Magpas AIR AMBULANCE

STANDARD OPERATING PROCEDURE

2.1 Advanced Life Support

Position responsible: Medical Director
Approved by: CGC

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Related Documents	Resuscitation Policy SOP 2.10 Post resuscitation (ROSC) care SOP 2.21 Resuscitative Thoracotomy SOP 2.22 Traumatic Cardiac Arrest
Further information	Resuscitation Council (UK) Pre-hospital Resuscitation Guideline European Resuscitation Council Guideline

1.0 Background

1.1 Each year 60,000 people sustain an out-of-hospital cardiac arrest (OHCA) in England for whom resuscitation is attempted in less than half. Reported return of spontaneous circulation (ROSC) at hospital is approximately 26% and survival to discharge 8%. The chain of survival describes four inter-related steps, which if delivered effectively optimize survival; (1) early recognition and call for help, (2) early bystander CPR, (3) early defibrillation, (4) early advanced life support and standardized post-resuscitation care.

1.2 The Magpas clinical team should be prepared to respond to OHCA in any age group or circumstance and should be ready to intervene at any stage of the chain of survival. However, the Magpas team are rarely first on scene therefore this SOP will focus on the approach to OHCA with other responders in attendance.

1.3 This SOP describes the actions to be taken in the event of a OHCA in adults and paediatrics.

2.0 Objectives

2.1 To standardise the optimal approach to the management of OHCA by pre-hospital emergency medical services.

3.0 Diagnosis

3.1 Cardiac arrest is a clinical diagnosis. Assess for agonal, abnormal or absent breathing, and the absence of a central pulse to confirm cardiac arrest. This should be a rapid check and should take less than 10 seconds.

3.2 Resuscitation should not be started when there is unequivocal evidence of death. Further guidance on not starting resuscitation and advance directives are given in the Magpas Resuscitation Policy.

4.0 Procedure

4.1 Magpas follows the guidance of the Resuscitation Council (UK) on management of patients in cardiac arrest or peri-arrest situations. The universal algorithms can be found at appendix 1 and 2. The objectives of initial management are to assess the rhythm, facilitate early

defibrillation and to ensure early effective CPR. All other management should fit in around these interventions. Management priorities may change once a likely working diagnosis is made.

4.2 It is easy to become task focussed in high tempo emergency situations; before proceeding ensure that the scene and attending responders are safe.

4.3 Confirm cardiac arrest

4.4 If the patient is in cardiac arrest, basic life support (BLS) should be commenced at a ratio of 30 compressions (adults) or 15 compressions (paeds) to 2 ventilations. Current guidelines emphasise the importance of effective chest compressions and now recommend a compression rate of 100 - 120/min. Ensure full release of the chest between chest compressions by avoiding leaning on the chest. Disruption to chest compressions must be minimised and must be limited only to essential tasks. Where possible, a metronome should be used to guide the rate of compressions and/or a feedback device.

4.5 BLS should continue during the application of appropriately sized multi-modality adhesive defibrillation pads in the standard anterio-lateral position. In small children the anterio-posterior (AP) pad position should be used. Chest hair should be shaved if required to improve skin contact. Any jewellery should be removed from the torso area.

4.6 The defibrillator should be used in manual mode. Energy selection in adults should follow the manufacturers guidance; most defibrillators will default and increment automatically. In children energy selection should be 4J/kg. Chest compressions should continue whilst the defibrillator is being charged.

4.7 If the ECG rhythm is VF or pulseless VT (ie shockable), a single safe defibrillation shock should be delivered followed by immediate resumption of BLS for 2 minutes.

4.8 If the ECG shows asystole or PEA (ie non-shockable), BLS should be performed for cycles of 2 minutes.

4.9 Following 2 minute cycles of BLS the rhythm should be briefly assessed and treated either as ‘shockable’ or ‘non-shockable’.

4.10 The person performing chest compressions should ideally be changed every two-minute cycle.

4.11 During resuscitation ALS interventions should be performed at appropriate intervals as not to interfere with BLS, this includes airway management and vascular access.

4.12 In resource limited environments, prolonged resuscitation and the need to move or transport patients the use of a mechanical compression device should be considered.

5.0 The Team Approach

5.1 Resuscitation requires a system to be in place to achieve the best possible chance of survival. The system requires technical and non-technical skills (teamwork, situational awareness, leadership, decision making).

5.2 On arrival establish the identity of the team leader and a brief history and management priorities. If patient safety issues are identified at this point (e.g. ineffective chest compressions, delayed defibrillation, un-managed airway) assume clinical responsibility and address these as a priority.

5.3 Team Leadership – It is most likely that one of the Magpas clinical team will be required to perform or support the team leader role. In a resource limited scenario, team leadership should occur from within the cardiac arrest team rather than stood in a traditional 'end of the bed' position.

5.4 Team roles should be allocated based on the resources and skill set of those available. It is likely that clinical resources will be limited and considerations should be given the appropriate utilisation of non-clinical responders (air crew, Police, Fire etc).

5.5 If resources allow the optimal team role allocation would be:

- **Position 1**: Airway (at head of patient) – the person must be trained and equipped to provide the full range of airway skills.
- **Position 2**: High quality chest compressions and defibrillation if needed – at patient's left side. Be prepared to alternate with the operator at position 3 to avoid fatigue.
- **Position 3**: High quality chest compressions and access to the circulation (intravenous, intraosseous) – at patient's right side.
- **Position 4**: Team leader – stand back and oversee the resuscitation attempt, only becoming involved if required. The team leader should have an awareness of the whole incident and ensure high quality resuscitation is maintained and appropriate decisions made.

6.0 Airway Management

6.1 The airway should be secured at the earliest opportunity but should not impede initial BLS. Timing of airway management should coincide with the two-minute cycles so not to delay rhythm analysis or defibrillation.

6.2 The method used to secure the airway is a clinical decision and should be based on an assessment of the condition of the airway, the risk to the airway and the resources available.

6.3 An effective supra-glottic device is suitable for most circumstances. There should be strong rationale for removing or changing this intra-arrest.

6.4 If a decision is taken to undertake endo-tracheal intubation this should be a deliberate attempt with a basic kit dump and preparation and should not compromise the delivery of chest compressions or defibrillation.

6.5 Capnometry should be used to confirm placement/effectiveness of all ETT and SGD. Capnometry can also be useful to indicate effectiveness of chest compressions, indicate a ROSC and be used as a prognosticator.

6.6 In patients with an ETT or effective SGD in situ continuous (asynchronous) chest compressions can be performed.

7.0 Ventilation

7.1 Initial ventilation should be by BVM with an appropriately sized and fitting mask. If resources allow this should be done using a two-person technique.

7.2 During BLS two ventilations should be given after 30 compressions (adults) or 15 compressions (paeds).

7.3 If performing continuous compressions ventilations should be given at a rate of 10 per minute.

7.4 Large tidal volumes should be avoided as this impedes venous return and filling compromising the effectiveness of chest compressions. PEEP should be set to zero.

7.5 Ventilators should be used with caution especially concurrently to a mechanical compression device as high intra-thoracic pressures may cause barotrauma and impede the quality of chest compressions.

7.6 Consideration should be given to gastric decompression with an oro-gastric tube as gastric filling is common following mouth-to-moth or BVM ventilation.

8.0 Vascular access

8.1 Access to the circulation should be obtained during resuscitation for the giving of drugs and fluids. Timing of vascular access should coincide with the two-minute cycles so not to delay rhythm analysis or defibrillation.

8.2 Two large points of access are preferred. The ante-cubital fossa or external jugular vein are preferred to more peripheral veins in order to facilitate the optimal administration of fluid and cardiac drugs. If intra-venous access is difficult, the intra-osseous route should be used.

9.0 Drugs

9.1 Adrenaline 1:10,000

- 1mg (adults) or 0.01mg/kg (paeds)
- IV or IO
- Immediately on confirmation of PEA or asystole
- After delivering the 3rd shock in VF or VT
- Repeated every 3-5 minutes (every other cycle)

9.2 Amiodarone

- 300mg (adults) or 5mg/kg (paeds)
- IV or IO
- After delivering the 3rd shock in VF or VT (concurrent or separate episodes)
- Repeated after the 5th shock in VF or VT – 150mg (adults) or 5mg/kg (paeds)

9.3 Fluid

- 20ml/kg
- IV or IO

9.4 Magnesium Sulphate

- 2g (adults) or 40mg/kg (paeds)
- IV or IO
- In polymorphic VT (torsade de pointes)

10.0 Reversible causes

10.1 During resuscitation, reversible causes of the arrest should be looked for and treated appropriately. These include:-

- Hypoxia – ensure adequate airway and ventilation with 100% oxygen
- Hypovolaemia – ensure that IV fluids are given
- Hypothermia – warming with blankets may help until arrival in hospital
- Hypo/hyperkalaemia/metabolic – Other than blood glucose, this cannot be measured or treated pre-hospitally. Treat hypoglycaemia with IV glucose.
- Tension pneumothorax – open thoracostomy performed
- Tamponade, cardiac – a resuscitative thoracotomy is not advocated for medical arrests
- Toxins – Gather any supporting evidence. Treat suspected narcotics overdose with Naloxone
- Thrombosis (coronary or pulmonary) - thombolysis can be considered

11.0 Shock Refractory Rhythms

11.1 A number of patients will present with shock refractory VF/pVT or recurrent episodes of VF/pVT and can be challenging to manage.

11.2 Defibrillation pads should be changed for a new set after a maximum of 12 shocks.

11.3 Alternative anterio-posterior (AP) pad placement should be considered. A higher energy can also be considered.

11.4 The underlying cause should be considered; thrombolysis or other treatment may be indicated. This can be discussed with DAD if necessary.

11.5 It may be appropriate to consider transport in these patients for further treatment in hospital. The safety and effectiveness of chest compressions in a moving vehicle should be considered and where possible a mechanical compression device should be used.

12.0 Return of Spontaneous Circulation

12.1 Return of spontaneous circulation (ROSC) represents a significant step in the resuscitation of a patient and their subsequent recovery. The care of patients post resuscitation is covered in SOP 2.10 Post Resuscitation Care.

13.0 Transport

13.1 There may be a number of reasons why transporting a patient intra-arrest may be considered - paediatric, other reversible causes, proximity, specialist treatment/pathways.

13.2 The safety and effectiveness of resuscitation should be considered and the risk balanced with clinical benefit.

13.3 It is recommended that all patients that are transported intra-arrest and conveyed by land ambulance. There may be rare circumstances where air transfer may be considered appropriate; this should be discussed with DAD.

14.0 Terminating Resuscitation

14.1 Guidance on not starting resuscitation and advance directives are given in the Magpas Resuscitation Policy.

14.2 It is a team decision to terminate resuscitation and should involve other health care providers and family where possible. Factors that should be taken into consideration include any delay in starting CPR, total length of resuscitation, pre-existing health, heart rhythm, end-tidal CO_2, and success of interventions so far. Age and pupillary reaction should not be used as prognostic markers.

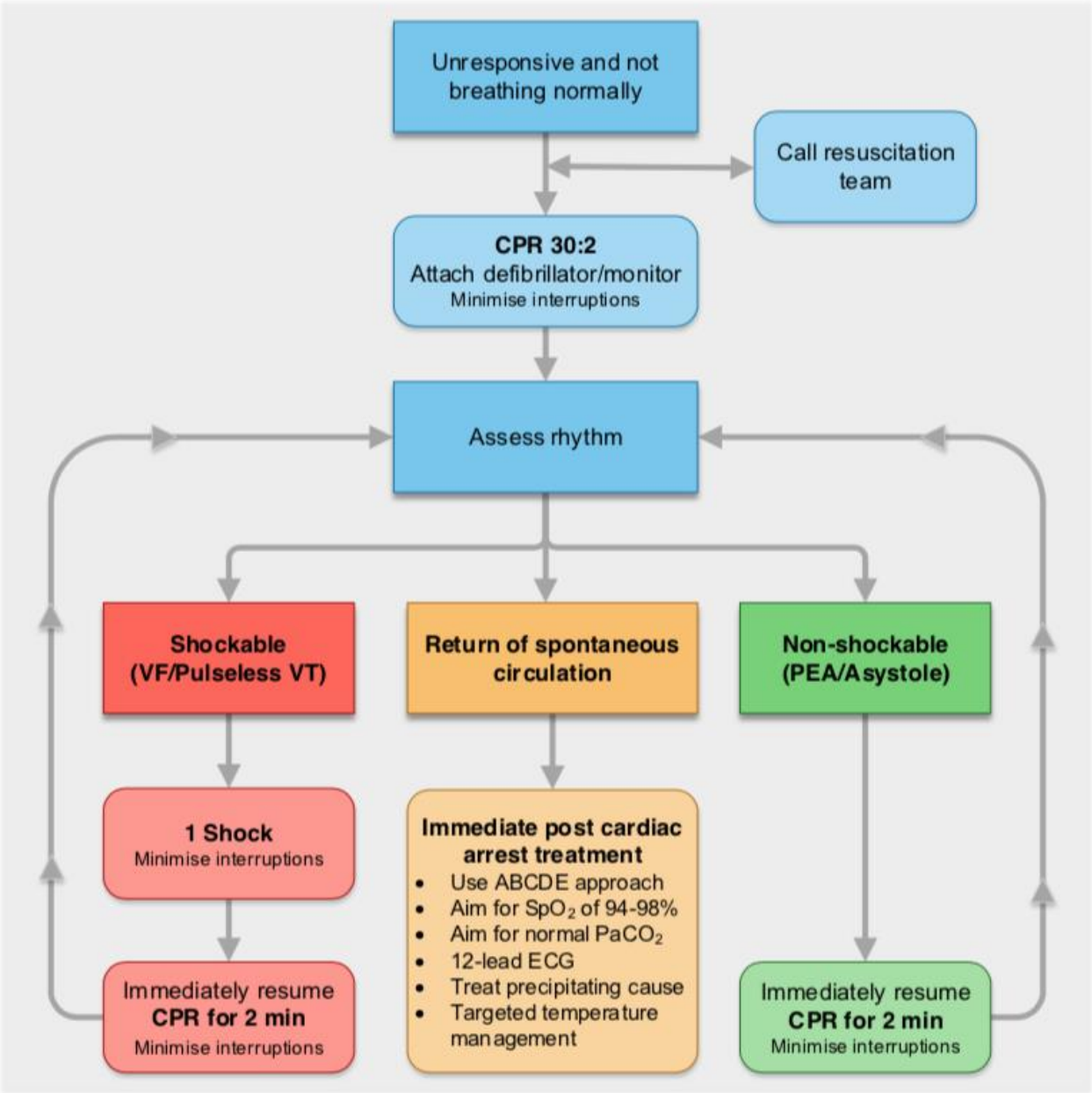
14.3 If ultrasound is available then this may be used to support prognostic decision making.

14.4 In cases of drowning, hypothermia and certain overdoses it may be advised to continue resuscitation for longer and therefore is more likely to be transported to hospital with CPR on-going.

14.5 In adults the body of the deceased is normally left in situ unless in a public place. Removal of the body to the mortuary should be discussed with the lead ambulance clinician and the Police. If resuscitation is terminated in children the body of the deceased should be transported to the nearest Emergency Department with paediatric services irrespective of the location of the arrest. Exceptions to this may be an active crime scene or some cases of expected death in terminal illness, this should be discussed and where necessary DAD involved with decision making support.

* The definition of "children" in these cases is up to the 18th birthday

Appendix 1 – Adult Advanced Life Support Algorithm



During CPR

- Ensure high quality chest compressions
- Minimise interruptions to compressions
- Give oxygen
- Use waveform capnography
- Continuous compressions when advanced airway in place
- Vascular access (intravenous or intraosseous)
- Give adrenaline every 3-5 min
- Give amiodarone after 3 shocks

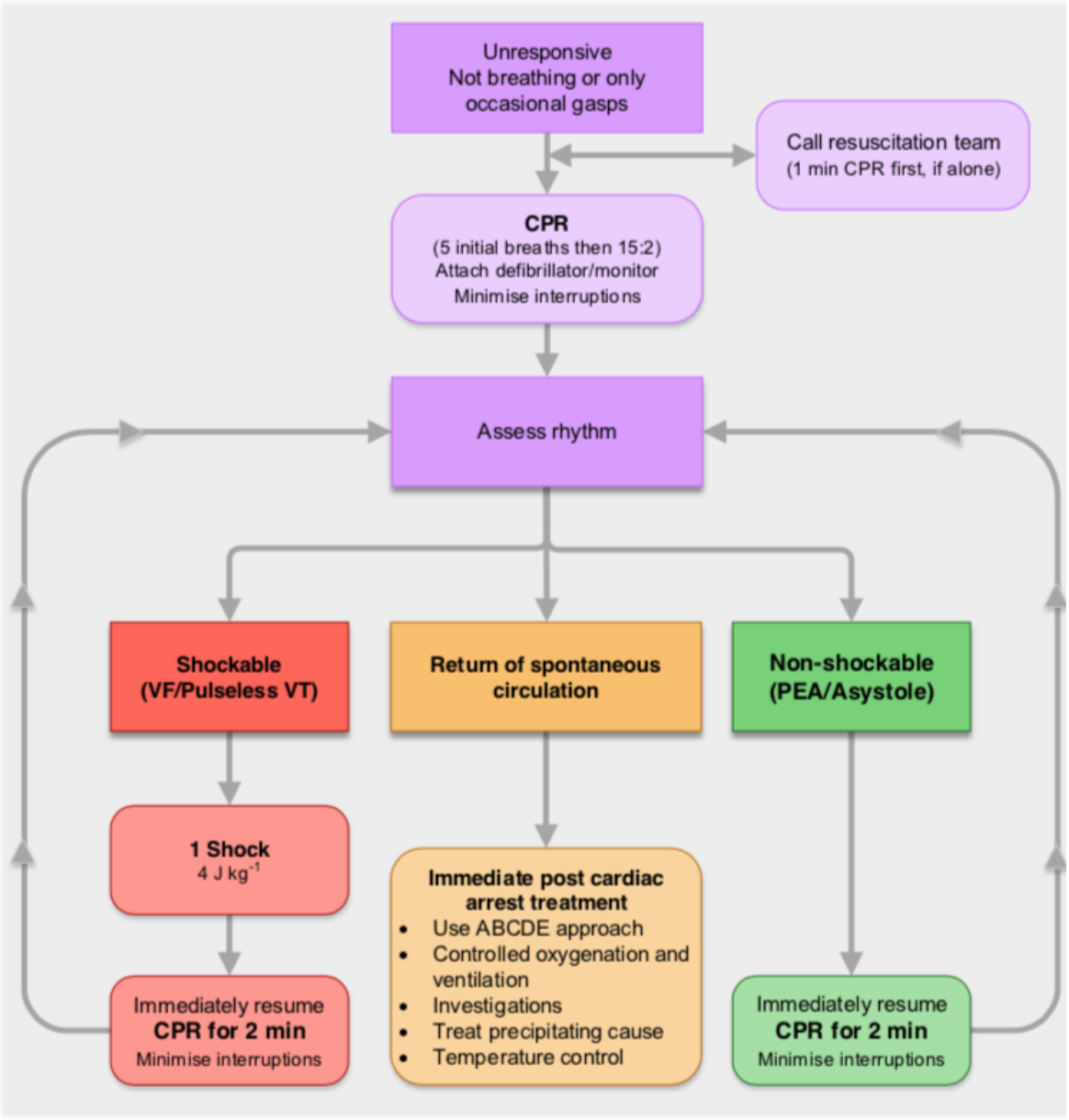
Treat Reversible Causes

- Hypoxia
- Hypovolaemia
- Hypo-/hyperkalaemia/metabolic
- Hypothermia
- Thrombosis - coronary or pulmonary
- Tension pneumothorax
- Tamponade – cardiac
- Toxins

Consider

- Ultrasound imaging
- Mechanical chest compressions to facilitate transfer/treatment
- Coronary angiography and percutaneous coronary intervention
- Extracorporeal CPR

Appendix 2 – Paediatric Advanced Life Support Algorithim



During CPR

- Ensure high-quality CPR: rate, depth, recoil
- Plan actions before interrupting CPR
- Give oxygen
- Vascular access (intravenous, intraosseous)
- Give adrenaline every 3-5 min
- Consider advanced airway and capnography
- Continuous chest compressions when advanced airway in place
- Correct reversible causes
- Consider amiodarone after 3 and 5 shocks

Reversible Causes

- Hypoxia
- Hypovolaemia
- Hyper/hypokalaemia, metabolic
- Hypothermia
- Thrombosis (coronary or pulmonary)
- Tension pneumothorax
- Tamponade (cardiac)
- Toxic/therapeutic disturbances

Appendix 3 – Defibrillation and Cardioversion Energies on Tempus LS

	Defibrillation	Cardioversion
Adult	150 – 170 – 200	100 – 150 – 200 sync
Paediatric	4J/KG	1J/KG sync

