Emergency Medical Retrieval Service (EMRS)

www.emrs.scot.nhs.uk

Standard Operating Procedure

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<th>Post-cardiac arrest</th>
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<td>Version</td>
<td>2.0</td>
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<tr>
<td>Related Documents</td>
<td>EMRS SOP ACS</td>
</tr>
<tr>
<td>Author</td>
<td>A Inglis, EJ Trayner, G Critchley</td>
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<tr>
<td>Reviewer</td>
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Aims

To clarify issues surrounding the management of post-cardiac arrest patients and involvement of EMRS

Background

- Management of post-cardiac arrest patients in rural centres can be an unfamiliar and challenging prospect.
- Around 1 in 8 cardiac arrests are admitted to ICU and 1/3 of these survive to hospital discharge
- The SOP aims to inform decision making and patient management decisions.

Application

Clinical staff in centres referring patients to EMRS
EMRS clinical staff
SAS Airwing

Patients appropriate for EMRS activation

Those post-arrest patients with a reasonable prospect of survival
Advice prior to team arrival

Cardiac arrests should be managed in accordance with Resuscitation Council UK guidelines (2010)

Post cardiac arrest the patient should be managed in accordance with Intensive Care Society guidelines ‘Standards for the management of patients after cardiac arrest’ (2008)

1) Some patients will rapidly regain stability, independent of continued support. This would be more likely in previously fit patients with no significant cardiorespiratory history and after an arrest due to a sudden arrhythmia. These patients may require early discussion with a cardiologist (see EMRS SOP ACS or local guidelines)

2) Some patients will require ongoing management of the underlying precipitant of the arrest e.g. an overdose, tension pneumothorax or severe asthma. Management of the precipitant is likely to determine appropriate triage

3) Some patients will require ongoing cardiorespiratory support including those with a reduced conscious level. This group can be particularly challenging to manage. This SOP is primarily concerned with these patients

Key points from the history

1) Of event,
   • Was the arrest witnessed, if so at what time?
   • If unwitnessed, when was the patient last seen before the arrest?
   • Was there any bystander CPR carried out before arrival of a trained health professional? If so for how long?
   • What was the arrest rhythm when monitoring was first attached?
   • How many attempts at defibrillation were made?
   • How many two minute cycles of CPR were carried out?
   • How long before ‘return of spontaneous circulation’ (ROSC)?
   • Was there a precipitant for the arrest (4Hs + 4Ts)?
   • Is there evidence of an acute coronary syndrome (ACS)?

2) Past medical history,
   • Is there other evidence of cardiovascular disease? (previous ischaemic heart disease, cerebrovascular disease, hypertension, type II diabetes etc.)
   • Is there previous evidence of respiratory disease? (COPD, smoking etc.)
   • What medications does the patient take?
   • Cardiorespiratory functional status of patient, exercise tolerance etc.
Further management

- Prognostication post cardiac arrest can be difficult
- In patients with a history of severe cardiac / respiratory disease with escalating levels of support post-arrest, survival may be unlikely.
- In such cases careful discussion with the family and withdrawal of care may be the most appropriate option
- In these cases it may be helpful to discuss with critical care / EMRS to determine whether transfer to an Intensive Care Unit would be appropriate
- Universally treat aggressively and optimally, until there is sufficient information to make a decision to continue, limit, or withdraw

Post-cardiac arrest syndrome

This requires active management that should be viewed as a continuation of resuscitation, a 'post cardiac arrest care bundle', including;

| A | Unstable patients for active treatment should remain intubated and ventilated |
| B | Controlled ventilation to $\text{SaO}_2$ of 94-98% and normal $\text{PaCO}_2$ |
| C | Arterial line if possible  
Catheterise and monitor urine output  
Treat cardiac failure (EMRS SOP Cardiogenic pulmonary oedema)  
Consider the need for coronary reperfusion (PCI / Thrombolysis) if evidence of coronary artery occlusion (see EMRS SOP ACS or local guidelines)  
Maintain Mean Arterial Blood Pressure (MAP) sufficient to ensure $> 0.5$ ml/kg/hr urine output (usually $> 65$ mmHg, higher in previously hypertensive)  
Hypotension requires placement of a CVP line and if unresponsive to fluid challenge requires inotropic support  
Aim for serum Potassium of $4.0 - 4.5$ mmol/L  
Maintain blood Glucose of $4.5$ to $8.0$ mmol/L |
| D | Obtunded patients require sedation, intubation and ventilation  
Treat seizures (sedation + phenytoin if needed) |
| E | Consider therapeutic hypothermia (see appendix)  
Otherwise maintain normothermia  
Hyperthermia ($>37^\circ\text{C}$) should be aggressively treated |

Ongoing continuous monitoring is required
**Investigations**

*Where possible* the following are useful (may not be available in some centres)

<table>
<thead>
<tr>
<th>1. Bloods</th>
<th>Arterial gases</th>
<th>To monitor and refine ventilation / resuscitation</th>
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<tbody>
<tr>
<td></td>
<td>FBC</td>
<td>Avoid anaemia</td>
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<tr>
<td></td>
<td>U+E</td>
<td>Magnesium</td>
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<td></td>
<td>Troponin</td>
<td>Baseline</td>
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2. Cardiac
   - 12 lead ECG
   - Echocardiography

3. Chest X-ray

**EMRS referral** to the duty retrieval consultant (via 0141 887 9111) should follow the ISOBAR format;

- Identifiers,
- Situation,
- Observations,
- Background,
- Assessment
- Recommendations

- In cases where transfer to ICU is agreed as appropriate, intubation, sedation, ventilation and monitoring should be continued pending EMRS arrival
- The need for transfer should be reviewed in patients with requirements for increasing support or further cardiac arrest

**References**

- AHA Policy statement; Regional Systems of Care for Out-of-Hospital Cardiac Arrest *Circulation*. 2010; 121: 709-729
- Part 9: Post-Cardiac Arrest Care : 2010 AHA Guidelines *Circulation* 2010; 122: S768 - S786
Appendix: **Targeted Temperature Management (TTM) after cardiac arrest**

The **International Liaison Committee on Resuscitation (ILCOR) consensus statement on post-cardiac arrest syndrome** states that:

- Therapeutic hypothermia should be part of a standardised treatment strategy for comatose survivors of cardiac arrest.
- Two randomized clinical trials and a metanalysis showed improved outcome in adults who remained comatose after initial resuscitation from out-of-hospital VF cardiac arrest and who were cooled within minutes to hours after ROSC.
- Four studies reported benefit after therapeutic hypothermia in comatose survivors of out-of-hospital non-VF arrest and all rhythm arrests.
- Mild hypothermia is the only therapy applied in the post cardiac arrest setting that has been shown to increase survival rates.

and recommends that:

- Unconscious adult patients with spontaneous circulation after out-of-hospital VF cardiac arrest should be cooled to 32—34 °C for at least 12—24 hours
- Induced hypothermia might also benefit unconscious adult patients with spontaneous circulation after non-VF in-hospital arrests
- NB **ILCOR update: Targeted Temperature Management following cardiac arrest** (2013)

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<th>Contraindications to therapeutic hypothermia:</th>
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<td>- pregnancy</td>
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<td>- major trauma or bleeding</td>
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<tr>
<td>- coagulopathy</td>
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<tr>
<td>- other possible cause of coma</td>
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<td>- cardiogenic shock (SBP&lt;90mmHg despite inotropes)</td>
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<td>- Poor prognosis due to co-morbidity or prolonged time without CPR.</td>
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**Prior to EMRS arrival;**

If it is agreed that therapeutic hypothermia is appropriate for a comatose, post-arrest patient

1. **Prior to cooling a patient must be intubated, ventilated, sedated and paralysed**
2. Begin cooling by whatever means available (exposure, ice packs, fan, etc.).

**EMRS management;**

- **Take equipment from EMRS base: Cold Fluids Transport Box with 2 litres cold Hartmann’s & 4 instant cold packs – BOX NEED TO BE STOCKED WITH COLD FLUID FROM FRIDGE PRIOR TO LEAVING BASE**
- Cooling does not take priority over ALS and medical treatment
- Aim to cool as soon as possible to target temperature of 32-34°C within 4 hours using:
- Apply activated instant cold packs to groins and axillae, minimal covers
- Sedation & paralysis to prevent shivering
- 30ml/kg of cold Hartmanns via peripheral line over 30 mins if no pulmonary oedema

- Full monitoring including nasopharyngeal temperature, defib pads attached

**Equipment**

- Cold Fluids Transport Box
- 2 litres of cold Hartmann’s solution
- Stored in fridge (Stock Level 4000mls)
- 4 instant cold packs (Box 00 in kit room)

  Instant cold packs and fluid must be replaced after use

**Instant Cold Pack (single use)**

To use:

- Shake contents to bottom of bag
- Locate inner pouch and squeeze firmly to break
- Shake well to mix contents

**Triage** *(see EMRS SOP Triage)*

- Patients with evidence of acute coronary artery occlusion (see EMRS SOP ACS):
  - should be discussed with the appropriate interventional cardiology centre (Clydebank / Aberdeen)
  - cardiac arrest patients requiring EMRS activation are unlikely to reach an interventional cardiology centre within 40 minutes travelling time for primary PCI, and should be given thrombolysis if there are no contraindications and then transferred to the appropriate centre
  - Patients with contraindications to thrombolysis will require primary PCI
- Patients **without** evidence of STEMI should be triaged to the nearest DGH ICU