



POLICY: 554.11
TITLE: Cardiac Arrest Algorithms

EFFECTIVE: 4/10/19
REVIEW: 4/2024
SUPERCEDES:

APPROVAL SIGNATURES ON FILE IN EMS OFFICE

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CARDIAC ARREST ALGORITHMS

I. **AUTHORITY**

Health and Safety Code, Division 2.5, California Code of Regulations, Title 22, Division 9

II. **PURPOSE**

To serve as a patient treatment standard for EMRs, EMTs, AEMTs and Paramedics within their scope of practice. To allow for the discontinuation of pre-hospital resuscitation by Paramedics in adult medical cardiac arrests after the delivery of adequate and appropriate ALS therapy.

III. **PROTOCOL**

A. HIGH PERFORMANCE CPR

The absence of a detectable pulse in the adult, medical cardiac arrest. Contraindicated in the patient with a valid DNR/POLST form and those meeting “Obviously Dead” criteria (policy 570.20). *Refer to High Performance CPR Algorithm for treatment standard.*

B. VENTRICULAR FIBRILLATION - PULSELESS VENTRICULAR TACHYCARDIA

V-FIB: Bizarre, rapid, irregular, ineffective rhythm with electrical waveforms varying in size and shape. There is no P wave. QRS complexes are absent. V-fib may masquerade in one lead as asystole. Be sure to check at least two leads to confirm asystole. **V-TACH:** Regular or slightly irregular rhythm with no pulse. Heart rate 100 to 200 (commonly about 120). A-V disassociation is present: P-waves may be seen unrelated to QRS complex. QRS complex distorted, wide (> 0.12 seconds) and bizarre. T-waves usually have opposite axis as QRS complex. Perform 12 Lead EKG if return of spontaneous circulation (ROSC). *Refer to Ventricular Fibrillation/Pulseless Ventricular Tachycardia Algorithm for treatment standard.*

C. PULSELESS ELECTRICAL ACTIVITY

The absence of a detectable pulse and the presence of some type of regular electrical activity other than V-Tach define this group of arrhythmias. Many of these patients do have cardiac mechanical activity without effective cardiac output (they are in profound shock). This category includes Electromechanical Dissociation (EMD), Idioventricular rhythms, Pseudo-EMD, and Bradycardic rhythms. Perform 12 Lead EKG if return of spontaneous circulation (ROSC). *Refer to Asystole/Pulseless Electrical Activity Algorithm for treatment standard.*

Consider Possible Causes:

HYPOVOLEMIA (volume infusion)
PULMONARY EMBOLISM
HYPOXIA (ventilation)
DRUG OVERDOSE (appropriate antidote)
CARDIAC TAMPONADE
HYPERKALEMIA (sodium bicarb, calcium chloride)
TENSION PNEUMOTHORAX (needle decompression)
ACIDOSIS (ventilation)
HYPOTHERMIA (refer to Hypothermia Policy 554.62)
MYOCARDIAL INFARCTION

D. ASYSTOLE

Asystole represents the total absence of electrical activity in the ventricle. There is no rhythm, although an occasional P-wave or agonal QRS may be seen. Heart rate is less than five beats per minute. Note: Asystole should be confirmed by at least two leads, since low-amplitude ventricular fibrillation can mimic asystole. Perform 12 Lead EKG if return of spontaneous circulation (ROSC). *Refer to Asystole/Pulseless Electrical Activity Algorithm for treatment standard.*

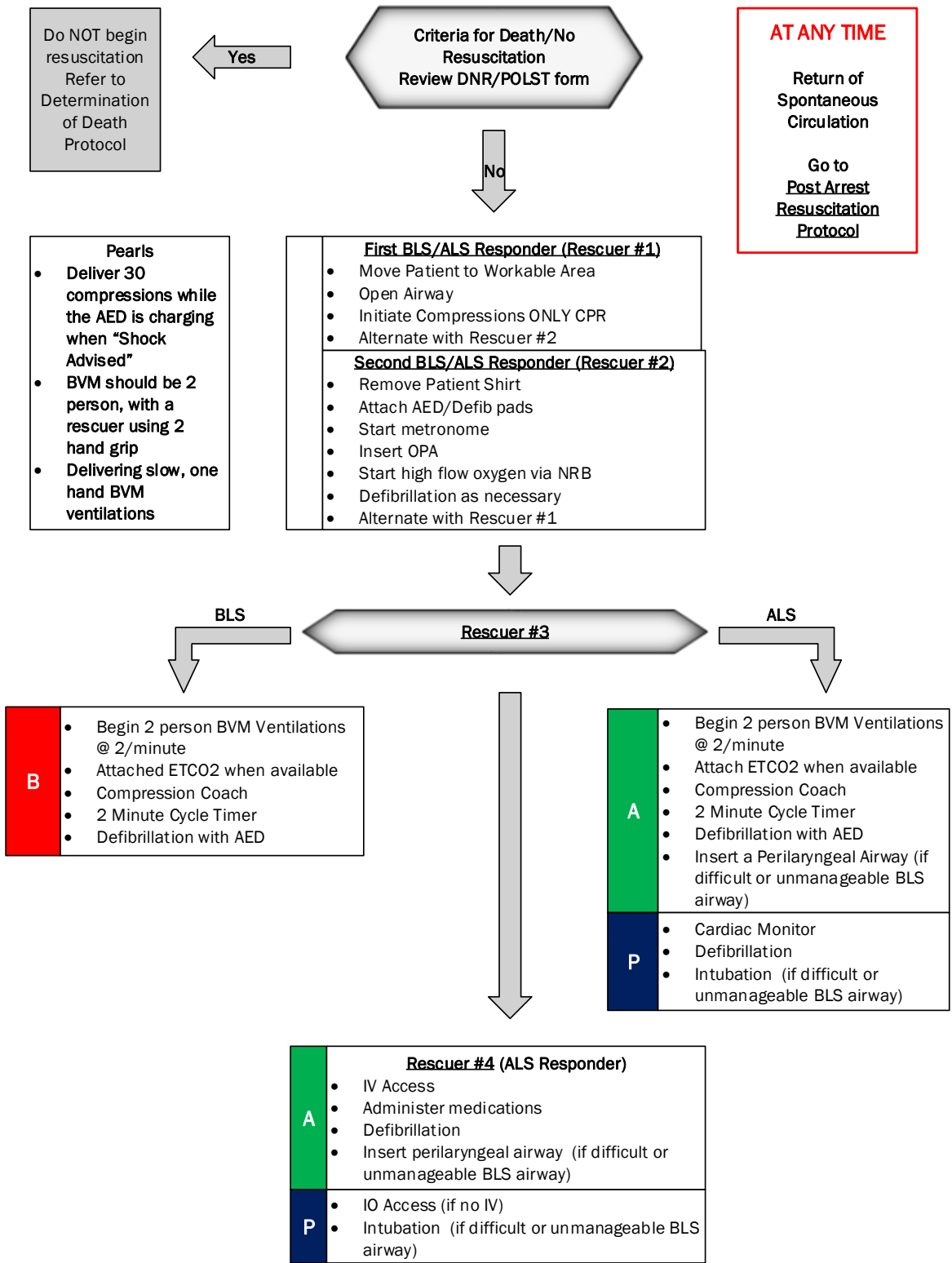
E. POST ARREST RESUSCITATION ALGORITHM

Return of Spontaneous Circulation (ROSC) post-cardiac or respiratory arrest. Perform 12 Lead EKG if Return of Spontaneous Circulation (ROSC) and transport all VF/PVT and STEMI patients to a STEMI Receiving Center if transport time is less than 60 minutes (air or ground). *Refer to Post Arrest Resuscitation Algorithm for treatment standard.*

F. TERMINATION OF RESUSCITATION- ADULT MEDICAL CARDIAC ARREST

Cardiopulmonary resuscitation (CPR) and advanced life support (ALS) interventions may be discontinued prior to transport when this procedure is followed. *Refer to the Termination of Resuscitation- Adult Medical Cardiac Arrest guidelines for treatment standard.*

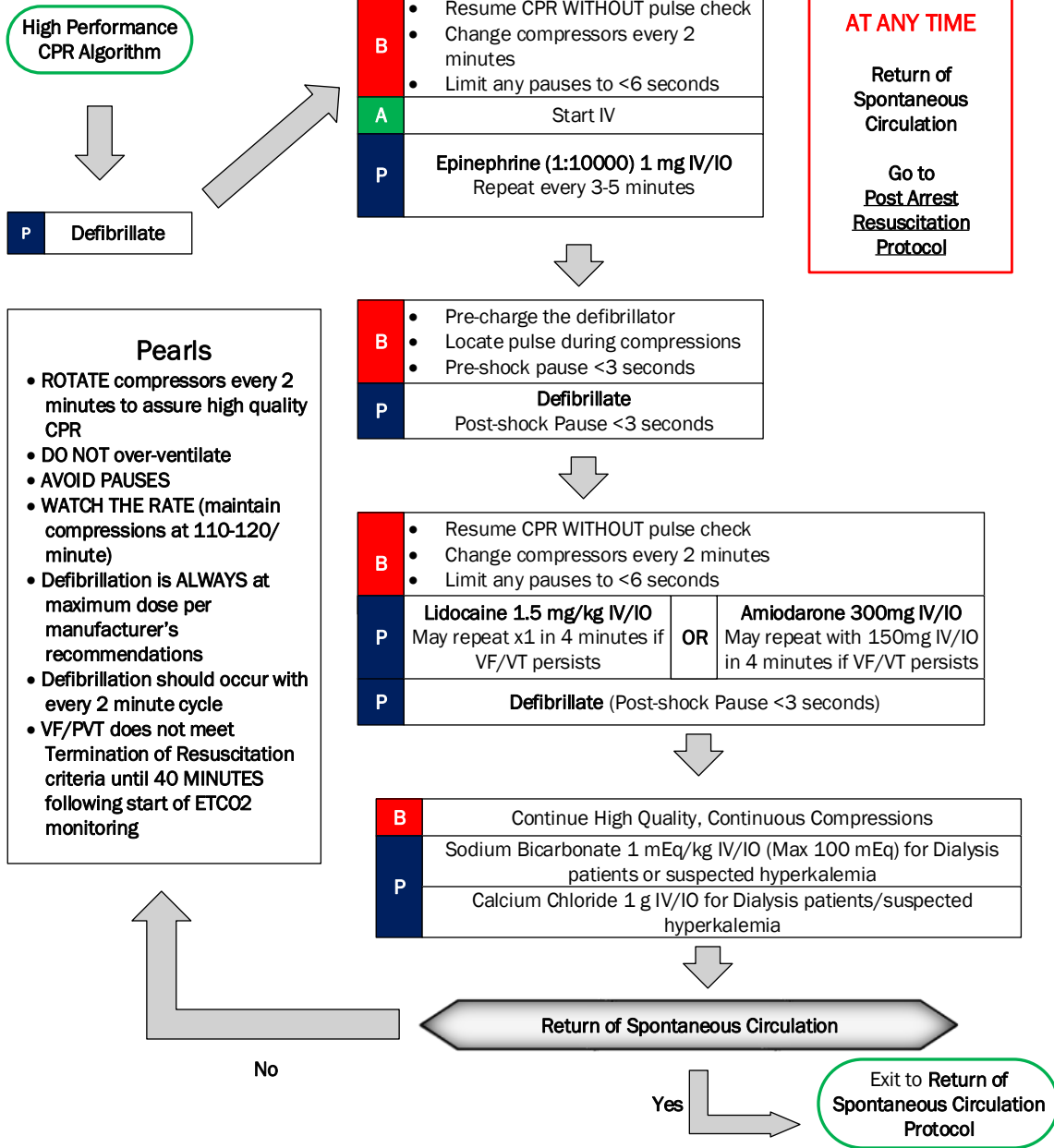
High Performance CPR Algorithm



Stanislaus County EMS Agency Policy 554.11

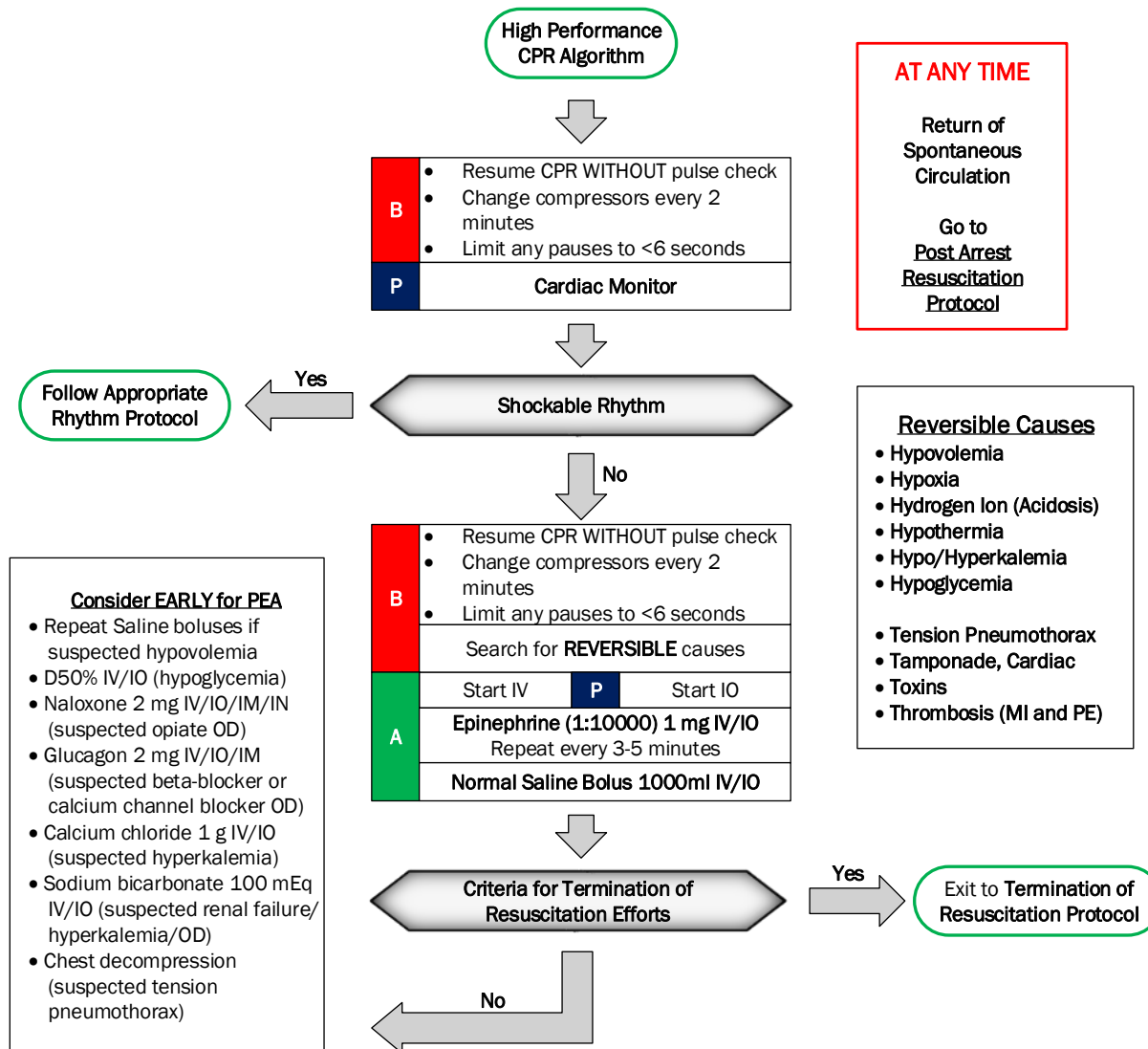
Ventricular Fibrillation/Pulseless Ventricular Tachycardia Algorithm

History <ul style="list-style-type: none"> • Events leading to arrest • Estimated downtime • Past medical history • Medications • DNR/POLST forms • Renal Failure/Dialysis 	Signs and Symptoms <ul style="list-style-type: none"> • Unresponsive • Apneic • Pulseless • VF/Pulseless VT on EKG 	Differential <ul style="list-style-type: none"> • Primary Cardiac • Endocrine • Drugs/Medication • Pulmonary
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Asystole/Pulseless Electrical Activity Algorithm

History <ul style="list-style-type: none"> • Events leading to arrest • Estimated downtime • Past medical history • Medications • DNR/POLST forms • Renal Failure/Dialysis • Suspected Overdose • Suspected hypothermia 	Signs and Symptoms <ul style="list-style-type: none"> • Unresponsive • Apneic • Pulseless • Asystole or PEA on cardiac monitor 	Differential <ul style="list-style-type: none"> • Hypovolemia (trauma/AAA) • Hypothermia • Hypoxia • Pulmonary Embolus • Hyperkalemia • Cardiac tamponade • Drug overdose • Acute MI
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Post Arrest Resuscitation Algorithm

History <ul style="list-style-type: none"> Respiratory Arrest Cardiac Arrest 	Signs and Symptoms <ul style="list-style-type: none"> Return of Pulse 	Differential <ul style="list-style-type: none"> Continue to address specific differentials associated with the original dysrhythmia
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Repeat Primary Assessment DO NOT move the patient for at least 5 minutes to allow for post-arrest stabilization	
Optimize Ventilation <ul style="list-style-type: none"> Maintain ETCO2 35-45 (roughly 6-12 ventilations/minute) DO NOT HYPERVENTILATE 	
A	<ul style="list-style-type: none"> Start IV Perilaryngeal airway, as indicated
P	<ul style="list-style-type: none"> Start IV/IO Advanced airway, as indicated
Cardiac Monitor 12 Lead EKG	

Refer to **STEMI Triage and Destination Policy (530.00)**

YES → **STEMI?**

If patient returns to cardiac arrest, follow the appropriate algorithm corresponding to the rhythm.

Transport to nearest STEMI Receiving Center if total transport time is <60 minutes. Consider helicopter if >60 minutes transport. Otherwise, transport to closest facility

No ↓
YES → **VF/PVT Arrest?**

A	Normal Saline Bolus 500ml IV/IO. Repeat as needed if lungs clear (Max 2000 mL)
P	Push dose Epinephrine: 0.2ml of 1:10,000 every 5 minutes to achieve systolic BP >90mmHg

No ↓
YES → **Hypotension Systolic BP <90**

No ↓
Arrhythmias Present
 Yes ↓

Arrhythmias are **COMMON** and often self limited following ROSC. Avoid antiarrhythmics as they may worsen cardiac conduction and promote arrhythmias

Termination of Resuscitation – Adult Medical Cardiac Arrest

Policy:

Cardiopulmonary resuscitation (CPR) and advanced life support (ALS) interventions may be discontinued prior to transport when this procedure is followed.

Purpose:

To allow for the discontinuation of pre-hospital resuscitation in adult medical cardiac arrests after the delivery of adequate and appropriate ALS therapy.

Procedure:

CPR and ALS interventions may be discontinued if **ALL** of the following criteria have been met:

- Patient has suffered a presumed medical (non-traumatic) cardiac arrest,
- Patient is NOT pregnant,
- Patient is not a victim of hypothermia or drowning/submersion,
- Arrest was not witnessed by EMS providers,
- Adequate High Performance CPR (HPCPR) has been administered,
- Airway has been successfully managed. Acceptable management techniques for this policy include effective BLS airway maneuvers, a perilyngeal airway, or endotracheal intubation (ETI),
- IV or IO access has been achieved,
- Rhythm appropriate medications and defibrillation have been administered according to algorithm *and*
- One of the three following criteria has been met:

Persistent ASYSTOLE with
ETCO2 <10 despite effective
and continuous HPCPR

May discontinue resuscitative
efforts after **20 minutes** from
start of ETCO2 monitoring
Make Base Contact

Persistent ASYSTOLE with
ETCO2 >10 with effective and
continuous HPCPR

May discontinue resuscitative
efforts after **30 minutes** from
start of ETCO2 monitoring
Make Base Contact

VF/PVT/PEA, with or without
rhythm changes

May discontinue resuscitative
efforts after **40 minutes** from
start of ETCO2 monitoring
Make Base Contact

Important Pearls

- Changing rhythms from asystole to PEA, PEA to VF/PVT is a **POSITIVE** sign that therapy is effective. **Keep working!**
- ETCO2 is an excellent tool to determine adequacy of compressions and potential for resuscitation. ETCO2 readings persistently below 20 despite adequate CPR is a **POOR** prognostic indicator. However, climbing ETCO2 levels above 20 with adequate CPR indicate metabolically favorable changes ongoing with the resuscitation. **Keep working!**
- Expect resuscitative efforts to be long and demanding, every time! **Keep working!**
- Documentation is **KEY!** Be sure to include ETCO2 readings throughout resuscitation. Document medications given and response to the medications. Document reasons for termination.