Medical Control Guideline: ECPR PATIENT ALGORITHM **Ref. No. 1318**

PRINCIPLES:

1. Some patients with out-of-hospital cardiac arrest who are refractory to conventional cardiopulmonary resuscitation have improved outcomes if extracorporeal membrane oxygenation (ECMO) is used to provide ongoing resuscitation support. ECMO treatment for patient in cardiac arrest is called extracorporeal cardiopulmonary resuscitation (ECPR) or extracorporeal life support (ECLS).

2. Currently it is not known exactly which patients are able to benefit from ECPR but certain patients including patients with refractory ventricular fibrillation/ventricular tachycardia (rVF/VT) cardiac arrest have been shown to have up to 30% improved survival.

3. For all patients with OHCA, management should be conducted to minimize interruptions in chest compressions and prioritize standard therapies, including chest compressions and defibrillation for shockable rhythms, and early epinephrine for non-shockable rhythms.

4. While usual protocols emphasize prolonged on scene resuscitation for rVF/VT, patients for whom ECPR is indicated and a mechanical compression device (MCD) is available to maintain quality chest compression during transport should be transported as soon as possible once ECPR criteria are met in order to minimize the low-flow time prior to cannulation for ECPR. Goal scene time is no more than 15 minutes.

5. Patients for whom there is a significant delay in transport due to extrication challenges or lack of MCD availability should be resuscitated on scene to achieve return of spontaneous circulation (ROSC) since ECPR is unlikely to be initiated in patients more than 60 minutes after cardiac arrest onset.

6. Patients transported with ongoing resuscitation should have an advanced airway in place to ensure adequate ventilations during movement and transport, and an Impedance Threshold Device (ITD) attached when available.

7. Epinephrine beyond 3 doses is associated with worse outcomes in patients with rVF/VT. Additional epinephrine for patients who re-arrest into a non-shockable rhythm should be considered on a case-by-case basis.

8. Contact directly with the ECPR Receiving Center Base facilitates clear communication and reduces delays. MICNs and Base physicians should be familiar with the differences in the field management priorities for these patients.

9. In general, patients for whom contact is made with a non-ECPR SRC Base for medical direction should not be redirected to an ECPR Receiving Center, since the delay will result in poor ECPR candidacy; in such cases, medical direction should focus on optimizing the resuscitation to achieve ROSC.

10. When the ECPR Receiving Center is the closest accessible SRC, additional patients who do not meet the ECPR criteria for immediate transport may be considered for ECPR on a case-by-case basis if the ECMO team feels the patient could benefit. Early contact with the ECPR SRC Base should be made in these cases to determine if early transport prior to ROSC is advisable.

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GUIDELINES:

1. Paramedics shall identify patients who meet ECPR criteria and manage the patient per TP 1210, Cardiac Arrest while prioritizing transport.

2. Scene time for ECPR eligible patients should be limited to ≤15 minutes.

3. A maximum of 3 doses of epinephrine (total of 3mg) is indicated during the resuscitation. Push-dose epinephrine is appropriate and should be administered after ROSC to prevent re-arrest when indicated.

4. An advanced airway should be inserted as soon as feasible to facilitate ventilations during transport.

5. Communication with the ECPR Receiving Center Base should occur immediately after transport is initiated. Base will ensure the hospital is prepared to receive the patient and can activate the ECMO team.

6. The ECPR Receiving Center Base will confirm priorities including chest compressions via MCD, defibrillations, and advanced airway with capnography monitoring, and will activate the ECMO team when indicated prior to patient arrival.

INITIATE TREATMENT OF NON-TRAUMATIC CARDIAC ARREST PER TP 1210

Potential ECPR Candidate (ALL of the following)

Age ≥15 and ≤75
AND
Initial rhythm VF/VT refractory after ≥2 defibrillations or ROSC with recurrent arrest
OR Suspected massive pulmonary embolism (PE)* (any rhythm)
AND
Able to apply Mechanical Compression Device
AND
≤30 minutes ground transport to the ECPR Center

Yes to All

None of the following

Do-not-resuscitate order, terminal illness**, or severe baseline neurologic dysfunction

Yes

Key Management Priorities

- Maintain continuous chest compressions with a mechanical compression device
- Insert an advanced airway, i-gel preferred if no contraindications
- Prioritize transport to the ECPR Receiving Center (limit scene time to ≤15 minutes)
- Continue management per TP 1210 en route
- Contact the ECPR Receiving Center Base immediately once en route, if not done prior, to notify of the patient for ECMO team activation

*Sudden cardiac death from massive PE may be suspected in a patient with recent immobilization from prolonged travel or hospitalization/surgery or known prior PE; symptoms are typically sudden in onset with preceding dyspnea and/or chest pain.

**Terminal illness refers to patients who are chronically ill with severe end-organ dysfunction and/or metastatic cancer. In general, patients with significant chronic comorbidities are poor candidates for ECPR. If in doubt and patient otherwise meets criteria, contact and route to the ECPR center.