



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 [®]
- Capnography with waveform and value
- ET/PAA without interrupting compressions
- NG/OG tube PRN
- 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 ECG 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
- Extracorporeal Cardiopulmonary Resuscitation (ECPR) Criteria

UNSTABLE‡ BRADYCARDIA

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

Rhythm unresponsive to atropine

- Midazolam 1-5 mg IV/IO PRN pre-pacing
- External cardiac pacing[†]
- If capture occurs and experiencing pain from pacing, treat per Pain Management Protocol (S-141)

If SBP <90 mmHg after atropine or initiation of pacing

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

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.

* May omit atropine in patients unlikely to have clinical benefit (e.g., heart transplant patients, 2nd degree type II, or 3rd degree heart block)

‡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

- Set rate and energy per manufacturer's recommendations
- Increase energy setting until capture occurs, usually between 50 mA and 100 mA
- After electrical and mechanical capture achieved, increase energy by 10%
- If patient remains hypotensive, increase rate in 5 bpm increments (not to exceed 100 bpm) to achieve and maintain adequate perfusion

SUPRAVENTRICULAR TACHYCARDIA

- Obtain 12-lead ECG

Stable (symptomatic)

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

Unstable[‡]

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

[‡]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 ECG
- If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO, MR [Ⓐ]

Rate \geq 180 and unstable[‡]

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

[‡]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 ECG

Stable

- If SBP <90 mmHg and rales not present, 250 mL fluid bolus IV/IO, MR [Ⓐ]
- Amiodarone 150 mg in 100 mL of NS over 10 min IV/IO, MR x1 in 10 min

OR

- Lidocaine 1.5 mg/kg IV/IO, MR at 0.5 mg/kg IV/IO q5 min to max 3 mg/kg

Unstable[‡]

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

[‡]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 VT¹

- CPR
- Defibrillate at manufacturer's recommended energy dose as soon as monitor available/charged
- Defibrillate at manufacturer's recommended energy dose q2 min while VF/VT persists
- Epinephrine 1:10,000 1 mg IV/IO q3-5 min, begin after second defibrillation

Persistent VF/VT after 3 defibrillation attempts

- Amiodarone 300 mg IV/IO, MR 150 mg q3-5 min (max 450 mg)
OR
- Lidocaine 1.5 mg/kg IV/IO, MR at 0.5 mg/kg IV/IO q5 min to max 3 mg/kg

¹ If patient meets ECPR criteria, make base hospital contact and transport **IMMEDIATELY** to an ECPR Receiving Center (per S-127A).

PULSELESS ELECTRICAL ACTIVITY

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

Suspected hyperkalemia

- CaCl₂ 1 gm IV/IO
- NaHCO₃ 1 mEq/kg IV/IO
- Continuous albuterol/levalbuterol 6 mL via nebulizer[Ⓐ]

Suspected hypovolemia

- 1,000 mL fluid bolus IV/IO, MR x2[Ⓐ]

Suspected poisoning / OD

- For suspected tricyclic antidepressant, beta blocker, or calcium channel blocker overdoses, consider treatment per Poisoning / Overdose Protocol (S-134)²

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

² Naloxone is not authorized in cardiac arrest.

ASYSTOLE / TERMINATION OF RESUSCITATION

ASYSTOLE

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

TERMINATION OF RESUSCITATION (TOR)

Resuscitation may be terminated on SO[§] if all 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, and electrocution. For traumatic arrests, treat per Adult Traumatic Cardiac Arrest algorithm in S-139 Trauma.

RETURN OF SPONTANEOUS CIRCULATION

- Ventilate PRN (goal of EtCO₂ = 40 mmHg)
- Obtain BP
- Obtain 12-lead ECG
- Transport to closest STEMI Center³ regardless of 12-lead ECG reading
- Provide cardiac monitor data to agency QA/QI department
- Monitor blood glucose PRN

SBP <90 mmHg

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

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.

³ Do not change destination if already enroute to an ECPR Receiving Center.

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 TAH coordinator
- Consult BH Physician for orders for TAH recommended treatments

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, MR at 0.5 mg/kg IV/IO q5 min to max 3 mg/kg

OR

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

EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION (ECPR) CRITERIA⁴

Age 18-70

Witnessed cardiac arrest

CPR

- Must be established within 5 minutes of cardiac arrest
- High-quality compressions throughout resuscitation, including during transport

Use of automated mechanical chest compression device

Refractory Ventricular Fibrillation/Pulseless VT

- Defined as persistent pulseless shockable rhythm after 2 defibrillation attempts (including AED-delivered shocks, but not AICD firings)

Time interval from cardiac arrest to arrival at ECPR receiving center \leq 45 minutes

⁴ If patient meets ECPR criteria, make base hospital contact and transport **IMMEDIATELY** to an ECPR Receiving Center (per S-127A).