ALL Cardiac Arrests – High Performance CPR

See Appendix 2 for High Performance Team Organization.

See **Protocol 2.19 Left Ventricular Assist Device (LVAD)** for patients with device.

Current Advanced Cardiac Life Support should be followed in conjunction with this protocol/algorithm

Start CAB (compressions, airway, breathing) when patient is unconscious/unresponsive, not breathing normally and no pulse is detected within 10 seconds.

Compressions

Do 5 cycles of chest compressions at 30:2 compression/ventilation ratio:

- Push hard (at least 2") and fast (100-120/min).
- Allow complete chest recoil.
- Minimize compression interruptions.
- Next up team compressor is continuously checking quality of femoral pulse and is ready to rotate to the compressor position at the end of the cardiac cycle (2 minutes).
- Rotate compressors every 2 minutes or sooner if fatigued.
- If transported with compressions ongoing and LUCAS device is employed (and no evidence of spinal trauma) elevate head of gurney 30 degrees.

~~**Airway/Ventilation:**~~

- ~~Open airway. Provide bag-mask ventilation. Pause compressions 2 seconds or less to ventilate during 30:2.~~
- ~~Ventilate enough to cause chest rise. Avoid excessive ventilation (too fast or too much volume).~~
- ~~Inserts airway adjuncts as appropriate. Do NOT stop chest compressions during advanced airway insertions.~~
- ~~Asynchronous ventilations every 6 seconds once advanced airway is in place or every 10th compression~~

AED/Defibrillator

- While CPR is in progress, turn on AED/defibrillator and apply pads (anterior posterior if possible) and puck.
- Shock on a 2-minute cycle. Pre-charge AED/Defibrillator at 1:45 to get ready to deliver shock at 2 minutes.
- Minimize perishock pause to less than 5 seconds.
- Change out rescuer on chest compressions during perishock pause.

- After first 30 compressions, analyze rhythm. Clear patient and shock if indicated. Resume compressions for another 2 minutes before next rhythm analysis.
- Always resume chest compressions immediately after rhythm analysis or shock.
- **EXCEPTION**: If patient goes into VF/pulseless VT while monitored or attached to an AED or defibrillator, a shock must be administered immediately.
- If no shock advised, resume compressions for another 2 minutes before next rhythm analysis/femoral pulse check.

  If a shockable rhythm continues past the third shock, attach a second set of defibrillator pads in a chest position to provide alternate vector defibrillation and switch vectors, or attach a second defibrillator with a second set of defibrillator pads as soon as one is available to provide alternate vector defibrillation.

Airway/Ventilation:

- Open airway. Provide bag-mask ventilation. Pause compressions 2 seconds or less to ventilate during 30:2.
- Ventilate enough to cause chest rise. Avoid excessive ventilation (too fast or too much volume).
- Inserts airway adjuncts as appropriate. Do NOT stop chest compressions during advanced airway insertions.
- Asynchronous ventilations every 6 seconds once advanced airway is in place or every 10th compression

IV/IO Medications:

- ALS provider ~~gets~~ obtains IV/IO access and gives medications as appropriate.

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TREAT REVERSIBLE CAUSES ~~FOR PULSELESS ELECTRICAL ACTIVTY (PEA)~~	
1. **H**ypoxia	1. **T**ension Pneumothorax
2. **H**ydrogen Ion (Acidosis)	2. **T**orsades
3. **H**ypovolemia	3. **T**oxins
4. **H**ypothermia	4. **T**amponade (cardiac)
5. **H**ypo/**H**yperkalemia and Hypoglycemia	5. **T**hrombosis, pulmonary or cardiac

In addition to ongoing ACLS, consider additional treatments:

Hypoxia: Bag-mask ventilation with O2. Insert airway adjuncts as appropriate. Target O2 saturation 94 – 95%.

Hydrogen Ion (Acidosis): Assure adequate ventilation to blow off CO2.

Hypovolemia: Give **Normal Saline** bolus ~~for an organized rhythm with SBP < 90.~~

~~If hypotension persists, may administer **Epinephrine** infusion.~~

- If secondary to blood loss, early transport

Hypothermia: Rewarm if patient is hypothermic.

Hyperkalemia: ~~Suspect hyperkalemia if tall, peaked T waves on monitor or EKG (in all leads) and prolonged QRS (>0.12 sec).~~

- Give Calcium Chloride
- ~~Give~~ Consider **Sodium Bicarbonate** only after Calcium Chloride when treating suspected hyperkalemia.
- Consider Albuterol via BVM
- ~~Give **Calcium Chloride**. May repeat in 10 min.~~

Hypokalemia: Consider early transport

Hypoglycemia: Check a blood glucose and correct hypoglycemia per **Protocol 2.03 Altered Mental Status** ~~with **Dextrose 10% or Glucagon.**~~

Tension Pneumothorax: Relieve tension pneumothorax per **Protocol 7.06 Needle Thoracostomy**

Torsades de Pointes: ~~Give~~ After defibrillation give **Magnesium Sulfate**

Toxins: Treat signs and symptoms of drug toxicity:

- If QRS widening from Tricyclic Antidepressant Overdose, give **Sodium Bicarbonate**. May repeat.
- If calcium channel blocker overdose, give **Calcium Chloride**. May repeat in 10 min.
- If opiate overdose is suspected, give **Naloxone.**

Tamponade (cardiac) or Thrombosis, pulmonary or cardiac: Consider early transport ~~In-hospital treatment only.~~

CARDIAC ARREST IN PREGNANCY

- Anticipate difficult airway; experienced provider preferred.
- **Normal Saline** fluid bolus. Reassess and repeat as indicated.
- During CPR, have a provider manually displace gravid uterus to patient's left side. If ROSC is achieved, place patient in Left Lateral Decubitus Position.
- If patient is receiving IV/IO **Magnesium** pre-arrest, stop infusion and switch to **Normal Saline**. Flush line with **Normal Saline** prior to giving **Calcium Chloride** . May repeat in 10 min.
- Focus on early transport where possible.

AFTER CARE IF ROSC

- Go to **Protocol 2.05 Adult Post-Cardiac Arrest or Return of Spontaneous Circulation**.

AFTER CARE IF NO ROSC

- Provide grief support and referrals for on-site survivors as needed.

~~- During CPR, have a provider manually displace gravid uterus to patient's left side. If ROSC is achieved, place patient in Left Lateral Decubitus Position.~~
~~- If patient is receiving IV/IO Magnesium pre-arrest, stop infusion and switch to Normal Saline. Flush line with Normal Saline prior to giving Calcium Chloride . May repeat in 10 min.~~

DOCUMENTATION

- Initial "At Patient Side" Time.
- Intervention and medication times.
- Use accelerometer ("puck") to track CPR unless LUCAS is being used
- ~~Report cardiac arrest data to **SFCardiacCaseReview@sfdph.org.**~~
- Patient response to interventions and medications (rhythm changes; pulses with and without CPR, ROSC).
- ROSC or termination resuscitation time.
- Bystander CPR prior to arrival and duration if not already a required field

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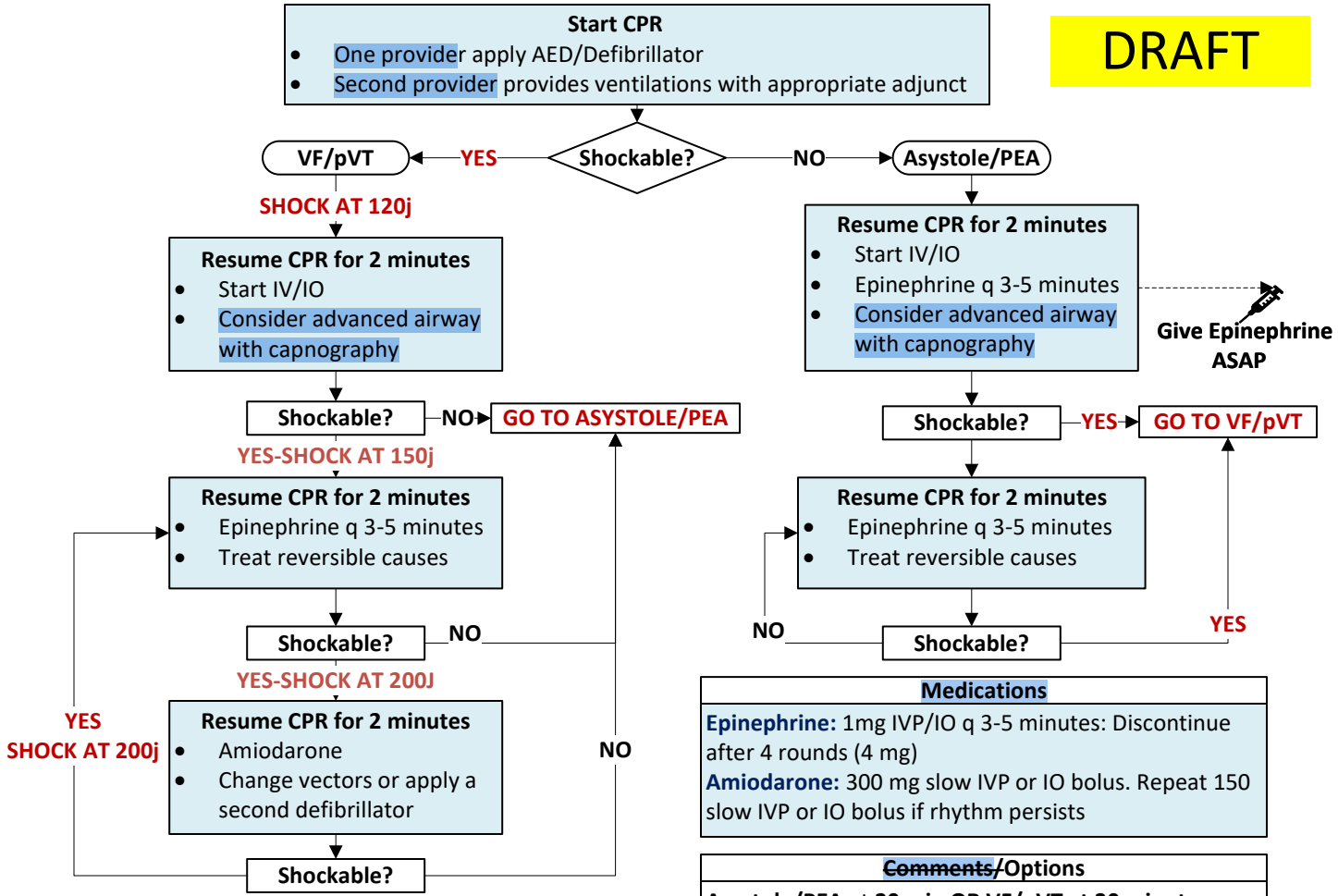
- **Start CAB** (compressions, airway, breathing) when patient is unconscious/unresponsive, not breathing normally and no pulse is detected within 10 seconds
- **Compressions**: 5 cycles of chest compressions at 30:2 compression/ventilation ratio. At least 2" deep at 100-120/min. Allow full chest recoil. Next up team compressor continually checking femoral pulse. Rotate compressor q 2min or sooner if fatigued. Apply quantitative waveform. If ETCO2 is low reassess compression quality.
- **AED/Defibrillation:** Apply AED/Defibrillator (anterior/posterior if possible) durring CPR. Pre-charge AED/Defibrillator at 1:45 to deliver shock if applicable. If patient goes into VF/pulseless VT-deliver shock immediately. If shockable rhythm past third shock, attach a second set defibrillator pads to change vectors, or apply an additional defibrillator
- **Airway/Ventilation:** Provide bag-mask ventilation with BLS airway. Minimize compression interruptions. Pause no more than 2 seconds to provide ventilations in 30:2 ratio. Do not stop chest compressions when inserting advanced airways. Asynchronous ventilations q 6 seconds or every 10th compression.
- **IV/IO medications**: ALS provider obtains IV/IO access and gives appropriate medications.

DRAFT



Medications

Epinephrine: 1mg IVP/IO q 3-5 minutes: Discontinue after 4 rounds (4 mg)
Amiodarone: 300 mg slow IVP or IO bolus. Repeat 150 slow IVP or IO bolus if rhythm persists

~~Comments~~/Options

Asystole/PEA at 20 min OR VF/pVT at 30 minutes

- Call Base Physician
- Transport to a STAR center with CPR
- Stop resuscitation

Reversible Causes

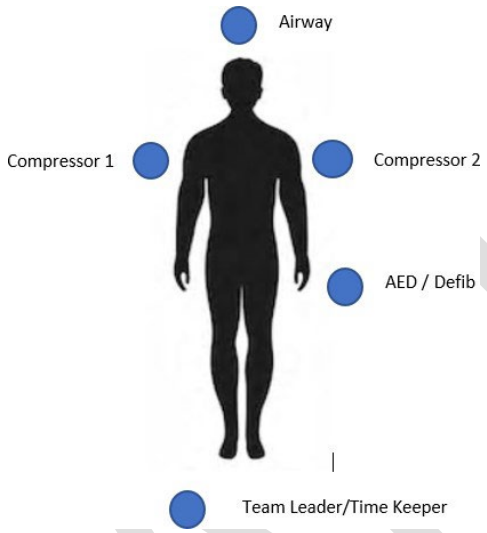
In addition to ongoing ACLS, consider additional treatments:

Hypoxia: BVM with O2-Target SPO2 to 94-95%
Hydrogen Ion: Adequate ventilation to blow off CO2
Hypovolemia: Give **Normal Saline** bolus. If secondary to blood loss, early transport
Hypothermia: Rewarm
Hyperkalemia: Give **Calcium Chloride.** Consider **Sodium Bicarbonate** after Calcium Chloride**.** Consider Albuterol via BVM
Hypokalemia: consider early transport
Hypoglycemia: Check blood glucose and correct per **Protocol 2.03 Altered Mental Status**
Tension Pneumothorax: Relieve tension per **Protocol 7.06 Needle Thoracostomy**
Torsades: After defibrillation give **Magnesium Sulfate**
Toxins: Widening QRS from TCA OD: Give **Sodium Bicarbonate, m**ay repeat. **Calcium channel OD,** give **Calcium Chloride, m**ay repeat in 10 minutes**. If Opiate OD is suspected,** give **Naloxone.**
Tamponade (cardiac) or Thrombosis, pulmonary or cardiac: Consider early transport

Effective: xx/xx/xx
Supersedes: xx/xx/xx

APPENDIX 2: High Performance CPR Team Set Up

Assign functional positions based on available personnel. One person may do one or more of the recommended functional positions listed below:



Compressor:

- Does chest compressions.

Airway:

- Opens airway.
- Provides bag-mask ventilation with O2. Inserts airway adjuncts as appropriate.
- Target O2 saturation 94 – 95%.

AED/Monitor/Defibrillator:

- Bring and operates AED/monitor/defibrillator

IV/IO Medications:

- ALS role – gets IV/IO access and gives medications.

Team Leader /Time keeper:

- Assigns team roles (or assumes roles if not assigned).
- Provides team feedback.
- Records intervention and medication times. Announces when next interventions and medications due.
- Records frequency and duration of CPR interruptions.

Next Compressor:

- Continuously checking femoral pulse. Switch at end of cardiac cycle (2 minutes).

Options:

- **Asystole/PEA at 20 minutes:**

  OR

- **VF/pVT at 30 minutes:**
- Call Base Physician
- Transport to a STAR center with CPR
- Stop Resuscitation