CSOP 032 – Medical Cardiac Arrest

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APPROVALS

Original Document Author:	Name Steve Dick, Critical Care Paramedic Dr Matthew Wyse, HEMS Doctor	Date	Signature
Revised Document Prepared by:			
Reviewed by:	Dr Stuart Reid, HEMS Doctor Keith Rutherford, Paramedic Phil Bridle, Head of Operations		
Approval:	Dr Justin Squires, Deputy Clinical Lead		
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HISTORY

Effective Date	Version No.	Summary of Amendment
	1.0	Creation of CSOP

REFERENCES

Document Reference Number	Document Title
1	Resuscitation Council UK, Advanced Life Support https://www.resus.org.uk/resuscitation-guidelines/adult-advanced-life-support/
2	Resuscitation Council UK, Prehospital Resuscitation https://www.resus.org.uk/resuscitation-guidelines/prehospital-resuscitation/
3	Resuscitation Council UK, Post-resuscitation care https://www.resus.org.uk/resuscitation-guidelines/post-resuscitation-care/
4	JRCALC Clinical guidelines

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	Brown, S. N., Kumar, D. S., James, C., & Mark, J. (Eds.). (2019). JRCALC clinical guidelines *2019*. Bridgwater: Class Professional.

1. **Purpose**
   This CSOP will describe the ethos, practice and development of medical arrest management within The Air Ambulance Service (TAAS).

2. **Scope**
   This CSOP relates to the management of all adult patients attended by TAAS who are in cardiac arrest and where the presumed aetiology is not traumatic. A comprehensive knowledge of the UK Resuscitation council ALS guidelines is a prerequisite for working on a TAAS platform, it is assumed TAAS clinicians will follow ALS guidelines as the initial basis for approaching adult cardiac arrest patients.

   Version 1.0 of this CSOP is designed as a baseline to define the current position and to provide a platform to develop from. Future updates will include specific patient pathways as they are finalised and advanced treatment modalities as they are agreed. It is expected that revisions will occur more frequently than other CSOPs as this topic is refined.

3. **Organisational objective**
   This policy should be read in conjunction with the charity's mission statements. Specifically, that *"[Our Mission is] to save lives and alleviate pain and suffering, wherever and whenever needed"*.

   TAAS critical care assets are not provided to meet gaps in normal service provision from our NHS ambulance service partners. TAAS assets should be deployed to incidents in which the extended skillset of our clinical teams is likely to provide a benefit to the patient. In rare circumstances TAAS resources may be utilised where the speed and/or location of TAAS resources are likely to provide a significant benefit.

4. **Tasking and dispatch**
   The tasking of prehospital critical care resources is the responsibility of the NHS ambulance service. TAAS recognise this and will seek to guide the services with whom we work into the most appropriate use of our resources.

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TAAS will provide a suggested dispatch algorithm for medical cardiac arrest patients, as detailed in appendix 1. It is recognised that the information required to make nuanced tasking decisions may not always be available to the ambulance service. Tasking to patients in cardiac arrest will be monitored and feedback provided to both tasking services.

The tasking criteria seeks to target TAAS resources to cardiac arrest patients who have a reasonable likelihood of achieving a return of circulation and thus post resuscitation care, those where specific interventions may be required (e.g. hysterotomy) or where it is felt that the expertise brought by TAAS clinicians may be beneficial.

The tasking criteria provided to the ambulance services is intended as guidance. TAAS crews may elect to attend incidents outside of this guidance at their own discretion. A decision not to attend an incident within these criteria should be exceptional. Any declined tasking within these guidelines should be reported immediately to the local base manager to allow for the guidance to be reviewed.

5. **Advanced Life Support**

TAAS will ensure that all TAAS clinicians have verified training and competence in ALS as evidenced by a current UKRC ALS provider certificate, in-house training delivered by TAAS training team or equivalent.

Chain of survival.

The chain of survival concept recognises that there is a requirement to deliver high quality prehospital care and deliver survivors to a place of definitive care in a timely fashion. It is important to recognise the role TAAS plays in forming links in the chain of survival but recognising that if the chain has been broken or cannot be maintained there is little TAAS can do to achieve definitive outcomes.

Initial actions

The following section seeks to provide a uniform approach to the initial management of cardiac arrest patients by TAAS clinicians. This seeks to standardise TAAS practice within the existing guidance.

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Commencing resuscitation

There may be occasions where, despite appropriate tasking, TAAS crews arrive to find a patient in whom resuscitation should not be started. Resuscitation should not be commenced where there are signs of unequivocal death, as defined by JRCALC as:

- Decomposition/putrefaction
- Hypostasis
- Rigor mortis
- Massive cranial destruction
- Hemicorporectomy
- Incineration

Further, JRCALC guidelines suggest a decision not to resuscitate can be taken for:

- Patients known to be in the final stages of an advanced and irreversible condition
- Patients with a valid DNACPR/Advanced Directive/ReSPECT form

In all other patient groups, initial resuscitation efforts should be commenced.

Immediate interventions should include establishing an airway, starting chest compressions and attaching defibrillator pads.

Note if the there is a witnessed and monitored VF or pulseless VT arrest:

- If initial rhythm is VF or pVT give up to three quick successive (stacked) shocks.
- Rapidly check for a rhythm change and if appropriate, ROSC after each defibrillation attempt
- If third shock unsuccessful commence chest compressions

Once done an assessment should be made of the potential underlying cause and whether there are features suggesting a potentially good prognosis or conversely it may become apparent that there is no realistic chance of successful resuscitation.

Signs of cases with potentially good prognosis as determined by evidence of end organ perfusion

- Spontaneous movement of limbs, eyes or respiratory activity
- ETCO2 that is above 3.0kPA or rising with Mechanical or Manual chest compression
- Monitored BP whilst Mechanical chest compression
- Good peripheral perfusion and no venous stasis.

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JRCALC uses the following wording in respect of stopping CPR.
When **ALL** of the following exist together:

- > 15 minutes have elapsed since the onset of cardiac arrest
- No evidence of bystander CPR in the 15 minutes before the arrival of the ambulance
- Exclusion factors are absent (drowning, hypothermia, poisoning/overdose, pregnancy, child/neonate, trauma)
- Asystole >30 seconds on ECG (CPR should only be paused once all other criteria are met)

Ongoing resuscitation

Where there are no criteria to stop resuscitation and where there are good prognostic signs, resuscitative efforts should be continued. It is inevitable that for some cases there is genuine uncertainty as to where the patient is on the spectrum of highly likely to highly unlikely to be successful in being resuscitated. In these cases then resuscitation should be actively pursued until the clinical picture becomes clearer.

The initial priorities in the early phase of resuscitation are:

- Secure the airway with a **supraglottic airway device**
- Apply a mechanical CPR device to minimise 'hands off' time. Where a device is not available, or where the device will not function due to the patient's size, the use of defibrillator pads with a CPR feedback function is **mandatory**.
- Establish intravascular or intraosseous access
- Commence ALS drug therapy
- Gain pertinent information regarding previous medical history and the events prior to collapse.

As an enhanced care resource, TAAS clinicians must endeavour to provide the highest quality of 'standard' ALS. Specifically, the importance of high-quality CPR with minimal "time off the chest" is crucial to successful resuscitation efforts. Where mechanical CPR devices are not used, TAAS clinicians will use defibrillator pads with CPR feedback functionality. The use of these pads is mandatory wherever a mechanical CPR device cannot be used. This may require transferring the patient on to the TAAS monitor.

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The initial stages should be completed quickly by using simultaneous activity and should ideally be completed within five minutes of arriving on scene. In the majority of cases, these actions are likely to have been completed or at least started by the ambulance service resources prior to the arrival of TAAS. Having established the patient's previous medical history and the history of their collapse, a decision should be made about whether to continue resuscitative efforts. When making a decision regarding resuscitation, the default decision should be to continue until all reversible causes have been excluded.

Resuscitative interventions

Where it is determined that resuscitation efforts should continue, the following should be performed/considered.

I. Endotracheal intubation

TAAS recognise that endotracheal intubation may confer benefit in some patients, particular when performed by an experienced team. Intubation should therefore be considered in cardiac arrest patients once resources permit.

Any intubation attempts should be performed to the same standard as that of an intubation during PHEA. A team approach should be used, maximising the chances of first pass success and minimising the period of apnoea. All equipment should be prepared as it would be for a PHEA and consideration should be given to the use of the PHEA checklist to ensure all equipment is available and working. With appropriate planning it is generally possible to intubate without pausing CPR or the LUCAS device.

II. Patients in VF

In cases of refractory VF following amiodarone and where there are other factors consistent with a good prognosis consideration should be given to transportation to a Primary PCI or ECMO/ECPR centre with resuscitation ongoing. Local clinical pathways should be used to guide this decision. Further guidance is available in the TAAS Clinician Aide Memoire and the Hospital Selection and Bypass CSOP.

There is no evidence to support the routine use of magnesium in the management of VF (excluding Torsades). Double sequential shocks, provided by utilising two defibrillators, are not supported by either clinical evidence or by the device manufacturers and therefore must not be used.

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III. Pulseless Electrical Activity

Where a patient presents in PEA, ultrasound could be utilised to determine the contractility of the heart. If the heart is not contracting and all reversible causes have been corrected and there are no 'special circumstances' (drowning, poisoning, pregnancy etc.) then resuscitation should be stopped.

Where the heart is seen to contract in a synchronous manner then the chance of ROSC is greater and further efforts should be made to optimise resuscitation:

- If heart is empty give fluids
- If heart poorly contractile consider small adrenaline boluses as inotrope
- If pericardial effusion or tamponade is seen in the absence of penetrating trauma consider that myocardial or aortic root rupture has occurred in which case resuscitation will be futile. TAAS do not currently support pericardiocentesis in this situation. If it is believed that the pericardial effusion is not due to myocardial rupture in this circumstance if there is cardiac activity visualised, good prognostic signs and a reasonable chain of survival, consider whether to convey the patient to ED with chest compressions on-going.
- Consideration should be given to transporting directly to an appropriate receiving hospital if there is a response to targeted therapy.

IV. Post-resuscitation care

Following ROSC treatment should focus on preventing secondary brain and organ injury. The following should be performed to reduce these injuries:

- Target SpO2 94-98%, rapidly titrate down FiO2 in 20% increments where safe to do so. Both hyperoxia and hypoxia have been shown to contribute to further cardiac arrest and an increased frequency of additional myocardial infarction.
- Strongly consider endotracheal intubation for all patients with obtunded cerebral function. Normally do not transport patients using supraglottic airway devices unless there is a justification for doing so, such as a predicted difficult airway.
- All ventilated patients should be ventilated using the Oxylog 3000 ventilator adopting a lung protective ventilation strategy. Aim for normocapnia. Bag-valve-mask ventilation and ambulance service ventilators should only be used where TAAS equipment is unavailable.

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- Maintain mean arterial blood pressure with Adrenaline. Boluses of 10 micrograms or an infusion of 1mg in 500 mls saline (0.5mg in 250mls) carefully infused at steady rate to give MAP of >60mmHg as measured by NIPB on Zoll
- If evidence of an ST Elevation MI convey patient to a centre that offers Primary Cardiac Intervention (PPCI)

V. ECPR – Extracorporeal Cardiopulmonary Resuscitation

ECPR refers to process whereby a patient is rapidly placed on to a portable ECMO machine using femoral arterial and venous cannulas. Pre-Hospital ECPR has been pioneered in Paris and other centres. In the UK our colleagues in NWAA are selecting patients for in hospital ECPR and flying them to University Hospital South Manchester (UHSM).
For TAAS our only viable access to ECPR is UHSM and we should only consider this is UHSM is closest appropriate hospital.
Refer to CSOP 26 for patient criteria and pathways for ECPR.

Cessation of Resuscitation

It is recognised that the significant clinical experience of TAAS Paramedics and Doctors may be sought in cases outside of these guidelines where resuscitation is deemed to be futile by those on scene. TAAS clinicians should not be deployed specifically to make such decisions but may be present when such decisions need to be taken. When making a decision to withdraw resuscitation from a patient outside of the group above, TAAS clinicians should be aware that they are operating outside of national prehospital guidelines and where empirical evidence is very limited. The anticipated clinical course of a patient in hospital may well be an influence on decision making but should not be a primary factor in deciding whether to continue or cease resuscitation.

Factors which may be involved in Cessation of Resuscitation decision making

The following factors would be associated with an adverse outcome:

- Poisoning where on basis of information available there is no readily available antidote or where on-going resuscitation would place rescuer at risk (Organophosphate, cyanide, Organic solvents)
- ALS has been commenced, reversable causes have been considered and excluded.
- And when there are no positive prognostic signs
- Where signs of unequivocal death are appearing

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- When there is no chance of maintaining the chain of survival e.g. patient unable to be safely moved despite multi agency efforts.

Underlying rhythm is not the only factor to be considered. TAAS clinicians may consider ceasing resuscitation regardless of rhythm (including refractory VF) using their clinical judgement, especially if factors such as the above are present.

TAAS clinicians must be aware that any decision to terminate resuscitation outside of JRCALC or local ambulance protocols will require careful documentation. In this instance, TAAS clinicians must ensure that the patient report form is completed comprehensively. The notification of death should be completed in line with local guidance, see CSOP 007 Recognition of life extinct.

6. Research and outcome reporting

TAAS recognise the importance of continual improvement. The service will produce quarterly reports of its cardiac arrest performance using Utstein reporting criteria. The data will be collected and monitored by the taasBase system. Specific outcomes reported will be:

- Number of medical arrests attended
- Percentage of ROSCs achieved
- Percentage of ROSCs achieved in UK ambulance "Utstein comparator" group (witnessed arrest, bystander CPR, VF as first rhythm or shock advised by AED).
- Specific interventions (for instance PHEA, Calcium)

In order to establish the long-term effect of TAAS attendance at medical cardiac arrests, the service will coordinate our data collection with both EMAS and WMAS to gather the 24 hour and 30 day survival of all ROSC patients. TAAS will report cardiac arrest case load and outcomes to our tasking ambulance services. This will be done via the clinical audit leads in conjunction with the clinical liaison officer. The process will use the clinical database and will require no additional inputs from the duty crews.

7. **Continuous improvement**

There are numerous innovative treatments, interventions and devices designed to improve OOHCA outcome. It is unlikely that any of these interventions will gain empirical evidence to support their use in prehospital care. None the less, this service recognises the potential benefit that novel treatments may offer in very specific patient groups. Consequently, TAAS will remain open to the

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use of novel treatments and devices. Clinician feedback, supported by ongoing audit data, will be used to determine if a device should be evaluated and used within TAAS. The decision to approve a device or procedure for use will be made by the Clinical lead and Director of Operations, with input from the clinical governance group. Where practical, the use of novel devices and techniques will be structured to allow for publication of the results, promoting the work of TAAS and seeking to enhance prehospital care.

Review

As medical cardiac arrests currently account for 25-35% of all TAAS incidents, and the evidence is continually being updated, this CSOP will be reviewed on an annual basis. A further interim review will also be triggered following the evaluation of any novel treatments or devices.

Abbreviations/Acronym	Description
TAAS	The Air Ambulance Service
ALS	Advanced Life Support
UKRC	UK Resuscitation Council
ROSC	Return of Spontaneous Circulation
NWAA	North West Air Ambulance

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