

# Acute Coronary Syndromes - Adult

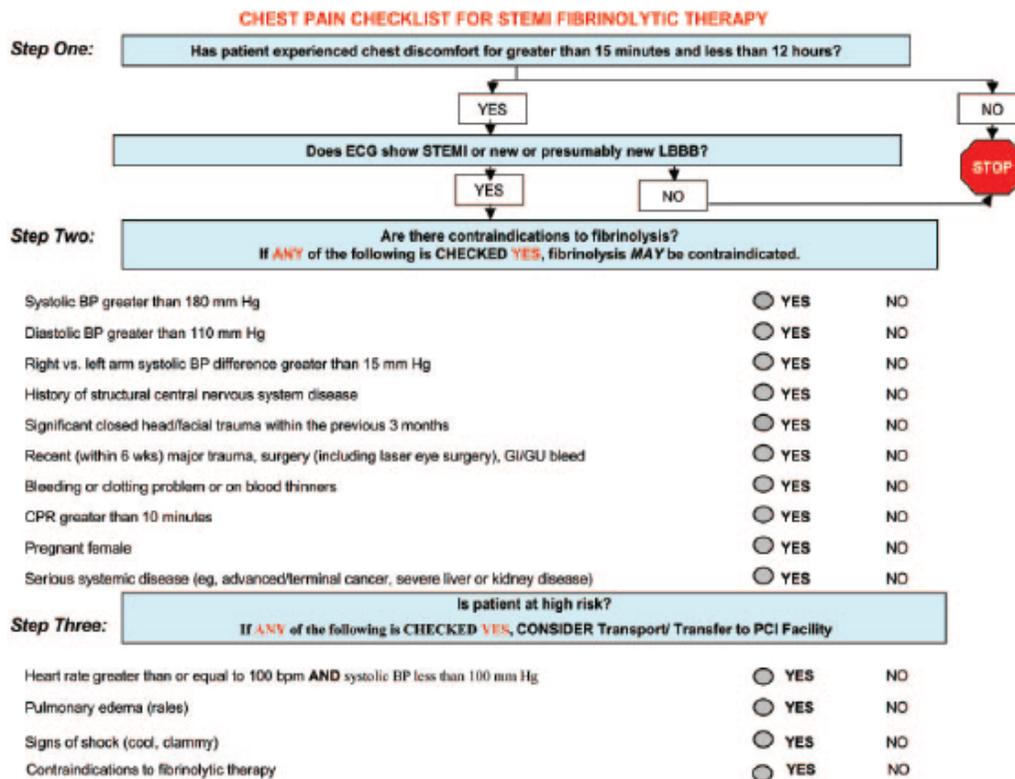
## Basic Standing Orders

# B

- ▶ Routine Patient Care
- ▶ Oxygen 15 L/min by non rebreather mask.
- ▶ Aspirin 324 mg PO (chewable) If patient states they cannot take ASA due to “stomach problems” or “doctors orders”, call medical control for guidance
- ▶ Facilitate administration of patient’s own nitroglycerin if SBP > 90, every 5 minutes up to 3
- ▶ Avoid NTG for patients who have taken Sildenafil (Viagra), Cialis (tadalafil) or Levitra (vardenafil) in past 48 hours
- ▶ Complete the following fibrinolytic questionnaire (below)
- ▶ Minimize scene time
- ▶ Consider ALS intercept

## Fibrinolytic Questionnaire

- ▶ No current or recent active bleeding within last month
- ▶ No LP, spinal anesthesia, or stroke within last month
- ▶ No known bleeding disorder or clinical suspicion of aortic dissection
- ▶ SBP < 180 at baseline or after Rx with NTG



## ***Acute Coronary Syndromes – Adult continued***

---

### **Advanced Standing Orders**

- A**
- ▶ IV access and administer fluids to maintain systolic blood pressure > 90 mmHg.
  - ▶ Nitroglycerin 0.4mg SL every 5 minutes while symptoms persist if SBP > 90 mmHg.

### **Paramedic Standing Orders**

- P**
- ▶ Place patient on monitor.
  - ▶ Obtain a 12 lead EKG and transmit to the ED (if possible).
  - ▶ If EKG suggests AMI, consider morphine, 2mg IVP every 5 minutes up to 10 mg if pain persists and SBP > 90.
  - ▶ Consider Fentanyl 25-50 mcg for patients with a morphine allergy or known right ventricular infarction.
  - ▶ Treat dysrhythmias PRN; refer to appropriate protocol.
  - ▶ Contact Receiving Facility to possibly Activate Cath Lab Team.

# Acute Coronary Syndromes Algorithm

## Acute Coronary Syndromes

1

Symptoms suggestive of ischemia or infarction

2

### EMS assessment and care and hospital preparation:

- Monitor, support ABCs. Be prepared to provide CPR and defibrillation
- Administer aspirin and consider oxygen, nitroglycerin, and morphine if needed
- Obtain 12-lead ECG; if ST elevation:
  - Notify receiving hospital with transmission or interpretation; note time of onset and first medical contact
- Notified hospital should mobilize hospital resources to respond to STEMI
- If considering prehospital fibrinolysis, use fibrinolytic checklist

3

ED and Hospital Evaluation and Treatment

## Cardiac Arrest - Adult

---

### Basic Standing Orders

# B

- ▶ Routine Patient Care – with focus on CPR.
- ▶ Apply and use AED if available.
- ▶ For Trauma:
  - ◆ Minimize on-scene time or consider not attempting resuscitation (see Determination of Death Protocol)
- ▶ Consider ALS intercept.

### Advanced Standing Orders

# A

- ▶ Consider treatable causes: overdose/poisoning hypothermia; treat as per specific protocol.
- ▶ IV access and administer fluids at wide open.
- ▶ Airway management as appropriate and trained.
- ▶ For Trauma, do not delay transport for IV, advanced airway, or medications.

### Paramedic Standing Orders

# P

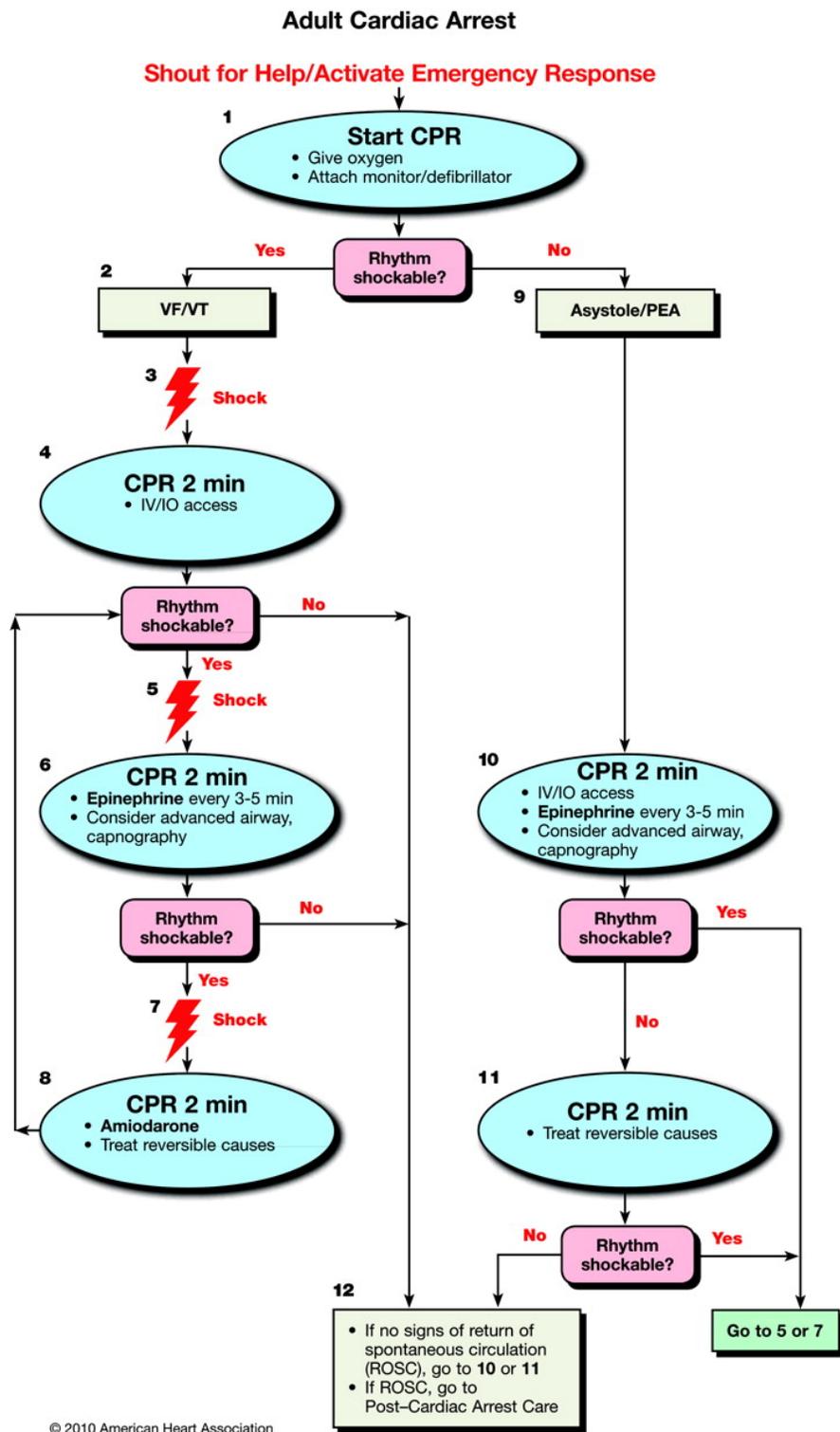
#### **For Ventricular Fibrillation (VF)/Pulseless Ventricular Tachycardia (VT)**

- ▶ If bystander CPR is not being performed, CPR for 5 cycles/2 min; then defibrillation (all energy levels are defibrillator and local protocol dependent) followed immediately by CPR for 5 cycles/2 min.; then rhythm check; repeat defibrillation attempts for VF/VT after each 5 cycles of CPR.
- ▶ Establish IV/IO access and advanced airway.
- ▶ Epinephrine (1:10,000) 1 mg IV; repeat every 3 -5 minutes. May give vasopressin 40 units in lieu of the first 1-2 doses of epinephrine.
- ▶ Consider Amiodarone, or Magnesium.

#### **For ASYSTOLE or Pulseless Electrical Activity (PEA)**

- ▶ Continue CPR for 5 cycles/2 min.
- ▶ Epinephrine (1:10,000) 1 mg IV; repeat every 3 -5 minutes. May give vasopressin 40 units in lieu of the first 1-2 doses of epinephrine.
- ▶ Continue CPR for 5 cycles/2 min. between interventions; stop only for rhythm check or return of circulation.
- ▶ Advanced airway management.
- ▶ NOTE: IV/IO administration of medications is preferred to administration via ETT.
- ▶ For Trauma Arrest– consider bilateral needle chest decompression.

# Cardiac Arrest Algorithm



## CPR Quality

- Push hard ( $\geq 2$  inches [5 cm]) and fast ( $\geq 100$ /min) and allow complete chest recoil
- Minimize interruptions in compressions
- Avoid excessive ventilation
- Rotate compressor every 2 minutes
- If no advanced airway, 30:2 compression-ventilation ratio
- Quantitative waveform capnography
  - If  $PETCO_2 < 10$  mm Hg, attempt to improve CPR quality
- Intra-arterial pressure
  - If relaxation phase (diastolic) pressure  $< 20$  mm Hg, attempt to improve CPR quality

## Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in  $PETCO_2$  (typically  $\geq 40$  mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

## Shock Energy

- **Biphasic:** Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic:** 360 J

## Drug Therapy

- **Epinephrine IV/IO Dose:** 1 mg every 3-5 minutes
- **Vasopressin IV/IO Dose:** 40 units can replace first or second dose of epinephrine
- **Amiodarone IV/IO Dose:** First dose: 300 mg bolus. Second dose: 150 mg.

## Advanced Airway

- Supraglottic advanced airway or endotracheal intubation
- Waveform capnography to confirm and monitor ET tube placement
- 8-10 breaths per minute with continuous chest compressions

## Reversible Causes

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

## ***Bradycardia (Symptomatic) - Adult***

---

Definition: Heart rate < 60 and inadequate clinical perfusion (e.g. acute altered mental status, ongoing chest pain, hypotension or other signs of SHOCK).

### Basic Standing Orders

# B

- ▶ Routine Patient Care.
- ▶ Consider ALS intercept.

### Advanced Standing Orders

# A

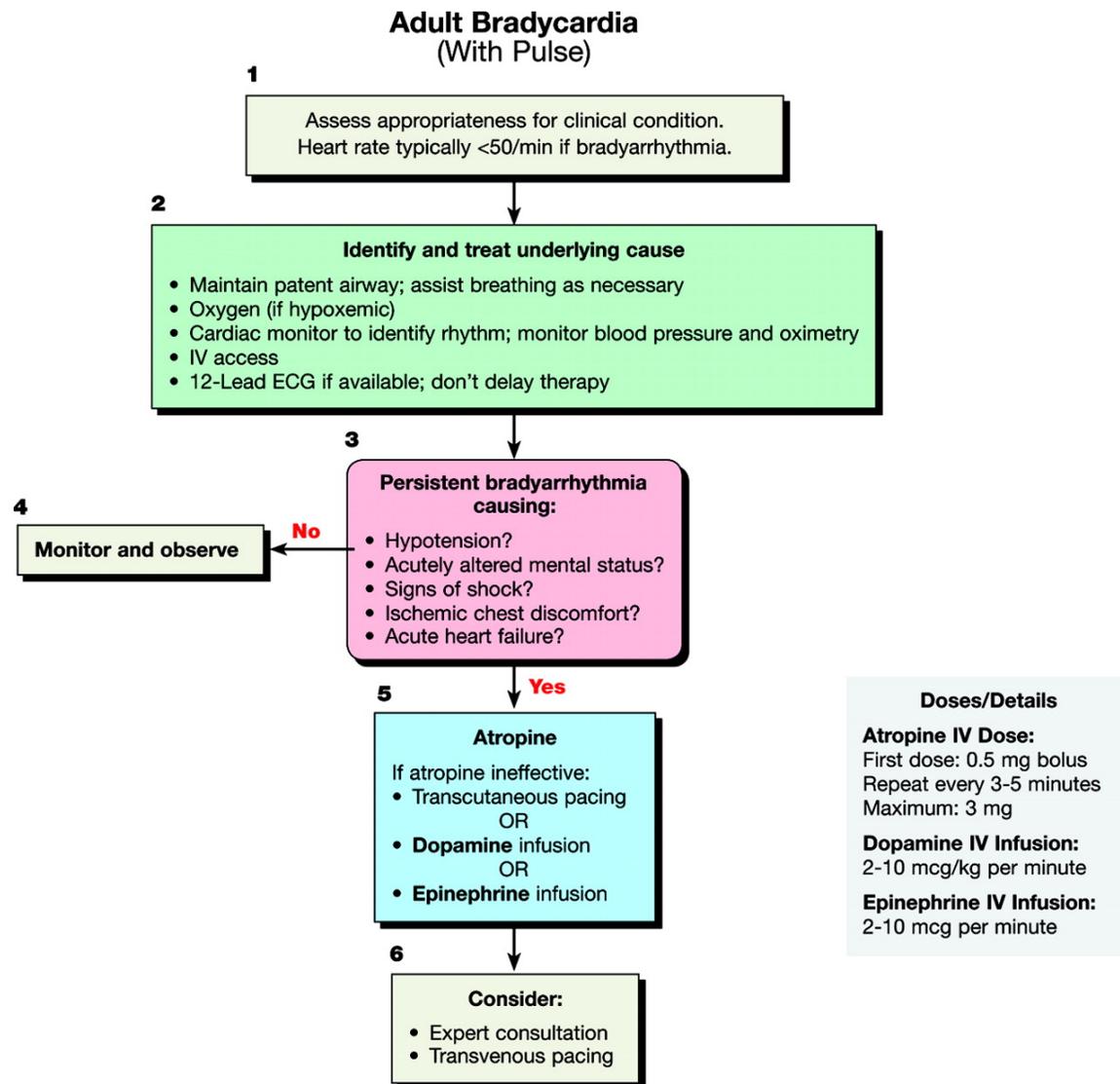
- ▶ Establish IV access.

### Paramedic Standing Orders

# P

- ▶ If available, perform 12-lead EKG.
- ▶ Consider atropine 0.5 mg IVP every 3-5 minutes to total of 3mg.
- ▶ Consider transcutaneous pacing if available. Attempt capture at 80 bpm at minimum output and increase until capture achieved. Use without delay for high degree block (Type-II second degree block or third degree block).
- ▶ Consider procedural sedation prior to pacing:
  - ♦ Lorazepam 1 mg IV or 2 mg IM, may repeat once in 5 minutes, **or**
  - ♦ Midazolam 2.5 mg IV, may repeat once in 5 minutes
- ▶ Consider Epinephrine (2 to 10 ug/min) or Dopamine (2 to 10 ug/min) infusion if pacing ineffective.
- ▶ Consider Glucagon 2-5 mg IV, IM or SQ over 2-5 minutes in adults for suspected overdose of a beta-blocker or calcium channel blocker.

# Bradycardia (Symptomatic) Algorithm - Adult



# Tachycardia - Adult

---

## Basic Standing Orders

**B**

- ▶ Routine Patient Care.
- ▶ Provide high-flow oxygen and consider assisting ventilation.
- ▶ Monitor blood pressure and oximetry. Identify and treat reversible causes.
- ▶ Consider ALS intercept.

## Advanced Standing Orders

**A**

- ▶ IV access and administer fluids to maintain systolic blood pressure > 90mmHg.

## Paramedic Standing Orders

**P**

- ▶ Identify rhythm using cardiac monitor and 12-lead ECG if available.
- ▶ **Unstable**  
**(Hypotension, altered mental status, signs of poor perfusion)**
  - ◆ Synchronized cardioversion
    - Narrow irregular 120-200J:, 300J, 360J
    - Narrow regular: 50J, 100J, 200J, 300J, 360J
    - Wide regular: 100J, 200J, 300J, 360J or biphasic equivalents
    - Wide irregular: defibrillation energy (unsynchronized)
  - ◆ Consider procedural sedation if practicable (Midazolam 2.5 mg IV or Diazepam 5 mg IV)
- ▶ **Stable**  
**PSVT or narrow complex tachycardia (with ventricular rate consistently greater than 140-150 BPM)**
  - ◆ Consider vagal maneuvers (avoiding carotid sinus massage in the elderly).
  - ◆ If vagal maneuvers fail, give adenosine 6 mg rapid IVP, repeat dose of 12 mg X 2 as needed.
  - ◆ Do NOT give adenosine to patients with asthma

## ***Tachycardia – Adult continued***

---

### Paramedic Standing Orders

**P**

▶ **Stable continued**

**Atrial fib, atrial flutter with narrow complex** (With Ventricular Rate consistently greater than 140- 150 BPM)

♦ Monitor and transport

**For VT or uncertain wide complex tachycardia**

♦ Monitor and transport

**For polymorphic VT / torsades**

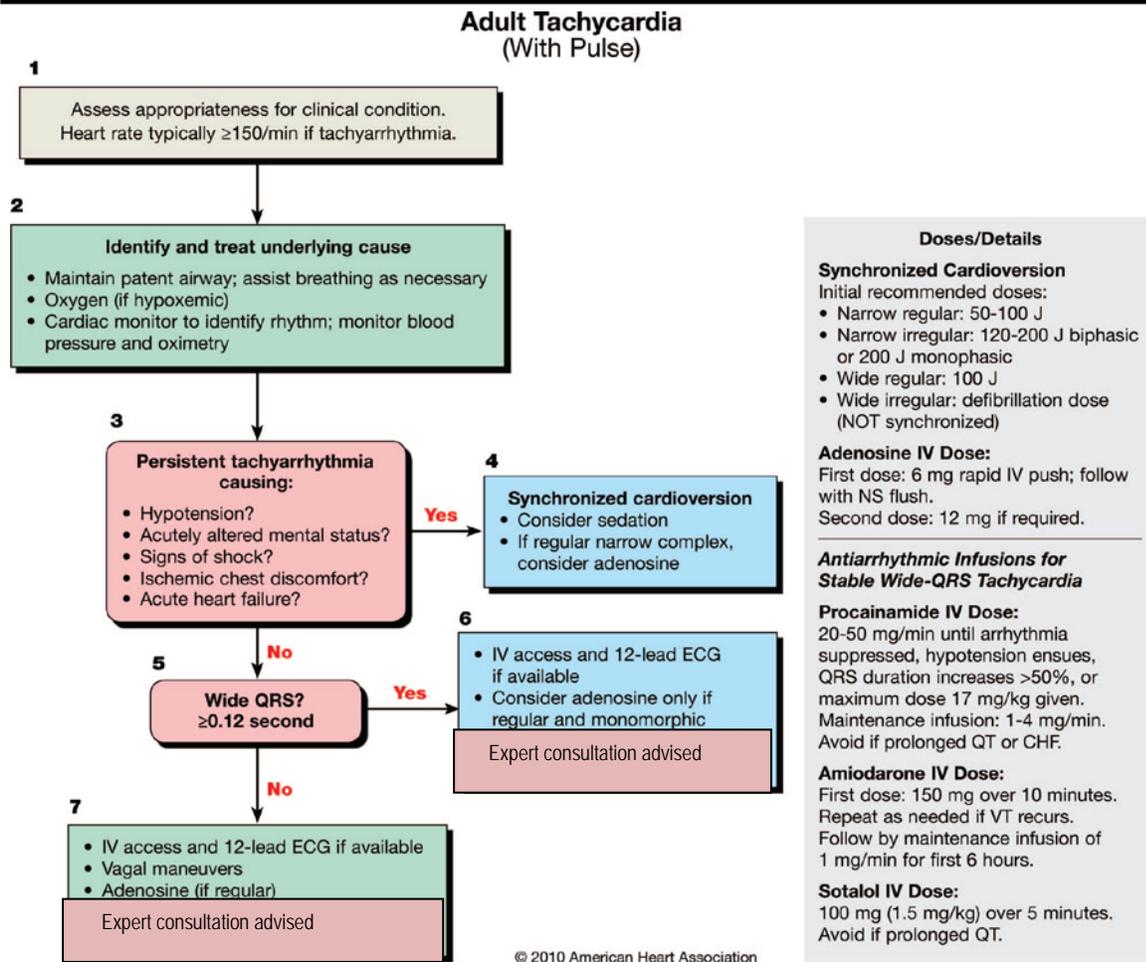
♦ Monitor and transport

**For Known WPW**

♦ Monitor and transport

If patient becomes unstable during monitoring and transport, treat as unstable.

# Tachycardia Algorithm - Adult



Boxes 6 and 7 adapted for pre-hospital use based on accompanying text.

## Neonatal Resuscitation

---

**Definition:** Neonatal resuscitation refers to the series of interventions used to stimulate spontaneous respiratory effort. The typical newborn response to hypoxia is apnea and bradycardia

### Basic Standing Orders

**B**

- ▶ Position the airway.
- ▶ .
- ▶ Dry and keep warm with thermal blanket or dry towel. Cover scalp with stocking cap.
- ▶ Stimulate by drying vigorously including the head and back.
- ▶ Clamp and cut the cord.
- ▶ Evaluate respirations.
- ▶ Assisted bag-valve-mask ventilation 40-60 breaths/minute with 100% oxygen if patient has apnea, severe respiratory depression, or heart rate < 100/min. Use blow by or mask with 100% oxygen for mild distress.
- ▶ Check heart rate at umbilical cord stump, or brachial artery.

### Paramedic Standing Orders

**P**

	<b>Pulse</b>		
	< 60/min	60-100/min	>100/min
◆	Continued assisted ventilation.	Continue assisted ventilation.	◆ Check skin color. If central cyanosis, give oxygen by mask or blow by.
◆	Begin chest compression at a rate of 120 events/min. (i.e. 3:1 as 90 compressions and 30 breaths)	◆ Reassess heart rate and respiration enroute. Perform tracheal intubation if no improvement.	◆ Reassess heart rate and respirations enroute.
◆	If no improvement after 30 seconds, perform tracheal intubation.		
◆	If no improvement, establish vascular access and give epinephrine (1:10,000) 0.01 mg/kg (0.1 ml/kg) IV or IO, or 0.03 mg/kg (0.3 ml/kg) ET. Repeat q 3-5 min. prn.		

## Cardiac Arrest - Pediatric

---

### Basic Standing Orders

**B**

- ▶ Routine Patient Care – with focus on CPR.
- ▶ If age – appropriate AED is available on scene, providers may use/continue to use it.
  - ◆ Use age–appropriate pads.
  - ◆ Follow manufacturer’s instructions.
- ▶ If age – appropriate AED is not available, may use adult pads if patient > 1 year of age. Do not let pads contact each other.
- ▶ For trauma, minimize scene time.
- ▶ Consider treatable causes: overdose/poisoning, hypothermia; treat as per specific protocol.
- ▶ Consider paramedic intercept.

### Advanced Standing Orders

**A**

- ▶ Do not delay transport for IV/IO access, advanced airway, or medications.
- ▶ Consider 1 or 2 large bore IV’s en route, bolus 0.9% NaCl (normal saline) 20 ml/kg.

### Paramedic Standing Orders

**P**

- ▶ Document presenting cardiac rhythm in two separate leads if possible.
- ▶ Advanced airway management.
- ▶ Consider intraosseous access.
- ▶ IV/IO administration of medications is preferred over administration via ETT.
- ▶ Consider nasogastric or orogastric tube to decompress the stomach of intubated patients.

#### **For ASYSTOLE or PEA**

- ▶ Give Epinephrine (1:10,000) 0.01 mg/kg (0.1 ml/kg) IV **or** 0.1 mg/kg (1:1000; 0.1 ml/kg) via ETT, repeat every 3 - 5 minutes.
- ▶ Give 5 cycles of CPR, then check rhythm.

## Cardiac Arrest - Pediatric continued

---

### Paramedic Standing Orders continued

P

- ▶ If no rhythm, continue epinephrine and 5 cycles of CPR until:
  - ◆ pulse obtained
  - ◆ shockable rhythm obtained, or
  - ◆ decision made to discontinue further efforts.
- ▶ If rhythm noted, determine if it is shockable if so, go to VF/Pulseless VT; if not, continue Epinephrine and 5 cycles of CPR until:
  - ◆ pulse obtained,
  - ◆ shockable rhythm obtained, or
  - ◆ decision made to discontinue further efforts.

#### **For VF/Pulseless VT**

- ▶ Defibrillate at 2 J/kg; deliver 5 cycles of CPR and recheck rhythm; if still a shockable rhythm, defibrillate at 4 J/kg; deliver 5 cycles of CPR; give Epinephrine (1:10,000) 0.01 mg/kg (0.1 ml/kg) IV/IO **or** 0.1 mg/kg (1:1000; 0.1 ml/kg) via ETT.
  - ◆ repeat every 3 - 5 minutes
- ▶ If still a shockable rhythm, defibrillate at 4 J/kg; deliver 5 cycles of CPR; consider:
  - ◆ Amiodarone 5 mg/kg (maximum 300 mg) IV **or**
  - ◆ Magnesium sulfate 25 – 50 mg/kg (max. 2 grams) IV/IO over 1 – 2 minutes for torsades de pointes.
- ▶ If pulse obtained, begin post-resuscitation care.

#### **Consider treatable causes**

- ▶ For trauma consider bilateral needle chest decompressions.
- ▶ For suspected or known hyperkalemia (dialysis patient), or known tricyclic antidepressant overdose, consider sodium bicarbonate 1 mEq/kg IVP.

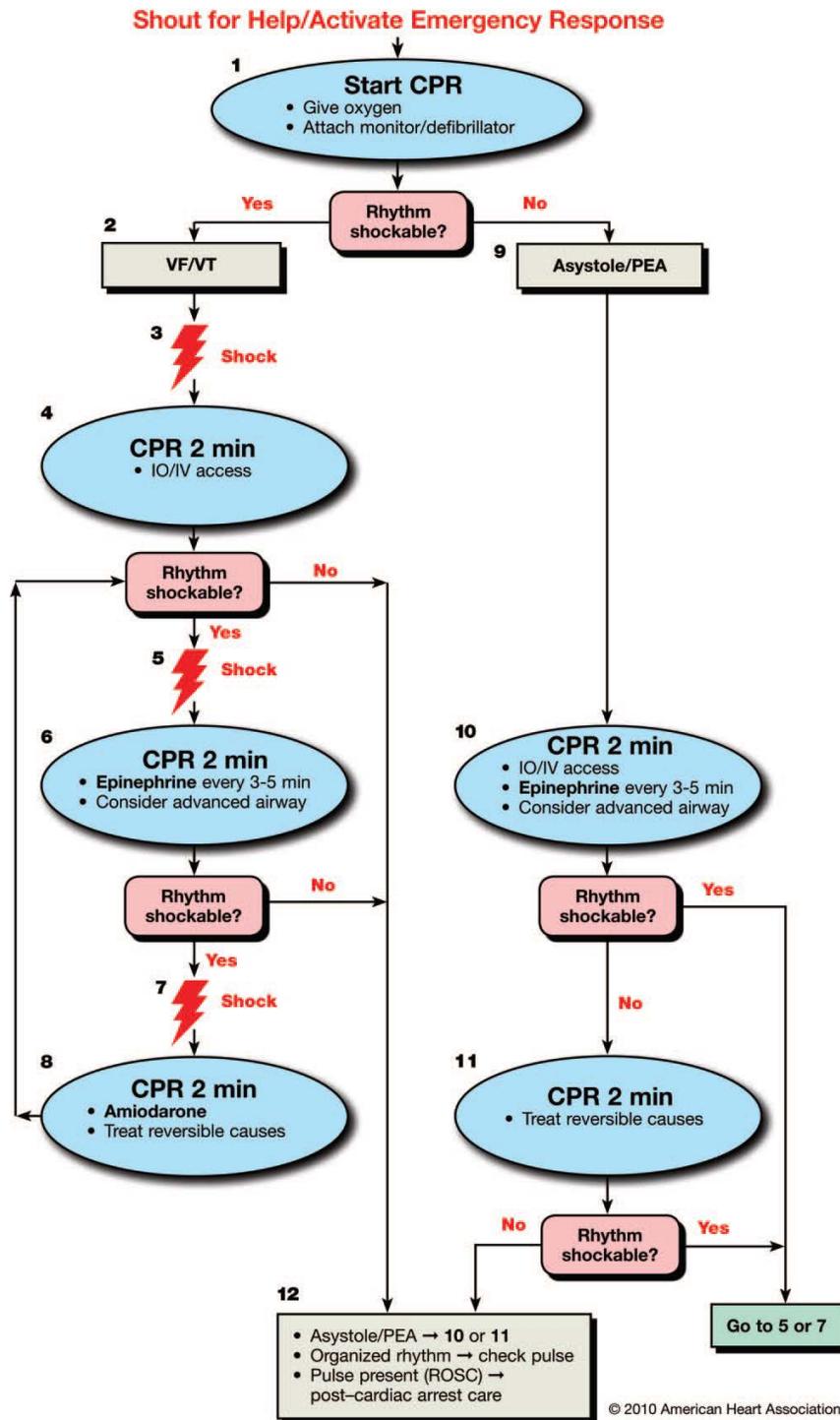
#### **For Post-resuscitation hypotension**

- ▶ IV Normal Saline 20 ml/kg and/or
- ▶ Consider:
  - ◆ \*Dopamine infusion 5 – 20 mcg/kg/min.

\* Note: An infusion pump is required for the use of pressor agents.

# Cardiac Arrest Algorithm

## Pediatric Cardiac Arrest



### Doses/Details

#### CPR Quality

- Push hard ( $\geq 1/3$  of anterior-posterior diameter of chest) and fast (at least 100/min) and allow complete chest recoil
- Minimize interruptions in compressions
- Avoid excessive ventilation
- Rotate compressor every 2 minutes
- If no advanced airway, 15:2 compression-ventilation ratio. If advanced airway, 8-10 breaths per minute with continuous chest compressions

#### Shock Energy for Defibrillation

First shock 2 J/kg, second shock 4 J/kg, subsequent shocks  $\geq 4$  J/kg, maximum 10 J/kg or adult dose.

#### Drug Therapy

- **Epinephrine IO/IV Dose:** 0.01 mg/kg (0.1 mL/kg of 1:10 000 concentration). Repeat every 3-5 minutes. If no IO/IV access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of 1:1000 concentration).
- **Amiodarone IO/IV Dose:** 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT.

#### Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place give 1 breath every 6-8 seconds (8-10 breaths per minute)

#### Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Spontaneous arterial pressure waves with intra-arterial monitoring

#### Reversible Causes

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypoglycemia
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

## ***Bradycardia (Symptomatic) - Pediatric***

---

AGE	Mean	Lower limit of normal
Newborn to 3 months	140	85 (80 sleep)
3 months to 2 years	130	100 (70 sleep)
2 years to 10 years	80	60
>10 years	75	60

### **Basic Standing Orders**

# B

- ▶ Routine Patient Care.
- ▶ Maintain airway.
- ▶ Consider underlying causes of bradycardia (e.g. hypoxia).
- ▶ Provide high-flow oxygen and consider assisting ventilations.
- ▶ Monitor vital signs, including pulse oximetry.
- ▶ Begin/continue CPR in child if HR < 60bpm and hypoperfusion despite oxygen.
- ▶ Consider ALS intercept.

### **Advanced Standing Orders**

# A

- ▶ IV access and administer fluids to maintain hemodynamic status.

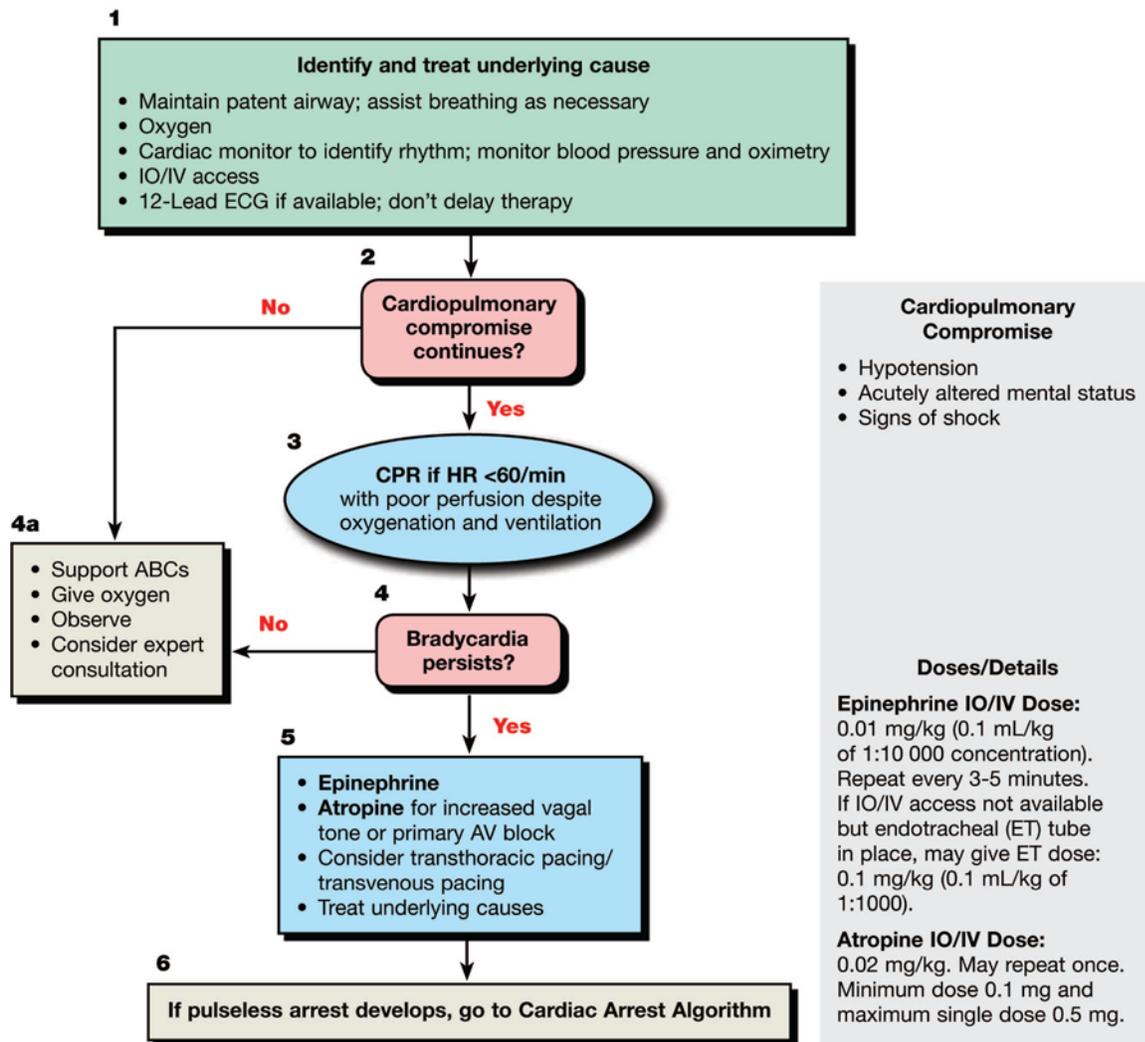
### **Paramedic Standing Orders**

# P

- ▶ Epinephrine 0.01 mg/kg IV (0.1 ml/kg of **1:10,000**) every 3-5 minutes, **or**
- ▶ Epinephrine 0.1 mg/kg ETT (0.1 ml/kg of **1:1000**) every 3-5 minutes.
- ▶ Consider atropine 0.02mg/kg (min single dose 0.1mg, - total max dose is 1 mg).
- ▶ Consider transcutaneous pacing at minimum output and increase until capture achieved for rate appropriate to age.
- ▶ Consider procedural sedation prior to pacing
  - ♦ Midazolam 0.05 mg/kg IV, **or**
  - ♦ Diazepam 0.05 mg/kg IV
- ▶ Consider glucose if hypoglycemia suspected.

# Bradycardia (Symptomatic) Algorithm – Pediatric

## Pediatric Bradycardia With a Pulse and Poor Perfusion



## Tachycardia - Pediatric

---

AGE	Mean	Upper limit of normal
Newborn to 3 months	140	205
3 months to 2 years	130	190
2 years to 10 years	80	140
>10 years	75	100

### Basic Standing Orders

- B**
- ▶ Routine Patient Care.
  - ▶ Assess and support ABC's as needed.
  - ▶ Provide high-flow oxygen and consider assisting respiration.
  - ▶ Consider Paramedic intercept.

### Advanced Standing Orders

- A**
- ▶ IV access and administer fluids to maintain systolic blood pressure >minimum for age and signs of adequate perfusion.

### Paramedic Standing Orders

- P**
- ▶ Identify rhythm using cardiac monitor and 12-lead EKG if available.
  - ▶ Evaluate QRS duration.
  - ▶ Consider treatable causes.
- Consider procedural sedation prior to cardioversion**
- ▶ Midazolam 0.05 mg/kg IV, or
  - ▶ Diazepam 0.05 mg/kg IV.
- PSVT or narrow complex tachycardia**
- ▶ **Consider vagal stimulation unless patient is very unstable or if it does not unduly delay chemical or electrical cardioversion:**
    - ◆ **Infants and Young Children:** apply ice to face without occluding airway.
    - ◆ **Older Children:** Valsalva. Blow through obstructed straw.
  - ▶ Adenosine 0.1mg/kg IV not to exceed 6 mg (first dose). May repeat once at 0.2mg/kg not to exceed 12mg (subsequent dose).
  - ▶ If unstable, synchronized cardioversion 0.5 to 1 J/kg, increase to 2 J/kg if not effective.
- For suspected VT (wide complex >0.09 sec)**
- ▶ If unstable, synchronized cardioversion 0.5 to 1 J/kg

# Tachycardia Algorithm- Pediatric

## Pediatric Tachycardia With a Pulse and Poor Perfusion

