I. PURPOSE: To establish a standardized procedure for the treatment of patients in cardiac arrest, and for those who have a return of spontaneous circulation (ROSC) following treatment for cardiac arrest.

II. AUTHORITY: California Health and Safety Code, Section 1797.220, and 1798. California Code of Regulations, Title 22, Section 100170.

III. POLICY:
   A. For all patients in cardiac arrest and are greater than 48 hours old, CAM protocol will be followed. Patients less than 48 hours old will follow VC EMS Neonatal Resuscitation Policy # 705.16. For patients who are 18-years-old and older, who achieve ROSC following a cardiac arrest that is non-traumatic in nature, post arrest (ROSC) protocol outlined in Section V of this policy will be followed.
IV. PROCEDURE

A. Arrest

Ventura County EMS

Cardiac Arrest Management (CAM) Protocol

For patients who are in cardiac arrest and greater than 48 hours old

*****PRIORITIES DURING CARDIAC ARREST RESUSCITATION*****

1. High Quality Continuous Chest Compressions with minimal interruptions
2. Low-volume interposed ventilations
3. Early defibrillation
4. Switch Compressors every 2 Minutes

Rescuer 1

- Verify Cardiac Arrest (<10 seconds)
  - Shake and Shout
  - Open airway with “Shark Hook” maneuver (If trauma, modified jaw thrust)
    - Pulse check helpful for heroin OD or cervical spine injury
  - If suspected FBAO: BLS: Inspect Airway; ALS: Laryngoscopy

- If not breathing:
  - Move patient to place that will allow optimal CPR
  - Immediately Start High Quality Continuous Compressions Over Shirt

Rescuer 2

- Turn on metronome (112/minute)
- Remove clothing over chest.
- Apply AED or Cardiac Monitor/Defibrillator pads

Basic Life Support (AED) | Advanced Life Support (Manual Defib)
-------------------------|----------------------------------
- Turn on AED            | Turn on Cardiac Monitor          
- Apply Pads             | Apply Pads                       
- Clear patient then press Analyze | Pre-charge monitor

“Shock Advised” | “No Shock Advised” | VF/VT | Non-Shockable rhythm
---|---|---|---
If AED allows, resume chest compressions during charge Clear patient and press “Shock” | Clear patient and deliver immediate shock | Disarm defibrillator charge

RESUME CHEST COMPRESSIONS IMMEDIATELY!
### Rescuer 3
- Insert OPA/NPA
- Assist ventilation with BVM along with 15L/min high flow O2
- Ensure proper seal with BVM mask to the patient with “2 Thumbs Up” technique
- Attach waveform capnography sensor, if equipped

### Rescuer 2
- Deliver 1 brief low-volume ventilation on the recoil phase of every 10th compression (Ventilation delivered with ONE HAND on bag to ensure low volume)

### Rescuer 4 (ALS)
- Attach waveform capnography sensor to BVM if not already completed by BLS
- Establish IV/IO Access
- PRESTO Blood Draw
- Advanced Airway PRN
- Follow VC EMS Policy 705.07 (Asystole/PEA) or 705.08 (VF/VT)

### Rescuer 5 (ALS)
- Assist Rescuer 4 with IV/IO, PRESTO draw, medications
- Gather patient information/medications
- Communicate with family members
- Pre-Charge monitor®
- Perform rhythm check every 2 min (< 3 seconds)
- Perform pulse check if EtCO2 > 20 AND organized rhythm >40

<table>
<thead>
<tr>
<th>VF/VT</th>
<th>Non-Shockable rhythm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear patient and deliver immediate shock</td>
<td>Disarm defibrillator charge</td>
</tr>
</tbody>
</table>

**RESUME CHEST COMPRESSIONS IMMEDIATELY!**

### Additional Information:

1. Patients less than 48 hours old will follow VC EMS Neonatal resuscitation Policy 705.16
2. Chest Compressions:
   - Rate: 112/min
   - Depth: 2-2.4 inches for an adult
     - 1/3 the anterior-posterior chest dimension for a child or infant
   - Full chest recoil after each compression
3. LIFEPAK 12/15 must be in paddles mode to capture compression data
4. Energy level per manufacturer or provider medical director
   (If 1 or more AED shocks were delivered, ALS defibrillation at next sequential Joules setting)
Triangle of Life
Cardiac Arrest

**Rescuer 3**
- Assemble BVM/ETCO2
- 2 hand thumb up mask seal
- Coach compression quality

**Rescuer 1**
- Shake and Shout
- Move to floor
- Shark hook airway
- Begin compressions

**Rescuer 2**
- Activate metronome
- Cut shirt
- Apply defib pads
- Deliver Ventilations
- Switch with rescuer 1 each rhythm check

**Rescuer 4**
- Rhythm Checks/Defib
- EtCO2 Monitoring
- IV/IO, Presto
- ALS Medications
- Advanced Airway PRN

*May delegate or perform as appropriate

**Rescuer 5**
- Assist Rescuer 4
- Gather Information/Meds
- Communicate with Family

*May be delegated variety of tasks based on scope*
### B. Procedure – Post Arrest Resuscitation (ROSC)

<table>
<thead>
<tr>
<th>Rescuer 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Palpate femoral pulse continuously for first 10 minutes prior to patient movement</td>
</tr>
<tr>
<td>• Immediately begin chest compressions if femoral pulse is lost or in question</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rescuer 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Continue rescue breathing</td>
</tr>
<tr>
<td>• Deliver 1 ventilation every 6 seconds, no more than 10 breaths per minute</td>
</tr>
<tr>
<td>• Deliver ventilations with ONE HAND on bag to avoid hyperventilation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rescuer 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ensure effective mask seal with continuous “2 thumbs up” technique</td>
</tr>
<tr>
<td>• Coach rescuer 2 as needed to assure delivery of ventilations and avoid hyperventilation</td>
</tr>
<tr>
<td>• For spontaneously breathing patients apply nasal EtCO₂ device, if available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rescuer 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Communicate treatment priorities to team – ensure roles are clear and effective</td>
</tr>
<tr>
<td>• Setup cardiac monitor to recognize change in patient status – monitor must remain attached to patient and observed through all phases of incident</td>
</tr>
<tr>
<td>• Confirm monitor settings</td>
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</tr>
<tr>
<td>• Attach adhesive SpO₂ sensor to maintain a consistent and reliable waveform, if available</td>
</tr>
<tr>
<td>• Perform a thorough assessment: history, medications, circumstances, physical exam</td>
</tr>
</tbody>
</table>

May delegate interventions as appropriate
## Rescuer 4
### TEAM LEAD

### ASSESSMENT

<table>
<thead>
<tr>
<th>CIRCULATION</th>
<th>AIRWAY-VENTILATION-OXYGENATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Evaluate for palpable femoral pulse</td>
<td>• Confirm EtCO₂ waveform present with every ventilation; normal 35 – 45 mmHg</td>
</tr>
<tr>
<td>• Evaluate MANUAL blood pressure</td>
<td>• Confirm presence of bilateral lung sounds</td>
</tr>
<tr>
<td>o repeat every 5 minutes</td>
<td>• Evaluate SpO₂ goal is 94% – 99%</td>
</tr>
<tr>
<td>o manual for patient changes or SBP &lt; 90 mmHg</td>
<td>• Consider likelihood of respiratory cause; E.g. choking</td>
</tr>
<tr>
<td>• Monitor for falling EtCO₂ as sign of re-arrest</td>
<td></td>
</tr>
<tr>
<td>• Obtain and evaluate 12 lead only after assessment and interventions</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUPPORT</th>
<th>AIRWAY-VENTILATION-OXYGENATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Obtain peripheral IV – preferred 18g, minimum 20g</td>
<td>• Place advanced airway as needed to</td>
</tr>
<tr>
<td></td>
<td>o Improve ventilation or oxygenation</td>
</tr>
<tr>
<td></td>
<td>o Protect against aspiration</td>
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<tr>
<td></td>
<td>o Effectively ventilate while moving</td>
</tr>
<tr>
<td>• Initiate 1 L fluid bolus, use pressure bag for IO or rapid infusion via peripheral IV</td>
<td>• SpO₂ goal 94%-99% - titrate supplemental oxygen down if SpO₂ is 100%</td>
</tr>
<tr>
<td></td>
<td>• Ventilation treatment goals</td>
</tr>
<tr>
<td></td>
<td>o EtCO₂ waveform present with each breath</td>
</tr>
<tr>
<td></td>
<td>o Bilateral breath sounds</td>
</tr>
<tr>
<td>• Epinephrine 10mcg/mL</td>
<td>• Consider etiology to direct treatment where possible</td>
</tr>
<tr>
<td>o 1mL (10mcg) every 2 minutes, slow IV/IO push</td>
<td>o Tension pneumothorax</td>
</tr>
<tr>
<td>o Titrate to SBP of greater than or equal to 90mm/Hg</td>
<td>o Bronchoconstriction</td>
</tr>
<tr>
<td>• Circulation treatment goals</td>
<td>o Pulmonary embolus</td>
</tr>
<tr>
<td>o Peripheral pulses present</td>
<td>o Upper airway obstruction</td>
</tr>
<tr>
<td>o Systolic BP &gt; 90 mmHg</td>
<td>o Opiate overdose</td>
</tr>
<tr>
<td>o Ongoing fluid therapy**</td>
<td></td>
</tr>
<tr>
<td>• Consider etiology to direct treatment where possible</td>
<td>**Fluid therapy indicated unless outward indication of fluid overload or left sided heart failure</td>
</tr>
<tr>
<td>o Hypovolemia, sepsis, GI bleeding</td>
<td></td>
</tr>
<tr>
<td>o MI, heart failure, idiopathic electrical anomaly</td>
<td></td>
</tr>
<tr>
<td>o Hyperkalemia</td>
<td></td>
</tr>
</tbody>
</table>

Refer to VCEMS Policy 735 for additional information on preparing push dose solution

*Assist in overseeing triangle of life roles
*Assist rescuer 4 by preparing medications and equipment
*Obtain manual blood pressure
*Obtain 12-lead EKG once directed; assure monitor is returned to pads / paddles mode
*May be delegated a variety of tasks based on scope
Triangle of Life
Post Arrest Resuscitation

Rescuer 3
- Two hand, thumbs up, mask seal
- Coaches to ensure adequate Ventilation
- Coaches to avoid hyperventilation

Rescuer 1
- Palpates femoral pulse continuously for 10 minutes
- Immediately starts compressions if femoral pulse lost or in question
- PRIORITY position; does not take on additional tasks

Rescuer 2
- Provides 1 hand BVM ventilations
- 1 breath every 6 seconds
- Avoids hyperventilation
- PRIORITY position; does not take on additional tasks

Rescuer 4
**Team Lead**
- Visually monitors EtCO2, SpO2, & Paddles EKG
- Obtains/delegated peripheral IV
- Initiates NS bolus
- Provides ALS circulatory assessment and support
- Provides airway assessment and support
- Determines all ALS care-performs/delegates

Rescuer 5
- Directly assists team lead
- Takes manual blood pressure
- Assists in obtaining 12-lead
- Most mobile position

*May be delegated variety of tasks based on scope
## POST ARREST RESUSCITATION CHECKLIST

### Initial Actions
- ✅ Initiate 10 minute continuous femoral pulse check
- ✅ Continue rescue breathing as needed
- ✅ Paddles attached and EKG waveform visible
- ✅ VF alarm set, SpO\textsubscript{2} and EtCO\textsubscript{2} waveforms visible

### Circulation
- □ Obtain peripheral IV access (18 g preferred, 20 g minimum)
- □ Initiate NS fluid bolus
- □ Assess for peripheral pulses
- □ Obtain manual blood pressure
- □ Push dose epinephrine IN ADDITION TO fluids for systolic BP < 90 mmHg

### Airway / Ventilation
- □ Assess for responsiveness and spontaneous ventilations
- □ Assess EtCO\textsubscript{2}, lung sounds, SpO\textsubscript{2}
- □ Maintain BLS airway or place advanced airway as indicated
- □ Place advanced airway if needed to ventilate while moving patient
- □ Oxygenate to SpO\textsubscript{2} 94% to 99%
- □ Oxygen flow rate titrated to prevent SpO\textsubscript{2} 100%

### 12 Lead EKG
- □ Obtain 12-lead EKG only after managing C-A-B and prior to movement

### Prior to Moving Patient, Confirm
- □ Patient has sustained ROSC approximately ≥ 10 minutes
- □ C-A-B have been effectively stabilized or appropriate efforts made
- □ Team has planned how to effectively ventilate during move
- Team is prepared to recognize re-arrest:
  - STOP MOVING
  - RESUME CAM ON SCENE
Post Arrest Resuscitation Transport

- Transport is indicated after a patient has sustained ROSC for approximately 10 minutes and effective efforts have been made to stabilize airway, breathing, and circulation.
- Continuous patient assessment and treatment must remain the priority during transport.
- Recognizing hypotension, inadequate ventilation, or re-arrest, will have a large impact on patient outcome.

Re-Arrest Guidelines (Loss of ROSC)

- Re-arrests require the same high-quality CAM and ALS care as the initial arrest:
  - Remain on scene
  - Ensure adequate workspace
  - Begin CAM Procedure
  - Defibrillate VF / VT ASAP
- Provide an additional 20 minutes of high-quality CAM prior to any further movement or initiating transport.
- If ROSC is obtained again, reassess, stabilize C – A – B as indicated, then continue with previous transport plan.
- If no ROSC, or multiple re-arrests, through 20 minutes from initial re-arrest consider underlying cause, circumstances, and presentation, then contact base for consultation.

Prioritizing Care in Re-Arrest

<table>
<thead>
<tr>
<th>Re-Arrest On Scene</th>
<th>Re-Arrest During Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>If re-arrest occurs during movement to gurney or ambulance, resume CAM on scene outside of ambulance</td>
<td>Prioritize immediate and continuous chest compressions</td>
</tr>
<tr>
<td>If re-arrest occurs after loading but prior to leaving scene, unload patient from ambulance, resume CAM, and move to workable space</td>
<td>Prioritize immediate and q 2 min defib for VF/VT</td>
</tr>
<tr>
<td></td>
<td>Reassess patient considering correctable causes and previous interventions</td>
</tr>
<tr>
<td></td>
<td>Confirm advanced airway effective and in place if air-Q or ETT was used</td>
</tr>
</tbody>
</table>

NOTE:
Most re-arrests occur in the first 10 minutes after ROSC is achieved.
Most delayed identification of re-arrest occurs during movement of the patient and during transport.
NO ROSC - NO ROSC AFTER RE-ARREST - FREQUENT RE-ARREST

**Base Consultation**

- Base consultation is indicated when considering DOD vs continuing resuscitation.
- Assessment findings, observations, and clinical circumstances should be clearly communicated during base hospital consultation.
- Direct consultation with base hospital physician is recommended in cases where the clinical scenario may warrant prolonged resuscitation or “early” termination of resuscitation.

<table>
<thead>
<tr>
<th>Patient Factors</th>
<th>Base Consult Takes Place</th>
<th>DOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asystole / PEA</td>
<td>After 20 minutes of resuscitation efforts</td>
<td>Consider after 20 minutes; base consult</td>
</tr>
<tr>
<td>Never defibrillated, no shockable rhythm observed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VF / VT</td>
<td>After 40 minutes of resuscitation efforts without ROSC</td>
<td>Consider after 40 minutes; base consult</td>
</tr>
<tr>
<td>Defibrillated at least once during arrest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bystander witnessed collapse</td>
<td>After 40 minutes of resuscitation efforts without ROSC</td>
<td>Consider after 40 minutes; base consult</td>
</tr>
<tr>
<td>EMS witnessed collapse or loss of pulse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signs of survivability</td>
<td>After 40 minutes of resuscitation efforts without ROSC</td>
<td>Consider DOD after 40 minutes; base consult</td>
</tr>
<tr>
<td>o EtCO2 &gt; 30</td>
<td></td>
<td>Physician consult preferred</td>
</tr>
<tr>
<td>o Spontaneous breathing attempts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Spontaneous movement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Frequent / persistent VF / VT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-arrest without ROSC</td>
<td>After 20 minutes of re-arrest, or 20 minutes of intermittent ROSC</td>
<td>Consider after base consult</td>
</tr>
<tr>
<td>Frequent re-arrest</td>
<td></td>
<td>Consider rhythm and signs of survivability</td>
</tr>
</tbody>
</table>