

The triage decision in Essex and Herts will depend on the location of the incident, the local hospital resources available and the availability of the aircraft (taking into consideration adverse weather and last daylight landing times). Most patients will need to be transferred to the nearest Emergency Department in a hospital with an adult Intensive Care Unit. It will be unusual in Essex or Herts for an aero-medical transfer to be required in this situation. There will be a group of patients who meet the criteria for transfer to the nearest PPCI centre. The nearest PPCI centre may be a land transfer or an aero-medical transfer, and this should be discussed with the pilot and the on-call PHC consultant.

Patients who have suffered one cardiac arrest are relatively more likely to suffer another. In the case of a land transfer, the patient should have defibrillation pads applied and remain fully monitored. Cardiac arrest drugs and the CardioPump should be immediately to hand, and both the land crew and the aircrew should discuss a plan for deterioration into cardiac arrest prior to leaving the scene. In the event of an aero-medical transfer, the defibrillation pads and monitoring are applied and the aircrew should plan for deterioration into cardiac arrest whilst in flight prior to lifting from the scene. The pilot should be asked to confirm that electrical

defibrillation in-flight is allowed if necessary and the medical crew must ask permission to remove harnesses in flight should clinical intervention be required. Cardiac arrest drugs should be available in the cabin along with the CardioPump. Whether to land as soon as possible or to continue to the hospital destination is a decision that must be taken as a crew on a case by case basis.

Key Performance Indicators

A KPI sticker should be attached to the documentation concerning every non-traumatic cardiac arrest attended by the team. The EHAAT audit standard is that all PRFs have a sticker attached and that all KPIs are met for each patient. It will be unusual that one of the KPIs is deliberately omitted, but in this case, the run sheet should be clearly annotated with the reason for non-compliance. See Cardiac Arrest KPI stickers (version 2).