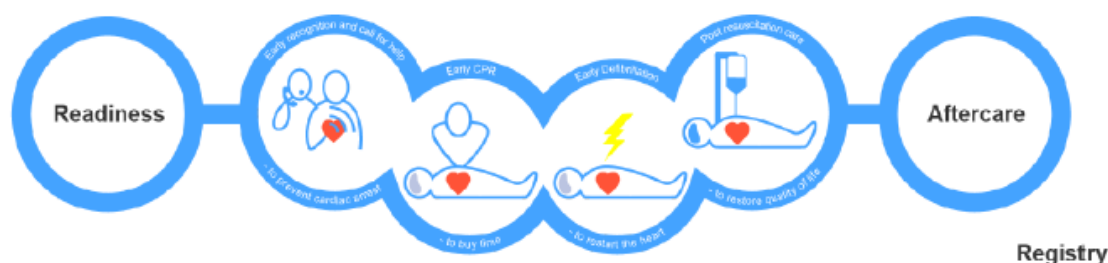


| | |
|---------------------------------------|----------------------|
| Date of OHCA | |
| Time of OHCA (or time found) | |
| Witnessed Arrest | |
| Was there bystander CPR? | |
| First recorded rhythm | VF/VT PEA ASYS |
| Time of first ROSC | |
| Time of sustained ROSC (if applic) | |
| Time of arrival in ED | |
| Time temperature management commenced | |
| Time temperature management completed | |

| | |
|------------------------|-----------------|
| Emergency Medicine SpR | Extension 23511 |
| Critical Care SpR | Bleep 2306 |
| Anaesthetic SpR | Bleep 2200 |
| Cardiology SpR | Bleep 4028 |
| CT Radiologist | Extension 23796 |

This guideline brings together the latest guidance on the management of patients who have suffered a cardiac arrest and achieve ROSC in the pre-hospital or Emergency Department setting. It should be commenced in the ED and follow the patient throughout admission.

**Cardiac Arrest Care**

[Pre-Hospital or Emergency Department Response]

Ongoing resuscitation

As per ALS guidelines

| | |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Immediate Post Arrest Care [Emergency Department] | Guideline recommendations including investigation into cause of arrest (prior to patient leaving the emergency department) |
| Standard Post Arrest Care | Post arrest care should be commenced immediately in the context of sustained ROSC, regardless of location of patient |
| Airway | If patient remains comatose post ROSC secure airway by means of RSI |
| Bloods +/- toxicology | Routine bloods should be obtained including full haematology and biochemistry profile (FBC, U&E, LFT, CK, coag) |
| ECG | In post OOHCA patients with ST elevation, urgent angiography +/- PCI should be undertaken. Consider urgent angiography for patients with LBBB, severe haemodynamic or electrical instability |
| CT head and CTPA | In patients without evidence of myocardial ischaemia, a CT head and CTPA should be performed prior to admission to critical care to exclude a neurological or respiratory cause of arrest. |
| Debrief | STOP5 Hot Debrief Tool to include all relevant staff (ED, SAS, Critical Care) |

| ICU Care | General Management |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oxygenation | PO2 10-13, avoid hypoxaemia, avoid hyperoxaemia |
| Ventilation | Lung protective strategy PaCO2 4.5-6 Prophylactic antibiotics for aspiration are not recommended |
| Circulation | Arterial line and central venous access Early formal echo to quantify myocardial dysfunction (<i>within 24hrs</i>) Target MAP > 65, maintained with fluids, noradrenaline +/- inotropy (adrenaline/ dobutamine) dependent on individual patient need Dynamic measures of cardiac function are encouraged including serial echocardiography where indicated to assess trends |
| Mechanical Support | Consider mechanical circulatory support (IABP, VA ECMO) in patients with circulatory shock in whom treatment with vasopressors, fluids and inotropes is insufficient to maintain adequate organ perfusion |
| Neurology | Sedation with propofol/alfentanil should be commenced on admission, with the aim of stopping sedation after 48 hours Routine seizure prophylaxis is not recommended In clinical seizure activity following OOHCA, levetiracetam is recommended as the first line drug (see monograph). EEG evidence of seizure activity is a poor prognostic sign (see neuroprognostication section) |
| Routine Care | Glycaemic control (4-10mmol/L) Start feeding VTE prophylaxis |
| Temperature Management | Apply cooling pads on admission, target temperature of 37 degrees Maintain temperature of 37 degrees for 72 hours following admission with aggressive avoidance of pyrexia > 37.7 |

Prognostication

No single predictor of outcome is accurate. A multimodal prognostication strategy is important, with prognostication occurring for most patient groups at least 72 hours from the time of arrest.

Discussions about patient prognosis and timings of neuroprognostication should also consider aspects other than brain injury such as age, co-morbidity, organ dysfunction and patient preferences.

Investigations useful in prognostication

The following investigations should be undertaken in the following timeframes to aid multimodal neuro-prognostication

EEG (Should be undertaken at any point 24 hours – 72 hours post arrest, ideally with sedation off)

EEG in this context gives prognostic information (See box at foot of page)

Hyperlink to EEG request form :

<http://intranet.lothian.scot.nhs.uk/Directory/Neurophysiology/PublishingImages/PAEDS%20EEG%20REQUEST%20FORM%20RHSC%202020.doc>

CT imaging (should repeated at 48h post arrest)

SSEP (If available) – should be undertaken > 24 hours post arrest

Neuron Specific Enolase (NSE) (where available via biochemistry) should be undertaken at 24 and 48 hours post arrest

Clinical assessment and interpretation of investigations at 72 hours post arrest

At 72 hours, and confident sedation no longer contributing to clinical state, you should clinically assess the patient

In a comatose patient with $M \leq 3$ at ≥ 72 h from ROSC, poor outcome is likely when two or more of the following predictors are present:

- no pupillary and corneal reflexes at ≥ 72 h
- bilaterally absent N20 somatosensory evoked potential (SSEP) wave at ≥ 24 h
- highly malignant EEG at >24 h
- neuron specific enolase (NSE) > 60 mcg L⁻¹ at 48 h and/or 72 h
- status myoclonus ≤ 72 h
- diffuse and extensive anoxic injury on brain CT/MRI.

In patients in whom the above criteria are not met, there should be a further period of 24-48 hours of clinical assessment, with further additional ancillary investigations as necessary.

Prognostic Significance of EEG patterns following cardiac arrest

Presence of any highly malignant pattern or >2 malignant features on EEG has $>95\%$ specificity for hypoxic brain injury. A benign EEG (without any malignant features) is highly predictive of a good neurological outcome.

Highly Malignant EEG Patterns (As per American Clinical Neurophysiology Society)

- Suppressed background (amplitude <10 μ V) without discharges
- Suppressed background with continuous periodic discharges
- Burst-suppression background with or without discharges

Malignant EEG Patterns

- Malignant periodic or rhythmic patterns (abundant periodic discharges; abundant rhythmic polyspike-/spike-/sharp-and-wave; **presence of seizures**)
- Malignant background (discontinuous background; low-voltage background; reversed anterior-posterior gradient)
- Unreactive EEG (absence of background reactivity or only stimulus-induced discharges)

Rationale and evidence underpinning guideline update**European Resuscitation Council Guidelines**

- Published 2021, includes expanded section on neuroprognostication, recommendation for angiography +/- CTPA and CT head in investigation of cardiac arrest

Tomahawk trial <https://www.nejm.org/doi/full/10.1056/NEJMoa2101909>

- In patients without ST elevation following OOHCA, immediate angiography no benefit over delayed strategy, although trial excluded patients with haemodynamic instability and LBBB

TTM2 trial <https://www.nejm.org/doi/full/10.1056/NEJMoa2100591>

- In OOHCA, induced hypothermia did not improve mortality, functional outcome or HRQoL

EEG in Prognostication

Westhall E, Rossetti AO, van Rootselaar AF, et al. Standardized EEG interpretation accurately predicts prognosis after cardiac arrest. *Neurology*. 2016;86(16):1482-1490. doi:10.1212/WNL.0000000000002462