

 <p>County of San Diego EMS A Division of San Diego County Fire</p>	TREATMENT PROTOCOL		S-127
	CPR / ARRHYTHMIAS		
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BLS

- Continuous compressions of 100-120/min with ventilation rate of 10-12/min
- Use metronome or other real-time audiovisual feedback device
- Rotate compressor at least every 2 min
- Use mechanical compression device (unless contraindicated)
- O₂ and/or ventilate with BVM
- Monitor O₂ saturation
- Apply AED during CPR and analyze as soon as ready

VAD

- Perform CPR
- Contact BH for additional instructions

TAH

- Contact BH for instructions

ALS

- Apply defibrillator pads during CPR. Defibrillate immediately for VF/pulseless VT.
- IV/IO SO
- Capnography SO with waveform and value
- ET/PAA SO without interrupting compressions
- NG/OG tube PRN SO
- Provide cardiac monitor data to agency QA/QI department

Team leader priorities

- Monitor CPR quality, rate, depth, full chest recoil, and capnography value and waveform
- Minimize interruption of compressions (<5 sec) during EKG rhythm checks
- Charge monitor prior to rhythm checks. Do not interrupt CPR while charging.

VAD/TAH

- See Adjunct Cardiac Devices section

Capnography

- For EtCO₂ > 0 mmHg, may place ET/PAA without interrupting compressions
- If EtCO₂ rises rapidly during CPR, pause CPR and check for pulse

Specific protocols (see below)

- Arrhythmias
 - Unstable bradycardia
 - Supraventricular tachycardia
 - Atrial fibrillation / flutter
 - Ventricular tachycardia
 - Ventricular fibrillation / pulseless VT
 - Pulseless electrical activity / asystole
- Return of Spontaneous Circulation
- Adjunct Cardiac Devices
- Termination of Resuscitation

UNSTABLE‡ BRADYCARDIA

- Obtain 12-lead EKG
- Atropine 1 mg IV/IO SO, MR q3-5 min to max 3 mg SO
- If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO SO, MR SO

Rhythm unresponsive to atropine

- Midazolam 1-5 mg IV/IO PRN pre-pacing SO
- External cardiac pacing* SO
- If capture occurs and SBP ≥100 mmHg, treat per Pain Management Protocol (S-141)

If SBP <90 mmHg after atropine or initiation of pacing

- 250 mL fluid bolus IV/IO SO, MR x1 SO
- Push-dose epinephrine 1:100,000 (0.01 mg/mL) 1 mL IV/IO BHO. MR q3 min, titrate to SBP ≥90 mmHg BHO.

Push-dose epinephrine mixing instructions

1. Remove 1 mL normal saline (NS) from the 10 mL NS syringe
2. Add 1 mL of epinephrine 1:10,000 (0.1 mg/mL) to 9 mL NS syringe

The mixture now has 10 mL of epinephrine at 0.01 mg/mL (10 mcg/mL) concentration.

‡SBP <90 mmHg and exhibiting any of the following signs/symptoms of inadequate perfusion, e.g.,

- Altered mental status (decreased LOC, confusion, agitation)
- Pallor
- Diaphoresis
- Significant chest pain of suspected cardiac origin
- Severe dyspnea

*External cardiac pacing

- Begin at rate 60/min
- Dial up until capture occurs, usually between 50 and 100 mA
- Increase by a small amount, usually about 10%, for ongoing pacing

SUPRAVENTRICULAR TACHYCARDIA

- Obtain 12-lead EKG

Stable (symptomatic)

- If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO SO, MR SO
- VSM SO
- Adenosine 6 mg rapid IV/IO followed by 20 mL NS rapid IV/IO SO
- Adenosine 12 mg rapid IV/IO followed by 20 mL NS rapid IV/IO SO, MR x1 SO

Unstable[‡] (or refractory to treatment)

- Consider midazolam 1-5 mg IV/IO pre-cardioversion SO
- Synchronized cardioversion at manufacturer's recommended energy dose SO, MR x2 SO, MR BHO
- After successful cardioversion
 - Check BP. If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO SO, MR SO.
 - Obtain 12-lead EKG

[‡]SBP <90 mmHg and exhibiting any of the following signs/symptoms of inadequate perfusion, e.g.,

- Altered mental status (decreased LOC, confusion, agitation)
- Pallor
- Diaphoresis
- Significant chest pain of suspected cardiac origin
- Severe dyspnea

ATRIAL FIBRILLATION / FLUTTER

- Obtain 12-lead EKG
- If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO SO, MR SO

Rate \geq 180 and unstable[‡]

- Consider midazolam 1-5 mg IV/IO pre-cardioversion SO
- Synchronized cardioversion at manufacturer's recommended energy dose SO, MR x2 SO, MR BHO
- After successful cardioversion
 - Check BP. If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO SO, MR SO.
 - Obtain 12-lead EKG

[‡]SBP <90 mmHg and exhibiting any of the following signs/symptoms of inadequate perfusion, e.g.,

- Altered mental status (decreased LOC, confusion, agitation)
- Pallor
- Diaphoresis
- Significant chest pain of suspected cardiac origin
- Severe dyspnea

VENTRICULAR TACHYCARDIA

- Obtain 12-lead EKG

Stable

- If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO SO, MR SO
 - Amiodarone 150 mg in 100 mL of NS over 10 min IV/IO SO, MR x1 in 10 min SO
- OR**
- Lidocaine 1.5 mg/kg IV/IO SO, MR at 0.5 mg/kg IV/IO q8-10 min to max 3 mg/kg SO

Unstable†

- Consider midazolam 1-5 mg IV/IO pre-cardioversion SO
- Synchronized cardioversion at manufacturer's recommended energy dose SO, MR x2 SO, MR BHO
- After successful cardioversion
 - Check BP. If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO SO, MR SO
 - Obtain 12-lead EKG

- †SBP <90 mmHg and exhibiting any of the following signs/symptoms of inadequate perfusion, e.g.,
- Altered mental status (decreased LOC, confusion, agitation)
 - Pallor
 - Diaphoresis
 - Significant chest pain of suspected cardiac origin
 - Severe dyspnea

VENTRICULAR FIBRILLATION / PULSELESS VT

- CPR
- Defibrillate as soon as monitor available/charged
- Defibrillate q2 min while VF/VT persists
- Epinephrine 1:10,000 1 mg IV/IO q3-5 min SO

Persistent VF/VT after 3 defibrillation attempts

- Amiodarone 300 mg IV/IO, MR 150 mg (max 450 mg) SO
- OR**
- Lidocaine 1.5 mg/kg IV/IO SO, MR at 0.5 mg/kg IV/IO q5 min to max 3 mg/kg SO

Early Base Hospital contact should be considered for persistent or recurrent VF/pulseless VT

PULSELESS ELECTRICAL ACTIVITY

- CPR
- Epinephrine 1:10,000 1 mg IV/IO q3-5 min SO

Suspected hyperkalemia

- CaCl₂ 500 mg IV/IO SO
- NaHCO₃ 1 mEq/kg IV/IO BHO

Suspected hypovolemia

- 1 L fluid bolus IV/IO, MR x2 SO

Suspected poisoning/OD

- Contact BH
- May consider treatment per Poisoning/Overdose Protocol (S-134)

For consideration of non-transport, see Asystole/Termination of Resuscitation protocol

ASYSTOLE / TERMINATION OF RESUSCITATION

ASYSTOLE

- CPR
- Epinephrine 1:10,000 1 mg IV/IO q3-5 min SO

TERMINATION OF RESUSCITATION (TOR)

Resuscitation may be terminated on SO[§] if all of the following conditions are met:

- Persistent asystole (NO other rhythms detected)
- Unwitnessed arrest (by bystanders or EMS)
- No bystander CPR
- No AED or other defibrillation
- No return of pulses
- ≥20 min on-scene resuscitation time

Base Hospital contact is not required if all criteria are met, even if ALS interventions are performed
Document time of death recognition, full name of paramedic making determination of apparent death, and circumstances under TOR determination

BHPO is required for TOR for all other presentations, rhythms, and situations

Document time of death pronouncement, full name of physician, and circumstances under which TOR was ordered

[§]Applies to cardiac arrests of presumed cardiac origin. Excludes drowning, hypothermia, trauma, and electrocution.

RETURN OF SPONTANEOUS CIRCULATION

- Ventilate PRN (goal of EtCO₂ = 40 mmHg)
- Obtain BP
- Obtain 12-lead EKG
- Transport to closest STEMI Center regardless of 12-lead EKG reading SO
- Provide cardiac monitor data to agency QA/QI department

SBP <90 mmHg

- If rales not present, 250 mL fluid bolus IV/IO SO, MR SO
- Push-dose epinephrine 1:100,000 (0.01 mg/mL) 1 mL IV/IO BHO. MR q3 min, titrate to SBP ≥90 mmHg BHO

Push-dose epinephrine mixing instructions

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ADJUNCT CARDIAC DEVICES

- Transport equipment and any knowledgeable family/support persons to ED with patient

VAD

- Contact BH and VAD coordinator
- Follow protocols for CPR and treatment of arrhythmias, including use of cardioversion, pacing, and defibrillation PRN

TAH

- Contact BH and TAH coordinator
- Treatment per BHO

Wearable defibrillators (vest)

- If vest device is broadcasting specific verbal directions, follow device's prompts
- If device not broadcasting directions and patient requires CPR or cardiac treatment, remove vest and treat

Malfunctioning pacemakers

- Treat per applicable arrhythmia protocol
- Treat pain per Pain Management Protocol (S-141) PRN

Reported/witnessed AICD firing ≥ 2

Pulse ≥ 60

- Lidocaine 1.5 mg/kg IV/IO SO, MR at 0.5 mg/kg IV/IO q8-10 min to max 3 mg/kg SO

OR

- Amiodarone 150 mg in 100 mL of NS over 10 min IV/IO SO, MR x1 in 10 min SO