# Clinical Advisory Subcommittee
# of the Emergency Medical Care Committee

## Meeting Agenda
## 10:15 A.M. Thursday, August 17th, 2023
## Location: SLOEMSA Conference Room
2995 McMillan Ave, Ste 178
San Luis Obispo, CA 93401

**Members**
CHAIR: Dr. Stefan Teitge, *County Medical Society*
Dr. Heidi Hutchinson, *ED Physician Tenet*
Dr. Kyle Kelson, *ED Physician Tenet*
Dr. Lucas Karaelias, *ED Physician Dignity*
Diane Burkey, *MICNs*
Rob Jenkins, *Fire Service Paramedics*
Nate Otter, *Ambulance Paramedics*
Paul Quinlan, *Fire Service EMTs*
Lisa Epps, *Air Ambulance*
Jeffrey Hagins, *Air Ambulance*
Arneil Rodriguez, *Ambulance EMTs*
Casey Hidle, *Lead Field Training Officer*
Tim Benes, *Medical Director Appointee*

**Staff**
STAFF LIAISON: David Goss, *EMS Coordinator*
Vince Pierucci, *EMS Division Director*
Dr. William Mulkerin, *Medical Director*
Ryan Rosander, *EMS Coordinator*
Rachel Oakley, *EMS Coordinator*
Sara Schwall, *EMS Admin Assistant III*

| AGENDA | ITEM | LEAD |
|---|---|---|
| Call to Order | Introductions | Dr. Teitge |
| | Public Comment | |
| Summary Notes | Review of Summary Notes February 16th | |
| Discussion | **Introduction of Amiodarone:**<br>• Review of Affected Protocols and Formularies | David |
| Adjourn | **Declaration of Future Agenda Items**<br>• Roundtable on Future Agenda Items | Dr. Teitge |
| | **Next meeting date –** Thursday October 19th, 2023<br><br>1015 hrs – **EMSA Conference Room**<br>2995 McMillan Ave. Suite 178<br>San Luis Obispo, CA 93401 | |

# Clinical Advisory Subcommittee of the Emergency Medical Care Committee

## Meeting Minutes
## 10:15 A.M., Thursday February 16, 2023
**SLO EMSA Conference Room**
**2995 McMillan Ave., Ste. 178, San Luis Obispo**

**Members**

☐CHAIR: Dr. Stefan Teitge, *County Medical Society, ED Physician Dignity*
☒ Dr. Heidi Hutchinson, *ED Physician Tenet*
☐ Dr. Kyle Kelson, *ED Physician Tenet*
☐ Dr. Lucas Karaelias, *ED Physician Dignity*
☒ Lisa Epps – *Air Ambulance*
☐ Jeffrey Hagins – *Air Ambulance*
☒ Rob Jenkins, *Fire Service Paramedics*
☒ Nate Otter, *Ambulance Paramedics*
☐ Arneil Rodriguez, *Ambulance EMTs*
☐ Casey Hidle, *Lead Field Training Officer*
☒ Diane Burkey RN, *MICNs*
☐ Tim Benes, *Medical Director Appointee*
☐ Paul Quinlan, *Fire Service EMTs*

**Staff**

☒ STAFF LIAISON: David Goss, *EMS Coordinator*
☐ Vince Pierucci, *EMS Division Director*
☒ Tom Ronay, *Medical Director*
☒ Ryan Rosander, *EMS Coordinator*
☒ Rachel Oakley, *EMS Coordinator*
☒ Sara Schwall, *EMS Admin Assistant III*

**Guests**

Doug Weeda, *CHP*
Carol Gonzales, RN, *French Hospital*

| AGENDA | ITEM | LEAD |
|---|---|---|
| Call to Order 1022 | Introductions | D. Goss |
| | Public Comment – No public comment | |
| Summary Notes | No Additions – N. Otter motions, D. Burkey 2nds, Finalized | |
| Discussion | **Review and Adoption of Draft Procedure #710 Vascular Access and Monitoring:**<br>• Reviewed presentation from December 15th Clinical Advisory<br><br>Discussion<br>Dr. Ronay – Reviewed definition of "in extremis" with critical patient findings.<br>R. Jenkins – Suggest making a change to the procedure to reflect the order of flushing.<br>D. Weeda – Are lines without color coding labeled?<br>C. Gonzales – Yes, but they can be difficult to read.<br>D. Burkey – In the hospital, utilization of IO for patients in extremis has seen a huge success rate.<br><br>Motion to approve Procedure #710<br>H. Hutchinson motions.<br>N. Otter 2nds.<br>All present in favor<br><br>Future Agenda Items: Pediatric SGAs | David Goss |
| Adjourned – 1048 | **Next meeting date –** Thursday, April 20th, 2023, 1015 a.m.<br>SLO EMSA Conference Room | |

COUNTY OF SAN LUIS OBISPO HEALTH AGENCY
PUBLIC HEALTH DEPARTMENT
**Penny Borenstein, MD, MPH** *Health Officer/Public Health Director*

| | |
|---|---|
| **MEETING DATE** | August 17th, 2023 |
| **STAFF CONTACT** | David Goss, EMS Coordinator<br>805.788.2514 dgoss@co.slo.ca.us |
| **SUBJECT** | Addition of Amiodarone |
| **SUMMARY** | While reviewing potential improvements to the EMS system, Amiodarone was found to be a potential improvement to out of hospital cardiac arrest patients and patients experiencing Ventricular Tachycardia with Pulses. In an effort to follow ACLS and numerous LEMSAs throughout the State of California, Amiodarone is being brought to the Clinical Advisory Subcommittee for potential adoption.<br><br>Following adoption, Amiodarone would be sent to the Operations Subcommittee for review and subsequently to EMCC for Adoption. Potential implementation date would be July 1st, 2024 with training occurring during the 2024 SLOEMSA Update Class. |
| **REVIEWED BY** | Vince Pierucci, Dr. William Mulkerin, SLOEMSA Staff |
| **RECOMMENDED ACTION(S)** | Recommended Amiodarone for adoption by CAC and move to Operations Agenda |
| **ATTACHMENT(S)** | CAC PowerPoint Presentation, Amiodarone Formulary, Lidocaine Formulary, Protocol #641, Protocol #641 Attachment A, Protocol #641 Attachment B, Protocol #643 |

# Clinical Advisory Subcommittee

AUGUST 17TH, 2023

# SLOEMSA Addition of Amiodarone

- Interested in adding Amiodarone to SLOEMSA protocols. This would include:
  - Protocol #641: Pulseless Cardiac Arrest Atraumatic
  - Protocol #641 Attachment A: Adult Pulseless Arrest Algorithm
  - Protocol #641 Attachment B: Pediatric Pulseless Arrest Algorithm
  - Protocol #643: Ventricular Tachycardia with Pulses
- Formulary Additions / Changes
  - Amiodarone Addition
  - Lidocaine Changes

# Amiodarone

- Class III Antiarrhythmic
- Would be indicated for the following conditions:
  - Cardiac Arrest with Ventricular Fibrillation or Pulseless Ventricular Tachycardia
  - Pulsating Ventricular Tachycardia
- Would be contraindicated for:
  - Any bradycardic rhythm
  - Known allergy or sensitivity

**AMIODARONE (Cordarone®)**

**Classification**: Class III Antiarrhythmic

**Action**: Prolongs cardiac repolarization. Also has sodium channel blockade, beta adrenergic blockade, and calcium channel blockade effects.

**Indications:**

1. Cardiac Arrest with Ventricular Fibrillation or Ventricular Tachycardia without Pulses
2. Ventricular Tachycardia with Pulses
3. Symptomatic/malignant ventricular ectopy

**Contraindications:**

1. **Second Degree Type II Heart Block**
2. **Third Degree Heart Block**
3. **Junctional Bradycardia**
4. **Ventricular ectopy associated with bradycardia.**
5. **Idioventricular rhythm**
6. **Known allergy or sensitivity to Amiodarone.**

# Amiodarone Dosage

**ADULT DOSE**

**Ventricular Fibrillation/ Ventricular Tachycardia without Pulses:**

- **300mg (50 mg/ml) IV/IO push; if rhythm persists after 5 min, 150mg IV/IO push refractory dose.**

**Ventricular Tachycardia with Pulses:**

- **150mg IV/IO drip over 10 min; repeat in 5 min to a total of 300mg.**

****Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add amiodarone and mix well. Run at 1.5gtts/second.**

**PEDIATRIC DOSE**

**Ventricular Fibrillation/ Ventricular Tachycardia without Pulses:**

- **5mg/kg IV/IO push; repeat every 5 min to a max of 15mg/kg**

**Ventricular Tachycardia with Pulses:**

- **5mg/kg IV/IO over 30 min (using 100cc bag Normal Saline)**

****Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add amiodarone and mix well. Run at 1gtt every 2 seconds.**

# Why?

- Amiodarone is utilized by 85% of LEMSAs across the State of California.
- Amiodarone is the preferred medication used for Antiarrhythmic therapy in Advanced Cardiac Life Support (ACLS).
- Amiodarone is a fixed dosage instead of weight based, mitigating possible medication errors

| LEMSA | Amiodarone |
|---|---|
| Alameda | x |
| Central California | x |
| Coastal Valleys | x |
| Contra Costa | x |
| El Dorado | x |
| Imperial | x |
| Inland | |
| Kern | |
| Los Angeles | x |
| Marin | x |
| Merced | x |
| Monterrey | x |
| Mountain Valley | x |
| Napa | x |
| North Coast | x |
| NorCal | x |
| Orange | x |
| Riverside | x |
| Sacramento | x |
| San Benito | x |
| San Diego | x |
| San Francisco | x |
| San Joaquin | |
| San Luis Obispo | |
| San Mateo | |
| Santa Barbara | x |
| Santa Clara | x |
| Santa Cruz | x |
| Sierra Sac | x |
| Solano | x |
| Stanislaus | x |
| Tuolumne | x |
| Ventura | x |
| Yolo | x |

# Why?

according to the International Consensus on Cardiopulmonary Resuscitation and Emerge
Cardiovascular Care Science with Treatment Recommendations (1-3). The guidelines
recommend administration of amiodarone for sustained ventricular fibrillation (Vf) and
ventricular tachycardia (VT) refractory to CPR, defibrillation, and vasopressor in out-of-
hospital cardiac arrest. Lidocaine is recommended as an alternative to amiodarone. How

Amiodarone can be considered the first-line antiarrhythmic agent given in cardiac arrest because it has shown the ability to increase short-term survival, improve the rate of ROSC, and increase the likelihood of hospital admission.

Amiodarone is primarily chosen for ACLS as the first-line antiarrhythmic agent for cardiac arrest. This is because it is effective in improving the rate of return of spontaneous circulation (ROSC) and improved ROSC to hospital admission in adults with refractory v-fib or pulseless v-tach.

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4999737/#:~:text=The%20guidelines%20recommend%20administration%20of,as%20an%20alternative%20to%20amiodarone.
- https://www.proacls.com/wiki/acls-pharmacology/amiodarone/
- https://emedcert.com/blog/acls-medications-review-amiodarone
- https://www.acc.org/Latest-in-Cardiology/ten-points-to-remember/2018/11/20/11/37/2018-American-Heart-Association-Focused-Update-on-ACLS
- https://www.ahajournals.org/doi/10.1161/CIR.0000000000000613

# Amiodarone Formulary

## AMIODARONE (Cordarone®)

**Classification**: Class III Antiarrhythmic

**Action**: Prolongs cardiac repolarization. Also has sodium channel blockade, beta adrenergic blockade, and calcium channel blockade effects.

**Indications:**

1. Cardiac Arrest with Ventricular Fibrillation or Ventricular Tachycardia without Pulses
2. Ventricular Tachycardia with Pulses
3. Symptomatic/malignant ventricular ectopy

**Contraindications:**

1. **Second Degree Type II Heart Block**
2. **Third Degree Heart Block**
3. **Junctional Bradycardia**
4. **Ventricular ectopy associated with bradycardia.**
5. **Idioventricular rhythm**
6. **Known allergy or sensitivity to Amiodarone.**

**Adverse Effects**:

**CNS: Hypotension, Rhythm Disturbances, Bradycardia, CHF, Cardiac Arrest, Shock, Heart Block, SIADH**
**Respiratory: Respiratory Depression, Pulmonary Toxicity**
**GI: Vomiting, Hepatotoxicity**
**Skin: Rash**
**Integumentary: Anaphylaxis**
**Musculoskeletal: Rhabdomyolysis**
**Renal: Acute Renal Failure**

**Administration**:

**ADULT DOSE**

**Ventricular Fibrillation/ Ventricular Tachycardia without Pulses:**

- **300mg (50 mg/ml) IV/IO push; if rhythm persists after 5 min, 150mg IV/IO push refractory dose.**

**Ventricular Tachycardia with Pulses:**

- **150mg IV/IO drip over 10 min; repeat in 5 min to a total of 300mg.**

****Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add amiodarone and mix well. Run at 1.5gtts/second.**

**PEDIATRIC DOSE**

**Ventricular Fibrillation/ Ventricular Tachycardia without Pulses:**

- **5mg/kg IV/IO push; repeat every 5 min to a max of 15mg/kg**

**Ventricular Tachycardia with Pulses:**

- **5mg/kg IV/IO over 30 min (using 100cc bag Normal Saline)**

****Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add amiodarone and mix well. Run at 1gtt every 2 seconds.**

**Onset**: Immediate

**Duration**: 10-20 Minutes

# Lidocaine Updated Formulary

## LIDOCAINE (Xylocaine®)

**Classification**: Antidysrhythmic agent

**Action**: Suppresses ventricular ectopy by stabilizing the myocardial cell membrane.

**Indications:**

1. Cardiac arrest with ventricular fibrillation or pulseless ventricular tachycardia
2. Post conversion or defibrillation of ventricular rhythms with base contact.
3. Ventricular tachycardia with pulse present
4. Symptomatic/malignant ventricular ectopy

**Contraindications:**

1. **2° degree type II heart block**
2. **3° degree heart block**
3. **Junctional bradycardia**
4. **Ventricular ectopy associated with bradycardia**
5. **Idioventricular rhythm**
6. **Known allergy to Lidocaine or sensitivity to other anesthetics (report to base).**

**Adverse Effects**:

**Cardiovascular**
Bradycardia
Hypotension
Arrest
Blurred vision

**Respiratory**
Dyspnea
Depression
Apnea

**Gastrointestinal**
Nausea/vomiting

**Neurological**
Dizziness
Drowsiness
Paresthesia
Restlessness
Slurred speech
Disorientation
Seizures
Lightheadedness
Tinnitus
Muscle twitching

**Administration**:

**ADULT DOSE**

1. **V-Fib/pulseless V-Tach (with SLOEMSA Authorization):** 1.5 mg/kg IVP/IO, repeat every 3-5 minutes, not to exceed 3 mg/kg.
2. **V-Tach with a pulse (with SLOEMSA Authorization):** 1.5 mg/kg IVP, may repeat with 0.75 mg/kg IVP every 5-10 minutes, not to exceed 3 mg/kg.
3. **Pain Management following IO Placement:** 0.5mg/kg (total max dose of 40mg) slow IO push over 60 seconds.

**PEDIATRIC DOSE**

1. **V-Fib/pulseless V-Tach (with SLOEMSA Authorization):** 1 mg/kg IVP/IO. May repeat every 5 minutes, not to exceed 3 mg/kg.
2. **V-Tach with a pulse (with SLOEMSA Authorization):** 1 mg/kg IVP/IO, may repeat with 0.5 mg/kg IVP/IO every 5-10 minutes, not to exceed 3 mg/kg.
3. **Pain Management following IO Placement:** 0.5mg/kg (total max dose of 40mg) slow IO push over 60 seconds.

**Onset**: 30 - 90 seconds

**Duration**: 10 - 20 minutes

**Notes**:

- Lidocaine may be used as backup to Amiodarone with SLOEMSA authorization (using Policy #205 Attachment C) in cases where Amiodarone stock is unavailable.
- In cases of premature ventricular contractions, assess need and treat underlying cause. Needs include: chest pain, syncope, R on T situations, multifocal and paired PVCs, bigeminy and trigeminy, and PVCs at 6-12 per minute. See appropriate protocols as needed.
- Lidocaine is to be administered no faster than 50mg/min, except in patients in cardiac arrest.

# Protocol #641: Cardiac Arrest (Atraumatic)

## CARDIAC ARREST (ATRAUMATIC)

### BLS Procedures

**ADULT**

- Universal Algorithm #601
- High Performance CPR (HPCPR) (10:1) per Procedure #712
  - Continuous compressions with 1 short breath every 10 compressions
- AED application (if shock advised, administer 30 compressions prior to shocking)
- Pulse Oximetry
  - $O_2$ administration per Airway Management Protocol #602

**PEDIATRIC (≤34 KG)**

- Same as Adult (except for neonate)
- Neonate (<1 month) follow AHA guidelines
- CPR compression to ventilation ratio
  - Newborn – CPR 3:1
  - 1 day to 1 month – CPR 15:2
  - >1 month – HPCPR 10:1
- AED – pediatric patient >1 year
- Use Broselow tape or equivalent if available

### ALS Procedures

**Rhythm analysis and shocks**

- At 200 compressions begin charging the defibrillator while continuing CPR
- Once fully charged, stop CPR for rhythm analysis
- **Defibrillate V-Fib/Pulseless V-tach** – Shock at 120J and immediately resume CPR
  - Subsequent shock, after 2 mins of CPR: 150J, then 200J
  - Recurrent V-fib/Pulseless V-tach use last successful shock level
- **No shock indicated** – dump the charge and immediately resume CPR

**V-Fib/Pulseless V-Tach and Non-shockable Rhythms**

- **Epinephrine 1:10,000** 1mg IV/IO repeat every 3-5 min
  - Do not give epinephrine during first cycle of CPR

**V-Fib/Pulseless V-Tach**

- **Amiodarone** 300mg IV/IO push; if rhythm persists after 5 min, administer 150mg IV/IO push refractory dose.

- **Emphasize resuscitation and HPCPR rather than immediate transport**

**Rhythm analysis and shocks**

- Coordinate compressions and charging same as adult
- **Defibrillate V-Fib/Pulseless V-Tach** – shock at 2 J/kg and immediately resume CPR
  - Subsequent shock, after 2 mins of CPR: 4J/kg
  - Recurrent V-Fib/Pulseless V-tach use last successful shock level
- **No shock indicated** – dump the charge and immediately resume CPR

**V-Fib/Pulseless V-Tach and Non-shockable Rhythms**

- **Epinephrine 1:10,000** 0.01 mg/kg (0.1 ml/kg) IV/IO not to exceed 0.3mg, repeat every 3-5 min
  - Do not give epinephrine during first cycle of CPR

**V-Fib/Pulseless V-Tach**

- **Amiodarone** 5mg/kg IV/IO push; repeat every 5 min to a max of 15mg/kg.

### Base Hospital Orders Only

ROSC with Persistent Hypotension

- **Push-Dose Epinephrine 10 mcg/ml** 1ml IV/IO every 1-3 min
  - Repeat as needed titrated to SBP >90mmHg
  - See notes for mixing instructions

***OR***

- **Epinephrine Drip** start at 10 mcg/min IV/IO infusion
  - Consider for extended transport
  - See formulary for mixing instructions

**Contact STEMI Receiving Center (French Hospital)**

- Refractory V-Fib or V-Tach not responsive to treatment
- Request for a change in destination if patient rearrests en route
- Termination orders when unresponsive to resuscitative measures
- As needed

**Contact appropriate Base Station per Base Station Report Policy #121** – Atraumatic cardiac arrests due to non-cardiac origin (OD), drowning, etc.)

Contact closest Base Hospital for additional orders

**ROSC with Persistent Hypotension for Age**

- **Push-Dose Epinephrine 10 mcg/ml** 1 ml IV/IO (0.1 ml/kg if <10kg) every 1-3 min
  - Repeat as needed titrated to age appropriate SBP
  - See notes for mixing instructions

***OR***

- **Epinephrine Drip** start at 1 mcg/min, up to max of 10 mcg/min IV/IO infusion
  - Consider for extended transport
  - See formulary for mixing instructions

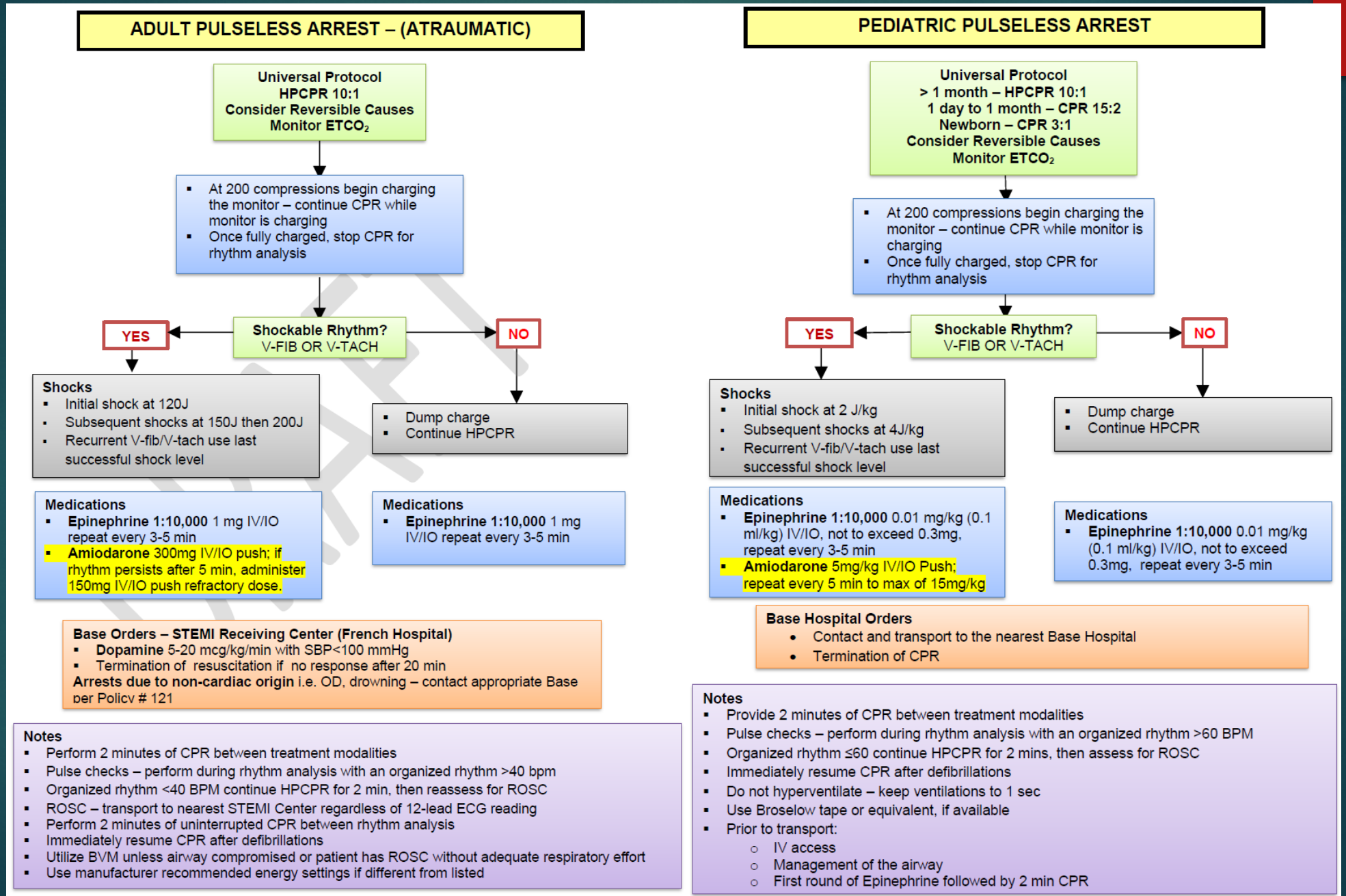
- As needed

### Notes

- **Mixing Push-Dose Epinephrine 10 mcg/ml (1:100,000):** Mix 9 ml of Normal Saline with 1 ml of **Epinephrine 1:10,000**, mix well.
- Use manufacturer recommended energy settings if different from listed.
- Assess for reversible causes:
  - Tension PTX, hypoxia, hypovolemia, hypothermia, hyperkalemia, hypoglycemia, overdose
- Vascular access – IV preferred over IO – continue vascular access attempts even if IO access established)
- Oral Intubation and Supraglottic Airways (Adults) – Utilize if airway is not patent or with maintained ROSC.
- Adult ROSC that is maintained:
  - Obtain 12-lead ECG and vital signs.
  - Transport to the nearest STEMI Receiving Center ***regardless of 12-lead ECG reading.***
  - Maintain O2 Sat greater than or equal to 94%
  - Monitor ETCO2
  - Protect airway with oral intubation or Supraglottic Airway
  - With BP < 100 mmHg, contact SRC (French Hospital) for fluid, or pressors.
- Termination for patients > 34 kg – Contact SRC (French Hospital) for termination orders
  - If the patient remains pulseless and apneic following 20 minutes of resuscitative measures
  - Persistent ETCO2 values < 10 mmHg, consider termination of resuscitation.
  - Documentation shall include the patient's failure to respond to treatment and of a non-viable cardiac rhythm (copy of rhythm strip)

- Pediatric patients less than or equal to 34 kg
  - Stay on scene to establish vascular access, provide for airway management, and administer the first dose of epinephrine followed by 2 min of HPCPR.
  - Evaluate and treat for respiratory causes.
  - Use Broselow tape if available.
  - Contact and transport to the nearest Base Hospital
  - Receiving Hospital shall provide medical direction/termination for pediatric patients.
- Lidocaine may be substituted for Amiodarone with SLOEMSA authorization (via Policy #205 Attachment C) when Amiodarone stock is unavailable. Refer to Lidocaine Formulary for dosages.

# 641 Attachment A and B: Adult/Ped Arrest Algorithm



# Policy #643: Ventricular Tachycardia with Pulses

## VENTRICULAR TACHYCARDIA WITH PULSES

| ADULT | PEDIATRIC (≤34 KG) |
|---|---|
| **BLS** | |
| • Universal Protocol #601<br>• Pulse Oximetry<br>  • O2 administration per Airway Management Protocol #602 | Same as Adult |
| **ALS** | |
| **Stable**<br>• **Amiodarone** 150mg IV/IO drip over 10 min; if rhythm persists after 5 min administer refractory dose to a total of 300mg.<br>• Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add Amiodarone and mix well. Run at 1.5gtts/second. | **Stable**<br>• **Amiodarone** 5mg/kg IV/IO drip over 30 minutes.<br>• Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add Amiodarone and mix well. Run at 1gtt every 2 seconds. |
| **Unstable**<br>• Consider **Midazolam** up to 2mg slow IV or 5 mg IN (split into two doses 2.5 mg each nostril) to pre-medicate<br>• Synchronized/Unsynchronized cardioversion sequences (see notes)<br>• Unresponsive to previous therapy:<br>• **Amiodarone** 150mg IV/IO drip over 10 min; if rhythm persists after 5 min administer refractory dose to a total of 300mg. | **Unstable**<br>• Synchronized/Unsynchronized cardioversion sequences (see notes)<br>• **Midazolam** 0.1 mg/kg IV/IN not to exceed 2 mg to pre-medicate prior to cardioversion.<br>• Unresponsive to previous therapy:<br>• **Amiodarone** 5mg/kg IV/IO drip over 30 minutes. |
| **Base Hospital Orders Only** | |
| • **Amiodarone** post conversion or for potentially malignant PVCs.<br>• As needed | • **Amiodarone** post conversion<br>• As needed |

**Notes**

- Obtain a 12-lead ECG before and after conversion, if possible.
- Vascular access may be omitted prior to cardioversion if in extremis.
- QRS ≥ 0.12 seconds typical for VT in adults
- QRS ≥ 0.09 seconds typical for VT in pediatrics
- Malignant PVCs – that may pose heightened risk of precipitating sustained dysrhythmias: short coupling interval <0.3 seconds, multifocal, couplets, and frequent occurrence.
- Irregular Wide-complex tachycardia (Torsade's de Pointes) requires unsynchronized cardioversion.
- Synchronized/Unsynchronized Sequences (if synchronized mode is unable to capture use unsynchronized cardioversion)

- Lidocaine may be substituted for Amiodarone with SLOEMSA authorization (via Policy #205 Attachment C) when Amiodarone stock is unavailable. Refer to Lidocaine Formulary for dosages.
- Use manufacturer recommended energy setting if different from below.

| Adult | Pediatric |
|---|---|
| 100 J | 1 J/kg |
| 120 J | 2 J/kg |
| 150 J | 2 J/kg |
| 200 J | |

(*start at 120J unsynchronized in adult patients with Torsade's de Pointes)

# Questions/Discussion

# AMIODARONE (Cordarone®)

**Classification**: Class III Antiarrhythmic

**Action**: Prolongs cardiac repolarization. Also has sodium channel blockade, beta adrenergic blockade, and calcium channel blockade effects.

**Indications:**

1. Cardiac Arrest with Ventricular Fibrillation or Ventricular Tachycardia without Pulses
2. Ventricular Tachycardia with Pulses
3. Symptomatic/malignant ventricular ectopy

**Contraindications:**

1. **Second Degree Type II Heart Block**
2. **Third Degree Heart Block**
3. **Junctional Bradycardia**
4. **Ventricular ectopy associated with bradycardia.**
5. **Idioventricular rhythm**
6. **Known allergy or sensitivity to Amiodarone.**

**Adverse Effects**: **CNS: Hypotension, Rhythm Disturbances, Bradycardia, CHF, Cardiac Arrest, Shock, Heart Block, SIADH**
**Respiratory: Respiratory Depression, Pulmonary Toxicity**
**GI: Vomiting, Hepatotoxicity**
**Skin: Rash**
**Integumentary: Anaphylaxis**
**Musculoskeletal: Rhabdomyolysis**
**Renal: Acute Renal Failure**

**Administration**:

**ADULT DOSE**

**Ventricular Fibrillation/ Ventricular Tachycardia without Pulses:**

- **300mg (50 mg/ml) IV/IO push; if rhythm persists after 5 min, 150mg IV/IO push refractory dose.**

**Ventricular Tachycardia with Pulses:**

- **150mg IV/IO drip over 10 min; repeat in 5 min to a total of 300mg.**

****Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add amiodarone and mix well. Run at 1.5gtts/second.**

**PEDIATRIC DOSE**

**Ventricular Fibrillation/ Ventricular Tachycardia without Pulses:**

- **5mg/kg IV/IO push; repeat every 5 min to a max of 15mg/kg**

**Ventricular Tachycardia with Pulses:**

- **5mg/kg IV/IO over 30 min (using 100cc bag Normal Saline)**

****Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add amiodarone and mix well. Run at 1gtt every 2 seconds.**

**Onset**: Immediate

**Duration**: 10-20 Minutes

# LIDOCAINE (Xylocaine®)

**Classification**: Antidysrhythmic agent

**Action**: Suppresses ventricular ectopy by stabilizing the myocardial cell membrane.

**Indications:**

1. Cardiac arrest with ventricular fibrillation or pulseless ventricular tachycardia
2. Post conversion or defibrillation of ventricular rhythms with base contact.
3. Ventricular tachycardia with pulse present
4. Symptomatic/malignant ventricular ectopy

**Contraindications:**

1. **2° degree type II heart block**
2. **3° degree heart block**
3. **Junctional bradycardia**
4. **Ventricular ectopy associated with bradycardia**
5. **Idioventricular rhythm**
6. **Known allergy to Lidocaine or sensitivity to other anesthetics (report to base).**

**Adverse Effects**:

**Cardiovascular**
Bradycardia
Hypotension
Arrest
Blurred vision

**Respiratory**
Dyspnea
Depression
Apnea

**Gastrointestinal**
Nausea/vomiting

**Neurological**
Dizziness
Drowsiness
Paresthesia
Restlessness
Slurred speech
Disorientation
Seizures
Lightheadedness
Tinnitus
Muscle twitching

**Administration**:

**ADULT DOSE**

1. **V-Fib/pulseless V-Tach (with SLOEMSA Authorization):** 1.5 mg/kg IVP/IO, repeat every 3-5 minutes, not to exceed 3 mg/kg.
2. **V-Tach with a pulse (with SLOEMSA Authorization):** 1.5 mg/kg IVP, may repeat with 0.75 mg/kg IVP every 5-10 minutes, not to exceed 3 mg/kg.
3. **Pain Management following IO Placement:** 0.5mg/kg (total max dose of 40mg) slow IO push over 60 seconds.

**PEDIATRIC DOSE**

1. **V-Fib/pulseless V-Tach (with SLOEMSA Authorization):** 1 mg/kg IVP/IO. May repeat every 5 minutes, not to exceed 3 mg/kg.
2. **V-Tach with a pulse (with SLOEMSA Authorization):** 1 mg/kg IVP/IO, may repeat with 0.5 mg/kg IVP/IO every 5-10 minutes, not to exceed 3 mg/kg.
3. **Pain Management following IO Placement:** 0.5mg/kg (total max dose of 40mg) slow IO push over 60 seconds.

**Onset**: 30 - 90 seconds

**Duration**: 10 - 20 minutes

**Notes**:

- Lidocaine may be used as backup to Amiodarone with SLOEMSA authorization (using Policy #205 Attachment C) in cases where Amiodarone stock is unavailable.
- In cases of premature ventricular contractions, assess need and treat underlying cause. Needs include: chest pain, syncope, R on T situations, multifocal and paired PVCs, bigeminy and trigeminy, and PVCs at 6-12 per minute. See appropriate protocols as needed.
- Lidocaine is to be administered no faster than 50mg/min, except in patients in cardiac arrest.

# CARDIAC ARREST (ATRAUMATIC)

| ADULT | PEDIATRIC (≤34 KG) |
|---|---|
| **BLS Procedures** | |
| • Universal Algorithm #601<br>• High Performance CPR (HPCPR) (10:1) per Procedure #712<br>  • Continuous compressions with 1 short breath every 10 compressions<br>• AED application (if shock advised, administer 30 compressions prior to shocking)<br>• Pulse Oximetry<br>  • $O_2$ administration per Airway Management Protocol #602 | • Same as Adult (except for neonate)<br>• Neonate (<1 month) follow AHA guidelines<br>• CPR compression to ventilation ratio<br>  • Newborn – CPR 3:1<br>  • 1 day to 1 month – CPR 15:2<br>  • >1 month – HPCPR 10:1<br>• AED – pediatric patient >1 year<br>• Use Broselow tape or equivalent if available |
| **ALS Procedures** | |
| **Rhythm analysis and shocks**<br>• At 200 compressions begin charging the defibrillator while continuing CPR<br>• Once fully charged, stop CPR for rhythm analysis<br>• **Defibrillate V-Fib/Pulseless V-tach –** Shock at 120J and immediately resume CPR<br>  • Subsequent shock, after 2 mins of CPR: 150J, then 200J<br>  • Recurrent V-fib/Pulseless V-tach use last successful shock level<br>• **No shock indicated** – dump the charge and immediately resume CPR<br>**V-Fib/Pulseless V-Tach and Non-shockable Rhythms**<br>• **Epinephrine 1:10,000** 1mg IV/IO repeat every 3-5 min<br>  • Do not give epinephrine during first cycle of CPR<br>**V-Fib/Pulseless V-Tach**<br>• **Amiodarone** 300mg IV/IO push; if rhythm persists after 5 min, administer 150mg IV/IO push refractory dose. | • **<u>Emphasize resuscitation and HPCPR rather than immediate transport</u>**<br>**Rhythm analysis and shocks**<br>• Coordinate compressions and charging same as adult<br>• **Defibrillate V-Fib/Pulseless V-Tach** – shock at 2 J/kg and immediately resume CPR<br>  • Subsequent shock, after 2 mins of CPR: 4J/kg<br>  • Recurrent V-Fib/Pulseless V-tach use last successful shock level<br>• **No shock indicated –** dump the charge and immediately resume CPR<br>**V-Fib/Pulseless V-Tach and Non-shockable Rhythms**<br>• **Epinephrine 1:10,000** 0.01 mg/kg (0.1 ml/kg) IV/IO not to exceed 0.3mg, repeat every 3-5 min<br>  • Do not give epinephrine during first cycle of CPR<br>**V-Fib/Pulseless V-Tach**<br>• **Amiodarone** 5mg/kg IV/IO push; repeat every 5 min to a max of 15mg/kg. |
| **Base Hospital Orders Only** | |
| ROSC with Persistent Hypotension<br>• **Push-Dose Epinephrine 10 mcg/ml** 1ml IV/IO every 1-3 min | Contact closest Base Hospital for additional orders<br>**ROSC with Persistent Hypotension for Age** |

| | |
|---|---|
| • Repeat as needed titrated to SBP >90mmHg<br>• See notes for mixing instructions<br><br>***OR***<br><br>• **Epinephrine Drip** start at 10 mcg/min IV/IO infusion<br>  • Consider for extended transport<br>  • See formulary for mixing instructions<br><br>**Contact STEMI Receiving Center (French Hospital)**<br>• Refractory V-Fib or V-Tach not responsive to treatment<br>• Request for a change in destination if patient rearrests en route<br>• Termination orders when unresponsive to resuscitative measures<br>• As needed<br><br>**Contact appropriate Base Station per Base Station Report Policy #121** – Atraumatic cardiac arrests due to non-cardiac origin (OD), drowning, etc.) | • **Push-Dose Epinephrine 10 mcg/ml** 1 ml IV/IO (0.1 ml/kg if <10kg) every 1-3 min<br>  • Repeat as needed titrated to age appropriate SBP<br>  • See notes for mixing instructions<br><br>***OR***<br><br>• **Epinephrine Drip** start at 1 mcg/min, up to max of 10 mcg/min IV/IO infusion<br>  • Consider for extended transport<br>  • See formulary for mixing instructions<br><br>• As needed |

**Notes**

- **Mixing Push-Dose Epinephrine 10 mcg/ml (1:100,000):** Mix 9 ml of Normal Saline with 1 ml of **Epinephrine 1:10,000**, mix well.
- Use manufacturer recommended energy settings if different from listed.
- Assess for reversible causes:
  - Tension PTX, hypoxia, hypovolemia, hypothermia, hyperkalemia, hypoglycemia, overdose
- Vascular access – IV preferred over IO – continue vascular access attempts even if IO access established)
- Oral Intubation and Supraglottic Airways (Adults) – Utilize if airway is not patent or with maintained ROSC.
- Adult ROSC that is maintained:
  - Obtain 12-lead ECG and vital signs.
  - Transport to the nearest STEMI Receiving Center ***regardless of 12-lead ECG reading.***
  - Maintain O2 Sat greater than or equal to 94%
  - Monitor ETCO2
  - Protect airway with oral intubation or Supraglottic Airway
  - With BP < 100 mmHg, contact SRC (French Hospital) for fluid, or pressors.
- Termination for patients > 34 kg – Contact SRC (French Hospital) for termination orders
  - If the patient remains pulseless and apneic following 20 minutes of resuscitative measures
  - Persistent ETCO2 values < 10 mmHg, consider termination of resuscitation.
  - Documentation shall include the patient's failure to respond to treatment and of a non-viable cardiac rhythm (copy of rhythm strip)

- Pediatric patients less than or equal to 34 kg
  - Stay on scene to establish vascular access, provide for airway management, and administer the first dose of epinephrine followed by 2 min of HPCPR.
  - Evaluate and treat for respiratory causes.
  - Use Broselow tape if available.
  - Contact and transport to the nearest Base Hospital
  - Receiving Hospital shall provide medical direction/termination for pediatric patients.
- Lidocaine may be substituted for Amiodarone with SLOEMSA authorization (via Policy #205 Attachment C) when Amiodarone stock is unavailable. Refer to Lidocaine Formulary for dosages.

# ADULT PULSELESS ARREST – (ATRAUMATIC)

**Universal Protocol**
**HPCPR 10:1**
**Consider Reversible Causes**
**Monitor $ETCO_2$**

- At 200 compressions begin charging the monitor – continue CPR while monitor is charging
- Once fully charged, stop CPR for rhythm analysis

**Shockable Rhythm?**
V-FIB OR V-TACH

**YES**

**Shocks**
- Initial shock at 120J
- Subsequent shocks at 150J then 200J
- Recurrent V-fib/V-tach use last successful shock level

**Medications**
- **Epinephrine 1:10,000** 1 mg IV/IO repeat every 3-5 min
- **Amiodarone** 300mg IV/IO push; if rhythm persists after 5 min, administer 150mg IV/IO push refractory dose.

**NO**

- Dump charge
- Continue HPCPR

**Medications**
- **Epinephrine 1:10,000** 1 mg IV/IO repeat every 3-5 min

**Base Orders** – **STEMI Receiving Center (French Hospital)**
- **Dopamine** 5-20 mcg/kg/min with SBP<100 mmHg
- Termination of resuscitation if no response after 20 min

**Arrests due to non-cardiac origin** i.e. OD, drowning – contact appropriate Base per Policy # 121

**Notes**
- Perform 2 minutes of CPR between treatment modalities
- Pulse checks – perform during rhythm analysis with an organized rhythm >40 bpm
- Organized rhythm <40 BPM continue HPCPR for 2 min, then reassess for ROSC
- ROSC – transport to nearest STEMI Center regardless of 12-lead ECG reading
- Perform 2 minutes of uninterrupted CPR between rhythm analysis
- Immediately resume CPR after defibrillations
- Utilize BVM unless airway compromised or patient has ROSC without adequate respiratory effort
- Use manufacturer recommended energy settings if different from listed

# PEDIATRIC PULSELESS ARREST

**Universal Protocol**
**> 1 month – HPCPR 10:1**
**1 day to 1 month – CPR 15:2**
**Newborn – CPR 3:1**
**Consider Reversible Causes**
**Monitor $ETCO_2$**

- At 200 compressions begin charging the monitor – continue CPR while monitor is charging
- Once fully charged, stop CPR for rhythm analysis

**Shockable Rhythm?**
V-FIB OR V-TACH

**YES**

**Shocks**
- Initial shock at 2 J/kg
- Subsequent shocks at 4J/kg
- Recurrent V-fib/V-tach use last successful shock level

**Medications**
- **Epinephrine 1:10,000** 0.01 mg/kg (0.1 ml/kg) IV/IO, not to exceed 0.3mg, repeat every 3-5 min
- **Amiodarone** 5mg/kg IV/IO Push; repeat every 5 min to max of 15mg/kg

**NO**

- Dump charge
- Continue HPCPR

**Medications**
- **Epinephrine 1:10,000** 0.01 mg/kg (0.1 ml/kg) IV/IO, not to exceed 0.3mg, repeat every 3-5 min

**Base Hospital Orders**
- Contact and transport to the nearest Base Hospital
- Termination of CPR

**Notes**
- Provide 2 minutes of CPR between treatment modalities
- Pulse checks – perform during rhythm analysis with an organized rhythm >60 BPM
- Organized rhythm ≤60 continue HPCPR for 2 mins, then assess for ROSC
- Immediately resume CPR after defibrillations
- Do not hyperventilate – keep ventilations to 1 sec
- Use Broselow tape or equivalent, if available
- Prior to transport:
  - IV access
  - Management of the airway
  - First round of Epinephrine followed by 2 min CPR

# VENTRICULAR TACHYCARDIA WITH PULSES

| ADULT | PEDIATRIC (≤34 KG) |
|---|---|
| **BLS** | |
| • Universal Protocol #601<br>• Pulse Oximetry<br>  • O2 administration per Airway Management Protocol #602 | Same as Adult |
| **ALS** | |
| **Stable**<br>• **Amiodarone** 150mg IV/IO drip over 10 min; if rhythm persists after 5 min administer refractory dose to a total of 300mg.<br>• Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add Amiodarone and mix well. Run at 1.5gtts/second.<br><br>**Unstable**<br>• Consider **Midazolam** up to 2mg slow IV or 5 mg IN (split into two doses 2.5 mg each nostril) to pre-medicate<br>• Synchronized/Unsynchronized cardioversion sequences (see notes)<br>• Unresponsive to previous therapy:<br>• **Amiodarone** 150mg IV/IO drip over 10 min; if rhythm persists after 5 min administer refractory dose to a total of 300mg. | **Stable**<br>• **Amiodarone** 5mg/kg IV/IO drip over 30 minutes.<br>• Using a 100cc bag of Normal Saline and macro drip tubing (10gtts/ml): add Amiodarone and mix well. Run at 1gtt every 2 seconds.<br><br>**Unstable**<br>• Synchronized/Unsynchronized cardioversion sequences (see notes)<br>• **Midazolam** 0.1 mg/kg IV/IN not to exceed 2 mg to pre-medicate prior to cardioversion.<br>• Unresponsive to previous therapy:<br>• **Amiodarone** 5mg/kg IV/IO drip over 30 minutes. |
| **Base Hospital Orders Only** | |
| • **Amiodarone** post conversion or for potentially malignant PVCs.<br>• As needed | • **Amiodarone** post conversion<br>• As needed |

**Notes**

- Obtain a 12-lead ECG before and after conversion, if possible.
- Vascular access may be omitted prior to cardioversion if in extremis.
- QRS ≥ 0.12 seconds typical for VT in adults
- QRS ≥ 0.09 seconds typical for VT in pediatrics
- Malignant PVCs – that may pose heightened risk of precipitating sustained dysrhythmias: short coupling interval <0.3 seconds, multifocal, couplets, and frequent occurrence.
- Irregular Wide-complex tachycardia (Torsade's de Pointes) requires unsynchronized cardioversion.
- Synchronized/Unsynchronized Sequences (if synchronized mode is unable to capture use unsynchronized cardioversion)

- Lidocaine may be substituted for Amiodarone with SLOEMSA authorization (via Policy #205 Attachment C) when Amiodarone stock is unavailable. Refer to Lidocaine Formulary for dosages.
- Use manufacturer recommended energy setting if different from below.

| Adult | Pediatric |
|---|---|
| 100 J | 1 J/kg |
| 120 J | 2 J/kg |
| 150 J | 2 J/kg |
| 200 J | |

(*start at 120J unsynchronized in adult patients with Torsade's de Pointes)