



Cardiac Arrest Management

FIELD TREATMENT GUIDELINE C-01

INDICATION	<ul style="list-style-type: none"> • Management of adult non-traumatic cardiac arrest resuscitation.
BLS	<ul style="list-style-type: none"> • Follow <u>General Medical Care M-01</u>. • Begin CPR: <ul style="list-style-type: none"> • Push hard (at least 2”) and fast (100 – 120/minute) and allow for full recoil of the chest. <ul style="list-style-type: none"> ▪ Efforts should be directed at high-quality and continuous chest compressions with limited interruptions and early defibrillation when defibrillation is indicated. ▪ Team (“Pit Crew”) performance of CPR is the standard of care for cardiac arrest. • Use the cardiac monitor metronome until a mechanical chest compression device is available and placed on the patient. • Initiate <u>Airway/Respiratory Management BP-01</u>. • Initiate use of an Automated External Defibrillator (AED) or cardiac monitor. Provide defibrillation per AED or paramedic interpretation of heart rhythm and appropriate Treatment Guideline(s). <ul style="list-style-type: none"> • LP15 cardiac monitors should be placed in “Paddles” mode for duration of cardiac arrest. • If indicated, initiate use of <u>Mechanical Chest Compression BP-02</u>. • If patient regains return of spontaneous circulation (ROSC): <ul style="list-style-type: none"> • <u>12-Lead ECG BP-03</u>. • Maintain an open airway and administer oxygen to maintain oxygen saturation per <u>General Medical Care M-01</u>. • Transport to a STEMI receiving facility. • If re-arrest occurs during transport, resume high-quality CPR/resuscitation.

If indicated:

- Perform necessary ALS Interventions:
 - **Endotracheal Intubation AP-01:**
 - In the presence of a patent BLS airway, do not intubate unless able to do so without interrupting chest compressions.
 - Once patient is placed on mechanical compression device, consider intubation.
 - Rescue airway (King Tube) should only be used if BLS airway is not patent and endotracheal intubation is not successful.
 - **Waveform Capnography AP-12.**
 - Capturing ETCO₂ at first breath is the standard of care. Maintain throughout arrest.
 - Initiate intravenous therapy and/or **Intraosseous Infusion AP-08.**
 - Administer medications in accordance with the specified Field Treatment Guideline.
 - **Fluid Challenge AP-09.**
 - If return of spontaneous circulation (ROSC) and it is clinically indicated:
 - Initiate **Targeted Temperature Management AP-10.**
- Transport to the nearest appropriate treatment facility as defined in Napa County EMS Agency **Administrative Policy 501, Patient Destination.**
- Notification to the receiving facility should occur as early as possible.

- EMS personnel should not transport patients by ambulance where resuscitative efforts have been discontinued.
- EMS personnel should initiate rapid transport and continue resuscitation when the following factors are present:
 - ROSC following cardiac arrest (5 minutes of palpable pulses)
 - If pulses are lost enroute, resume high-quality CPR/resuscitation and continue transport to receiving facility.
 - Drowning.
 - Hypothermia.
 - Pulmonary Embolism.
 - Resistant ventricular fibrillation.
- EMS personnel shall make all efforts to record and transmit cardiac arrest data from monitor:
 - During a cardiac arrest, personnel should operate cardiac monitors in “PADS” mode.
 - Enter the patients name in the LP15/LP12 record.
 - Personnel shall transmit completed cases to the site “CODE STAT” as soon as patient care has been transferred or ended. This should be completed before monitor is turned off.
- EMS personnel shall follow Napa County EMS Agency **Administrative Policy 115, Determination of Death** when making decision to discontinue resuscitation efforts.

OPTIMAL TEAM (PIT CREW) ROLES

PIT CREW

(P1) Compression Leader: (ALS or BLS)

- ✓ If BLS, operates AED
- ✓ Assists with CPR / performs compressions as needed
- ✓ Assists with setup (mechanical compression device and other devices)
- ✓ Ventilates during off cycle

(P2) Airway Leader: (Usually ALS)

- ✓ Assists with setup (mechanical compression device and other devices)
- ✓ Performs appropriate airway techniques/procedures.
- ✓ Supervises airway decisions and ensure utilization of confirmatory adjuncts
- ✓ Utilize waveform capnography throughout resuscitative efforts
- ✓ Defibrillates if medication leader not available
- ✓ Defer advanced airway insertion rather than interrupt chest compressions. Use ET or King Tube as indicated. Once established, give continuous chest compressions without pauses for ventilations.
- ✓ Avoid hyperventilation.
- ✓ Communicates with law/family as needed

(P3) Team Assistant: (ALS or BLS)

- ✓ Serves as assistant to compression leader
- ✓ Performs compressions as needed
- ✓ Assists airway leader

(P4) Medication Leader: (Always ALS)

- ✓ Defibrillates
- ✓ Initiates IV/IO (IO preferred)
- ✓ Administers (or supervises) medications
- ✓ Tracks and notifies team of all monitor changes
- ✓ Sets up/monitor mechanical CPR device
- ✓ Communicates with family/law as needed
- ✓ Terminates resuscitative efforts (with pit crew leader)

(P5) Pit Crew Leader: (ALS or BLS)

- ✓ Responsible for overall conduct of resuscitation / team leader
- ✓ Assigns roles
- ✓ Monitors time intervals (2 min. CPR, drug intervals, etc.)
- ✓ Assures consistent and high quality COMPRESSIONS/CPR
- ✓ Assures use of proper equipment and adjuncts, e.g., waveform capnography
- ✓ Supervises and assigns crowd control as appropriate
- ✓ Serves as scribe (field notes) if resources allow
- ✓ Supervises DNR/POLST issues

(P6) CPR Leader (optional): (ALS or BLS)

- ✓ Supervises and performs CPR (with team leader)
- ✓ Performs compressions as needed
- ✓ Assists with equipment/medication setup
- ✓ Assists in all patient treatment decisions



Asystole/Pulseless Electrical Activity

FIELD TREATMENT GUIDELINE C-02

INDICATION	<ul style="list-style-type: none"> Asystole is defined as a cardiac arrest rhythm in which there is no discernible electrical activity on the ECG monitor. Pulseless electrical activity (PEA), also known as electromechanical dissociation, refers to cardiac arrest in which the electrocardiogram shows a heart rhythm that should produce a pulse, but does not. 		
BLS	<ul style="list-style-type: none"> Follow General Medical Care M-01. Follow Cardiac Arrest Management C-01. 		
ALS	<ul style="list-style-type: none"> Epinephrine (1:10,000): <i>Adult:</i> 1mg IV/IO, repeat every 3-5 minutes. Treat Reversible Causes <ul style="list-style-type: none"> If hypovolemia is suspected, consider Fluid Challenge AP-09. If hyperkalemia is suspected consider: <ul style="list-style-type: none"> Calcium Chloride: <i>Adult:</i> 500 mg IV/IO. Sodium Bicarbonate: <i>Adult:</i> 1 mEq/kg IV/IO, may repeat once in 5 minutes 		
KEY CONCEPTS	<ul style="list-style-type: none"> Continue resuscitation efforts until return of spontaneous circulation (ROSC) occurs or resuscitation efforts fail. Efforts should continue for ≥ 30 minutes. At termination of efforts, capnography value should be ≤ 10 mmHg. EMS personnel should initiate rapid transport and continue resuscitation when the following factors are present: <ul style="list-style-type: none"> With a PEA rate > 40, capnography value > 10 mmHg, and a suspected pulmonary embolism. ROSC following cardiac arrest (5 minutes of palpable pulses) Drowning. Hypothermia. EMS personnel should attempt to identify possibly reversible cause of asystole/PEA: <table style="width: 100%; border: none;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> Hypovolemia Hypoxia or ventilation problem Hydrogen Ion (acidosis) Hypo/Hyperkalemia Hypothermia </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> Toxins Tamponade (cardiac) Tension pneumothorax Thrombosis (coronary / pulmonary) Trauma (hypovolemia or elevated ICP) </td> </tr> </table> 	<ul style="list-style-type: none"> Hypovolemia Hypoxia or ventilation problem Hydrogen Ion (acidosis) Hypo/Hyperkalemia Hypothermia 	<ul style="list-style-type: none"> Toxins Tamponade (cardiac) Tension pneumothorax Thrombosis (coronary / pulmonary) Trauma (hypovolemia or elevated ICP)
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Ventricular Fibrillation/ Pulseless Ventricular Tachycardia

FIELD TREATMENT GUIDELINE C-03

INDICATION	<ul style="list-style-type: none"> Cardiac arrest patient presenting in ventricular fibrillation or pulseless ventricular tachycardia.
BLS	<ul style="list-style-type: none"> Follow <u>General Medical Care M-01</u>. Follow <u>Cardiac Arrest Management C-01</u>.
ALS	<ul style="list-style-type: none"> <u>Defibrillate at 360J</u>. <ul style="list-style-type: none"> Defibrillation should not be delayed for any patient presenting in ventricular fibrillation/pulseless ventricular tachycardia. Should be repeated at 360J after each 2 minutes of CPR if patient remains in ventricular fibrillation/pulseless ventricular tachycardia. Minimize perishock pauses – consider pre-charging the defibrillator <u>Epinephrine (1:10,000)</u>: <i>Adult:</i> 1mg IV/IO after second defibrillation. Repeat every 3-5 minutes. <u>Amiodarone</u>: <i>Adult:</i> 300 mg IV/IO after <u>third</u> defibrillation. If patient remains in ventricular fibrillation/pulseless ventricular tachycardia, administer a second dose of 150 mg IV/IO. If patient is resistant to 3 consecutive shocks (including from AED), without a rhythm change: <ul style="list-style-type: none"> <u>Double Simultaneous External Defibrillation AP-06</u>. <ul style="list-style-type: none"> If ventricular fibrillation/pulseless ventricular tachycardia persist after first DSED, transport to the closest STEMI receiving center for further treatment.
KEY CONCEPTS	<ul style="list-style-type: none"> CPR should not be interrupted for placement of IV/IO, airway, or medication administration. If after ROSC the patient rearrests, shock with the energy level that converted the patient. EMS personnel should initiate rapid transport and continue resuscitation when the following factors are present: <ul style="list-style-type: none"> ROSC following cardiac arrest (5 minute of palpable pulses) Near drowning. Hypothermia. Double simultaneous external defibrillation. Patients in recurrent ventricular fibrillation may benefit from transport to hospital for additional antiarrhythmic therapy. NOTE: Further treatment at the hospital may include one or more of the following: ECMO, thrombolytics, or percutaneous intervention (PCI).



Symptomatic Bradycardia

FIELD TREATMENT GUIDELINE C-04

INDICATION	<ul style="list-style-type: none"> Symptomatic Bradycardia: Heart rate < 60 with serious signs and symptoms. Patient must demonstrate a systolic blood pressure < 90 mmHg <u>and</u> one or more of the following: <ul style="list-style-type: none"> Chest pain. Shortness of breath. Pulmonary Edema. 																		
BLS	<ul style="list-style-type: none"> Follow General Medical Care M-01. Identify and Treat Underlying Cause. 12-Lead ECG BP-03. (Do not delay therapy for 12-Lead ECG). 																		
ALS	<ul style="list-style-type: none"> MODERATE SYMPTOMATIC BRADYCARDIA: Alert with serious signs and symptoms: <ul style="list-style-type: none"> Atropine: <i>Adult:</i> 0.5 mg IV/IO. Repeat every 5 minutes, MAX total dose of 3 mg. If patient doesn't respond to atropine or there is difficulty gaining IV/IO access: External Cardiac Pacing AP-07. <ul style="list-style-type: none"> Consider Sedation AP-14 if patient is awake and aware. If patient doesn't respond to atropine and external cardiac pacing: Dopamine: <i>Adult:</i> Titrate to systolic blood pressure of 90 mmHg, based on weight range of Dopamine Dose Chart. SEVERE SYMPTOMATIC BRADYCARDIA: Altered mental status with serious signs and symptoms: <ul style="list-style-type: none"> External Cardiac Pacing AP-07 should be first line therapy for treating severe symptomatic bradycardia. <ul style="list-style-type: none"> Consider Sedation AP-14 if patient is awake and aware. If patient doesn't respond to external cardiac pacing: Dopamine: <i>Adult:</i> Titrate to systolic blood pressure of 90 mmHg, based on weight range of Dopamine Dose Chart. 																		
KEY CONCEPTS	<ul style="list-style-type: none"> Begin immediate transport if unable to establish IV/IO; continue treatment while transporting. Bradycardia is often seen in patients with STEMI or ischemia. 12-lead should be obtained. Sedation prior to starting pacing is not required. Critical patients should be paced first. Sedation in pacing is to decrease discomfort, not to decrease level of consciousness. Atropine is not often effective for wide-QRS third degree block and in heart-transplant patients. 																		
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Wide-Complex Tachycardia

FIELD TREATMENT GUIDELINE C-05

INDICATION	<p>Stable or unstable patient presenting with a wide-complex tachycardia:</p> <ul style="list-style-type: none"> QRS \geq 0.12 seconds as documented in two (2) leads. Rate is typically regular, but may be irregular.
BLS	<ul style="list-style-type: none"> Follow <u>General Medical Care M-01</u>. <u>12-Lead ECG BP-03</u>.
ALS	<p>STABLE: Systolic blood pressure above 90 mmHg in the absence of chest pain, shortness of breath, or acutely altered mental status.</p> <ul style="list-style-type: none"> <u>Amiodarone:</u> <i>Adult:</i> 150 mg IV/IO, infuse over 10 minutes. If dysrhythmia continues, may repeat once in 10 minutes. <p>UNSTABLE : Systolic blood pressure below 90 mmHg or chest pain, shortness of breath, or acutely altered mental status.</p> <ul style="list-style-type: none"> Synchronized Cardioversion: <ul style="list-style-type: none"> Consider <u>Sedation AP-14</u> if patient is awake and aware. Initial energy setting: 100J If no response: 200J If no response: 300J If no response: 360J Contact base hospital for consideration of additional therapy (i.e. extended transport times requiring ongoing amiodarone infusion).
KEY CONCEPTS	<ul style="list-style-type: none"> Rhythm analysis should be based on review of printed ECG strip, not monitor screen or computerized readout of 12-lead ECG. Caution with administration of amiodarone. Rapid infusion may cause hypotension. Amiodarone should not be used in unstable patients. This includes hypotensive patients. Amiodarone should not be administered to patients experiencing ventricular ectopy. Use of amiodarone should be restricted to ventricular tachycardia.



Supraventricular Tachycardia (SVT)

FIELD TREATMENT GUIDELINE C-06

INDICATION	<p>Stable or unstable patient presenting with supraventricular tachycardia (SVT):</p> <ul style="list-style-type: none"> Regular heart rate > 150 with QRS < 0.12 seconds as documented in two (2) leads.
BLS	<ul style="list-style-type: none"> Follow <u>General Medical Care M-01</u>. Identify and treat underlying cause <u>12-Lead ECG BP-03</u>.
ALS	<p>STABLE: Systolic blood pressure above 90 mmHg in the absence of severe chest pain, severe shortness of breath, or acutely altered mental status.</p> <ul style="list-style-type: none"> Valsalva maneuver. <u>Adenosine:</u> <i>Adult:</i> 6 mg IV/IO rapid push followed by 10 mL normal rapid saline flush. If no response after two minutes: <i>Adult:</i> 12 mg rapid IV push followed by 10 mL normal saline flush. <p>UNSTABLE: Systolic blood pressure below 90 mmHg or severe chest pain, severe shortness of breath, or acutely altered mental status.</p> <ul style="list-style-type: none"> Synchronized Cardioversion: <ul style="list-style-type: none"> Consider <u>Sedation AP-14</u> if patient is awake and aware. Initial energy setting: 100J If no response: 200J If no response: 300J If no response: 360J
KEY CONCEPTS	<ul style="list-style-type: none"> Rhythm analysis should be based on review of P and QRS waves on printed ECG strip, not monitor screen or computerized readout of 12-lead ECG. Hypoxia is a common cause of tachycardia. Initial evaluation should focus on determining if oxygenation is adequate.



Rapid Atrial Fibrillation/Atrial Flutter

FIELD TREATMENT GUIDELINE C-07

INDICATION	<p>Atrial Fibrillation: Appearance of irregularly irregular rhythm with variations in both R wave to R wave interval and amplitude.</p> <p>Atrial Flutter: Appearance of classic saw-tooth pattern rhythm with ventricular response rates rarely > 150 to 180.</p>	
BLS	<ul style="list-style-type: none"> Follow <u>General Medical Care M-01</u>. <u>12-Lead ECG BP-03</u>. 	
ALS	<p>UNSTABLE: Systolic blood pressure below 90 mmHg or severe chest pain, severe shortness of breath, or acutely altered mental status.</p> <ul style="list-style-type: none"> Administer <u>Fluid Challenge AP-09</u>. Synchronized Cardioversion: <ul style="list-style-type: none"> Consider <u>Sedation AP-14</u> if patient is awake and aware. 	
	Atrial Fibrillation	Atrial Flutter
	<ul style="list-style-type: none"> Initial energy setting: 200J 	<ul style="list-style-type: none"> Initial energy setting: 100J
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KEY CONCEPTS	<ul style="list-style-type: none"> Rhythm analysis should be based on review of P and QRS waves on printed ECG strip, not monitor screen or computerized readout of 12-lead ECG. Atrial fibrillation and atrial flutter are typically well-tolerated rhythms that do not require aggressive therapy. Assess patient for other possible causes if symptomatic. Attempts to covert the rhythm should be reserved for the patient in extremis. 	



Cardiogenic Shock

FIELD TREATMENT GUIDELINE C-08

INDICATION	<p>Systolic blood pressure < 90 mmHg. Shock-like appearance suggestive of cardiac origin. May have:</p> <ul style="list-style-type: none"> • History of congestive heart failure, • Chest pain, • Rales or clear lung sounds, • Shortness of breath, or • Pedal edema. 																									
BLS	<ul style="list-style-type: none"> • Follow General Medical Care M-01. • 12-Lead ECG BP-03. <ul style="list-style-type: none"> • If acute ST elevation myocardial infarction (STEMI) detected on 12-Lead ECG, e.g., ***MEETS ST ELEVATION MI CRITERIA***: <ul style="list-style-type: none"> • Transmit 12-Lead ECG with direct transport to the closest authorized STEMI receiving center. • Contact receiving facility ASAP. 																									
ALS	<ul style="list-style-type: none"> • Administer Fluid Challenge AP-09. • If patient doesn't respond to the above treatment: <ul style="list-style-type: none"> • Dopamine: <i>Adult</i>: Titrate to systolic blood pressure of 90 mmHg, based on weight range of Dopamine Dose Chart. 																									
KEY CONCEPTS	<ul style="list-style-type: none"> • Rapid transport with early notification to receiving facility should be considered early in the management of cardiogenic shock. • Sepsis should be considered as a possible cause of atraumatic shock. • Place multifunction defibrillator/pacer pads on patient in case of cardiac arrest. • Use Dopamine with caution in cardiogenic shock with accompanying congestive heart failure. 																									
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Suspected Acute Coronary Syndrome

FIELD TREATMENT GUIDELINE C-09

INDICATION	<p>Retrosternal chest discomfort, heaviness, squeezing, burning or tightness; pain radiating or isolated to jaw, shoulders or back; nausea; diaphoresis; dizziness; dyspnea; anxiety; or back pain. Patient may have a history of coronary artery disease (CAD).</p>
BLS	<ul style="list-style-type: none"> • Follow <u>General Medical Care M-01</u>. • <u>12-Lead ECG BP-03</u>. <ul style="list-style-type: none"> • If acute ST elevation myocardial infarction (STEMI) detected on 12-Lead ECG, e.g., ***MEETS ST ELEVATION MI CRITERIA***: <ul style="list-style-type: none"> ▪ Transmit 12-Lead ECG with direct transport to the closest authorized STEMI receiving center. ▪ Contact receiving facility ASAP. • <u>Aspirin</u>: <i>Adult</i>: 162 mg PO. Have patient chew if possible. Do not use enteric coated tablets.
ALS	<ul style="list-style-type: none"> • <u>Nitroglycerine</u>: Sublingual <i>Adult</i>: 0.4 mg SL. Repeat every 3-5 min if discomfort persists and systolic blood pressure remains \geq 100 mmHg. • <u>Nitroglycerine</u>: 2% Paste <i>Adult</i>: If transport time is $>$ 1 hour, administer $\frac{1}{2}$ inch of 2% paste to anterior chest wall. If discomfort is relieved and systolic blood pressure remains \geq 100 mmHg, continue the use of paste. • <u>Fentanyl</u>: Administer according to <u>Pain Management AP-13</u>. • If patient is a STEMI, consider establishing a second IV NS TKO during transport.
KEY CONCEPTS	<ul style="list-style-type: none"> • Do not administer nitroglycerine before establishing IV access. • Many STEMI's evolve during prehospital care and may not be noted on the initial 12-Lead. • If no STEMI detected in ECG interpretation and providers have additional concerns about the patient, consider base hospital consultation with transmission of the 12-Lead ECG. • Do not administer nitroglycerine to patients who have recently taken erectile dysfunction drugs: Viagra, Staxyn, Levitra, or Stendra with 24 hours, or Cialis within 36 hours. • Consider an aortic dissection/aneurysm if unequal pulses in extremities, tearing pain, pain radiating to back (hypertensive or hypotensive), transport immediately. • Oxygen, IV, and initial treatment of dysrhythmias (for frequent couplets or repeated non-sustained V-tach) should be started prior to transport. • Myocardial ischemia is a frequent cause of chest pain, but consider other life-threatening causes: pneumothorax (particularly in asthmatics, COPD, trauma); pulmonary embolus (women on birth control pills, or pregnant, or patients with immobilized lower extremities); dissecting aneurysm (atherosclerotic disease); or pericarditis. • Etiology of chest pain is frequently difficult to diagnose. If any doubt exists, assume the pain arises from a life-threatening condition. • Patients who take other blood thinners (Lovenox, Coumadin [warfarin], Pradaxa [dabigatran], etc.) SHOULD still receive aspirin.