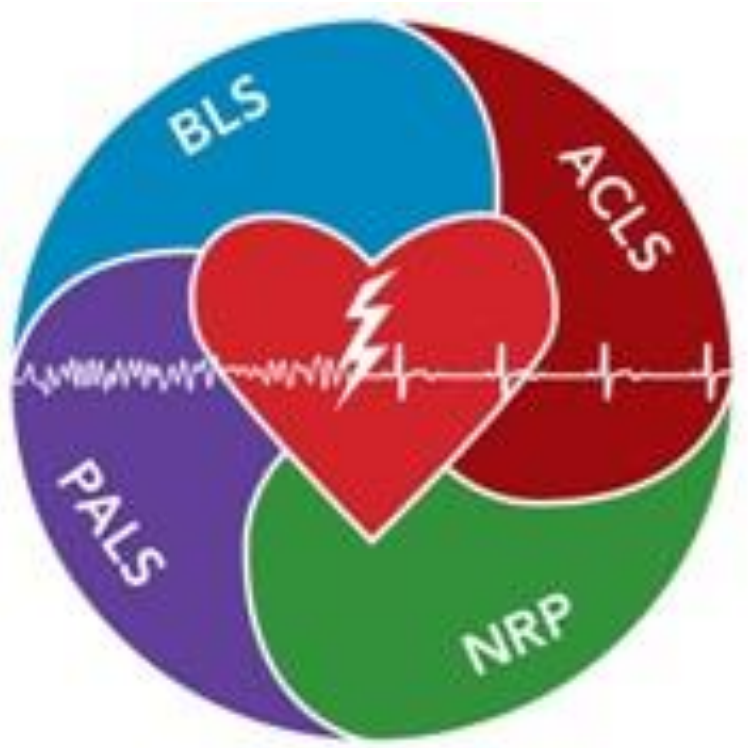
TAB 2

CARDIAC

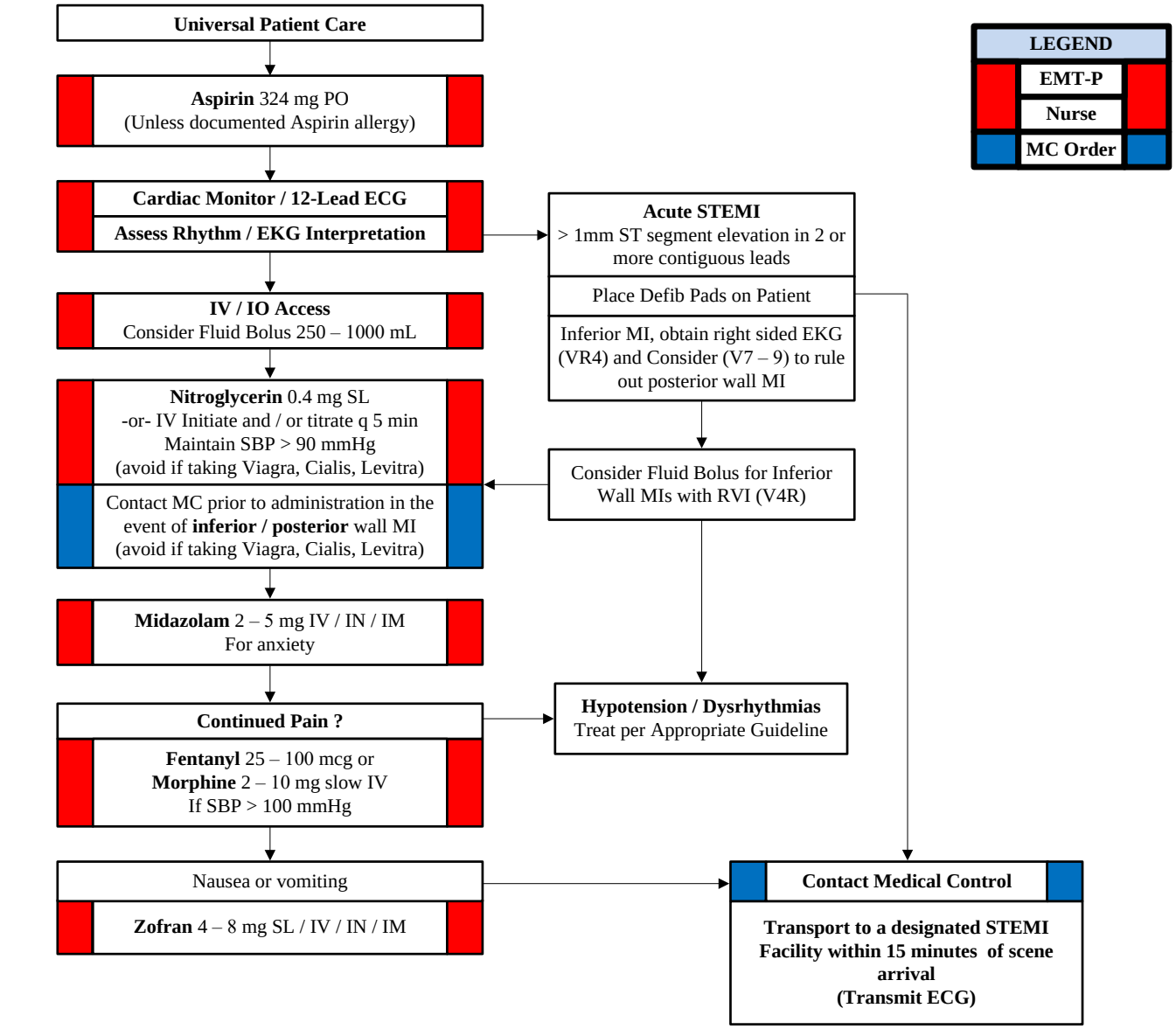
GUIDELINES



TAB 2 GUIDELINE 1

CHEST PAIN | ACUTE CORONARY SYNDROME

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Age • Medications (Viagra, Levitra, Cialis) • MI, Angina, Diabetes, Post Menopausal • Allergies • Recent physical exertion • **O**nset • **P**alliation / **P**rovocation • **Q**uality • **R**egion / **Radiation** / **R**eferred • **S**everity (1-10) • **T**ime (duration / repetition)	• CP (pain, pressure, aching, vice-like tightness) • Location (substernal, epigastric, arm, jaw, neck, shoulder) • Radiation of pain • Pale, diaphoresis • Shortness of Breath • Nausea, vomiting, dizziness • Atypical presentations • Anginal equivalents	• Trauma vs. Medical • Angina vs. Myocardial Infarction • Pericarditis • Pulmonary embolism • Asthma / COPD • Pneumothorax • Aortic dissection or aneurysm • GE reflux or Hiatal hernia • Esophageal spasm • Chest wall injury or pain • Pleural pain • Overdose (Cocaine)



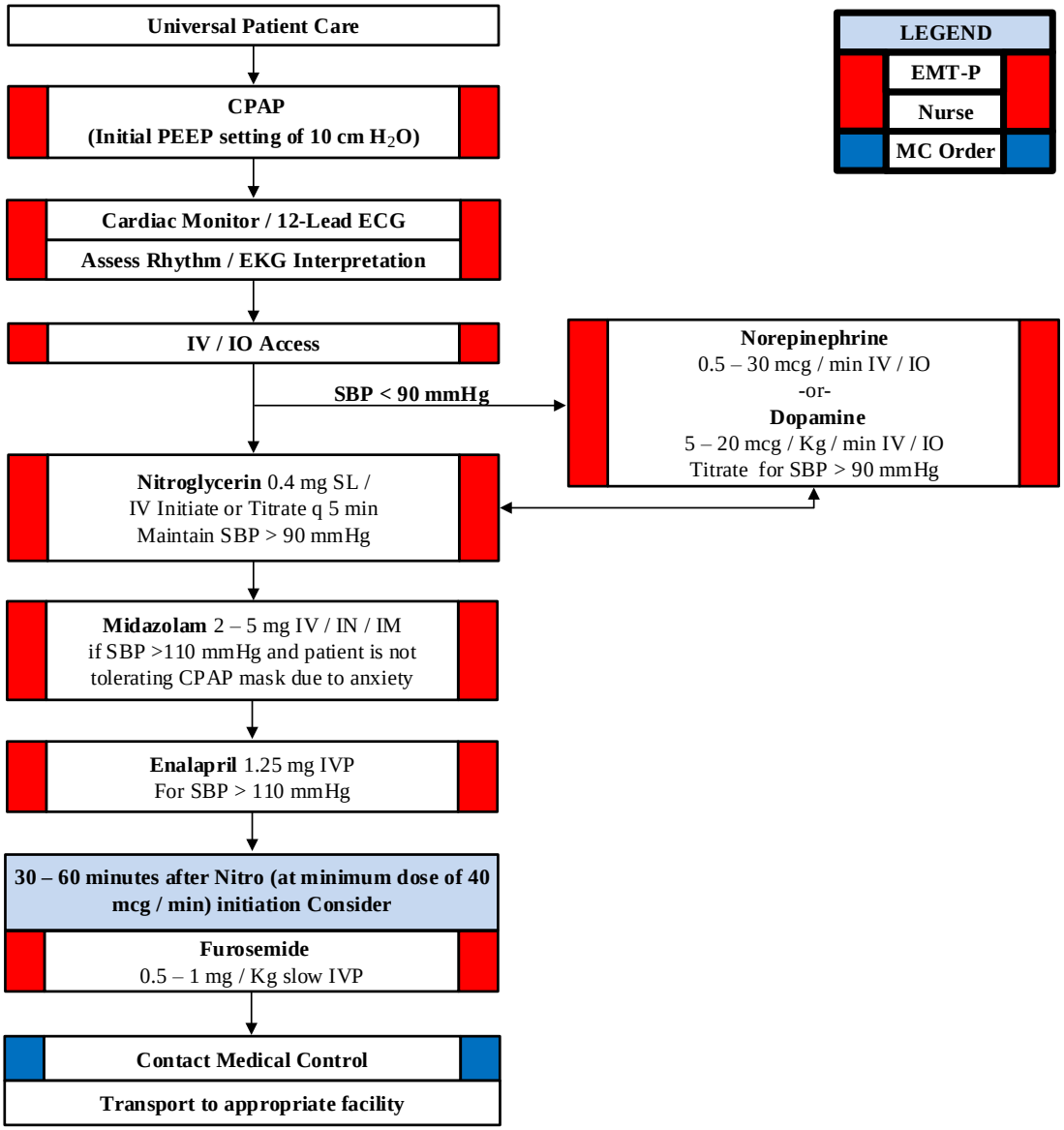
SPECIAL CONSIDERATIONS:

1. Patients with 12-Lead ECG signs indicative of ST-segment elevation myocardial infarction (STEMI) will be triaged to the closest available PCI (Percutaneous Coronary Intervention) facility for treatment.
2. **Flight and Mobile crews may temporarily stop and disconnect the heparin and nitroglycerin drips that were previously initiated in order to expedite transfer of patient.** If nitroglycerin is stopped then the patient should receive (1) spray of nitroglycerin every 5 minutes to maintain SBP < 160 mmHg. All drips should be resumed within the aircraft or mobile ICU. Vasoactive drips (levophed / dopamine) should NOT be stopped.
3. **STEMI Criteria:**
    a. ST-segment elevation, measured at the J-point, of 1mm or more.
    b. ST-segment elevation must be present in two anatomically contiguous leads.
    c. Probable new-onset BBB.
4. STEMI ALERT Procedure:
    a. Acquire 12-Lead ECG (if not already obtained from outlying facility / EMS department) as outlined in the 12-Lead ECG guideline.
        i. **DO Not Delay Transport for 12 Leak EKG acquisition**.
    b. 12-Lead interpretation indicative of myocardial injury (STEMI).
        i. Localize area of injury (Septal, Anterior, Inferior, etc.).
        ii. Rule out possible ACS imitators.
            1. Bundle branch block (BBB).
            2. Left ventricular hypertrophy (LVH).
            3. Ventricular Rhythms.
            4. Benign Early Repolarization (BER).
            5. Pericarditis.
5. **All inferior wall MI's should have a V4R and should consider V7 – 9 to rule out posterior wall MI**.
6. Transmit 12-Lead ECG to the assigned receiving PCI facility as time permits. Notify On-Line Medical Control, during patient assessment transmission, that 12-Lead ECG has been sent.
7. **Avoid the administration of NTG if the patient has taken Sildenafil (Viagra) or Vardenafil (Levitra) in the prior 24 hours or Tadalafil (Cialis) in the prior 48 hours.**
8. Avoid administration of supplemental oxygen (> 2 L / min) unless oxygen saturation < 94%

TAB 2 GUIDELINE 2

CONGESTIVE HEART FAILURE | ACUTE PULMONARY EDEMA

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Congestive heart failure • Past medical history • Medications (Digoxin, Lasix) • Viagra, Levitra, Cialis • Cardiac history - past myocardical infarction	• Respiratory distress, Bilateral rales • Apprehension • Orthopnea / Paroxysmal Nocturnal Dyspnea • Jugular vein distention • Pink, frothy sputum • Peripheral edema, diaphoresis • Hypotension, shock • Chest pain • Diaphoresis	• Myocardial infarction • Congestive heart failure • Asthma / COPD / Pneumonia • Anaphylaxis • Aspiration • Pleural effusion • Pulmonary embolus • Pericardial tamponade • Toxic exposure



SPECIAL CONSIDERATIONS:

1. Immediately begin administration of oxygen and titrate for SpO_2 > 92%. This will maximize oxygen concentration and fully saturate circulating hemoglobin.
2. If a patient is in extreme distress, it may be appropriate to proceed to immediate intubation and ventilation.
3. For patients who have moderate to severe pulmonary edema, noninvasive ventilations should be started (CPAP). CPAP provides positive airway pressure and reduces the work of breathing. Preload and afterload are also both reduced by CPAP, which is very beneficial in CHF patients.
4. Initial therapy with Nitroglycerin (NTG) is a preload-reducing agent that also decreases the workload of the heart. NTG spray is most useful in the acute care setting, but redosing will require temporary CPAP mask removal. **Administer Nitroglycerin q 3-5 minutes as long as SBP > 110 mmHg.** If Nitroglycerin spray is not available, SL tablet may be substituted with same dosing regimen (q 3-5 minutes).
    a. **The target minimal dose is 40 mcg / min with maximum dose of 200 mcg / min. The patient should be on nitroglycerin at minimal dose for 30 minutes before giving Lasix.**
    b. Avoid the administration of NTG if the patient has taken Sildenafil (Viagra) or Vardenafil (Levitra) in the prior 24 hours or Tadalafil (Cialis) in the prior 48 hours.
5. The second step in the treatment of the patient with CHF or pulmonary edema is to reduce afterload – that is, to reduce the pressure and resistance that the left ventricle has to pump against, so that cardiac output will be improved. **Captopril sublingually or Enalapril via IV / IO** will assist in lowering blood pressure, cause vasodilation of the arterial system, improve cardiac output and cause blood volume reduction via the excretion of sodium in the urine. ACE Inhibitor administration should be considered after the initiation of Nitro therapy and application of CPAP.
6. Some patients with decompensated CHF will have such poor perfusion they would be classified as having cardiogenic shock. This small subset of patients may not tolerate any preload or afterload reduction and may, in fact, need inotropic support (Levophed or Dopamine) to maintain any blood pressure. Unfortunately, the mortality rate for this group of patients is very high, despite therapy.

TAB 2 GUIDELINE 3

CARDIOGENIC SHOCK

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Age • Medications • Past medical history (MI, Angina, Diabetes) • Allergies • Recent events • Onset	• Chest pain • Systolic BP < 100 mmHg • Rales or crackles ("wet" lung sounds) • Pedal edema • Dyspnea • Diaphoresis • Nausea / Vomiting	• Trauma vs. Medical • Myocardial infarction • Pulmonary embolism • Pneumothorax • Chest wall injury or pain • Sepsis

Universal Patient Care

Airway Management
Monitor lung sounds for fluid overload

Cardiac Monitor / 12-Lead ECG

Assess Rhythm / EKG Interpretation

IV / IO Access
SBP < 90 mmHg
Fluid Bolus 20 mL / kg (max 500 mL) – avoid in patient with fluid overload

LEGEND
- EMT-P
- Nurse
- MC Order

Minimum Systolic BP by Age
- **< 1 mo: 60 mmHg**
- **1 mo to 10 y: 70 + (2 × age in years)**
- **≥ 10 y: 90 mmHg**

Adult

For SBP < 90 mmHg

Norepinephrine
0.5 – 30 mcg / min IV / IO
-or-
Dopamine 2 – 20 mcg / Kg / min
Titrate for SBP > 90 mmHg

Consider For Continued SBP < 90 mmHg

Epinephrine Drip 2 – 10 mcg / min
Titrate for SBP > 90 mmHg

Dysrhythmias
Treat per appropriate guideline

Consider
Synchronized cardioversion 50 – 100 J for tachyarrythmias

Pediatric

For SBP < normal for age

Consider Norepinephrine
Initial dose of 0.05 – 0.1 mcg / Kg / min
– or –
Dopamine 5 – 20 mcg / Kg / min
Titrate for SBP > minimum for Age

Consider For SBP < normal for age

Epinephrine drip
0.01 – 1 mcg / kg / min IV

Dysrhythmias
Treat per appropriate guideline

Consider
Synchronized cardioversion 50 – 100 J for tachyarrythmias

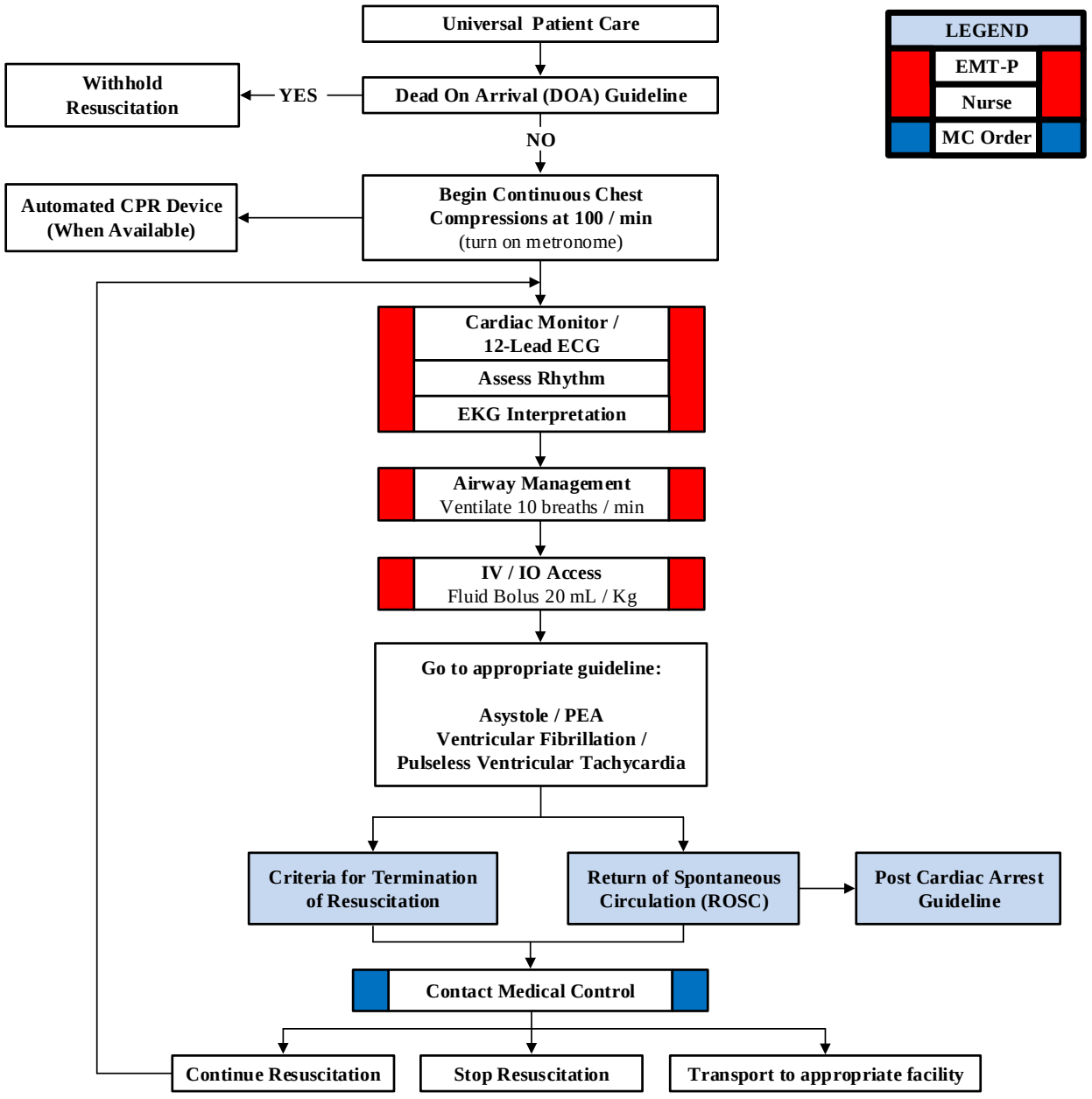
Contact Medical Control

Transport to appropriate facility

TAB 2 GUIDELINE 4

CARDIAC ARREST – ADULT | PEDIATRIC

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Time of onset, time lapse until CPR initiated • Events leading to arrest • Estimated down time • Past medical history • Medications • Existence of terminal illness • DNR	• Unresponsive • Apneic • Pulseless • Signs of lividity, rigor mortis • Evidence of drug ingestion • Trauma • Hypothermia	• Medical vs. Trauma • Ventricular Fibrillation vs. Pulseless Ventricular Tachycardia • Asystole • Pulseless Electrical Activity (PEA)



SPECIAL CONSIDERATIONS:

1. **Resuscitation is based on proper planning and organized execution. Procedures require space and patient access. Make room to work. Utilize Team Focused Approach (PIT Crew CPR) assigning responders to predetermined tasks.**
2. **Unless patient / crew are in an unsafe environment all resuscitative measures should be performed where the cardiac arrest occurred. Sustained ventricular tachycardia / fibrillation greater than 20 minutes should be discussed with online medical control for potential transport.**
3. **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated.**
4. **MCMAID** acronym for Cardiac Arrest Priorities:
    a. **M**etronome – Rate above 100 beats per minute but allow adequate recoil
    b. **C**ompression – harder, deeper, faster (continuous with advanced airway in place)
        i. **INTERRUPTION IN COMPRESSIONS NEEDS TO BE KEPT TO A MINIMUM.**
        ii. "Push Hard and Push Fast" at a rate of 100 – 120 beats per minute
            1. Allow chest to recoil from compressions
            2. Limit interruptions to chest compressions
        iii. **If no advanced airway (BIAD, ETT) compressions to ventilations are 30:2. If advanced airway in place ventilate 8 – 10 breaths per minute with continuous, uninterrupted compressions.**
        iv. Deploy and utilize automated CPR device when appropriate and available. With the efficacy of automated CPR devices, compressions should not be stopped during defibrillation
    c. **M**onitor – defibrillate after 2 minutes of CPR if down > 4 minutes
        i. AED should be used on all children over the age of 1 year
        ii. AED should deliver one (1) shock and then CPR should immediately begin
    d. **A**irway
        i. **DO NOT HYPERVENTILATE:**
        ii. Breathing / Airway management after second shock and / or 2 rounds of compressions (2 minutes each round.)
        iii. **DO NOT STOP CPR TO INTUBATE EARLY IN THE ARREST**. Initiate basic airway (King LT or LMA preferred) with Bag Valve Mask ventilations and

apply ResQPOD device inline or with constant mask seal, **VENTILATE AT A RATE OF 10 BREATHS / MINUTE** with oxygen source at flow rate of 15 LPM.

iv. Utilize EZ cap or capnography device if available, evaluate CPR ($EtCO_2$ > 10 mmHg).

1. In patients with return of spontaneous circulation (ROSC), the first visualized sign may be a significant increase in capnographic waveform and capnogram value. $C0_2$ washout through the lungs upon return of mechanical circulation proves a valuable sign of ROSC and should prompt the EMS providers in the field to assess patient circulation (pulses).
2. Rescue breaths over one (1) second
3. Limit ventilations one (1) every six (6) seconds or ten (10) per minute
4. Limit tidal volumes to 500 ml for adults if using oxygen

v. Upon placing and evaluating an advanced airway (ET, LMA, KING), it is **strongly recommended** that the patient's head be immobilized with a C-collar and/or CID to maintain airway control.

a. **I**V Access or IO if no success within 90 seconds or after 2 attempts

b. **D**rugs – ACLS guidelines per AHA.

i. **Perform CPR for 2 minutes immediately following any pharmacologic intervention and after defibrillation, before the rhythm is checked.**

ii. Medications that may be given via the endotracheal tube:

1. Atropine (concentration of 0.8 mg / 20 ml)
    a. Adult – 2 – 2.5 mg
    b. Pediatric – 0.04 mg / kg (minimum single dose 0.2 mg – max total dose 2 mg)
2. Epinephrine
    a. Adult – 2 – 2.5 mg
    b. Pediatric – 0.1 mg / kg (0.1 ml / kg 1:1000)
3. Lidocaine
    a. Adult – 100 mg
    b. Pediatric – 2 mg / kg
4. Versed
    a. Adult – 2 – 4 mg
    b. Pediatric – 0.2 mg / kg (max 10 mg)

iii. The dosage of these medications, when administered into the tracheal bronchial tree, should be 2 times the dose otherwise given IV / IO. Followed with a **5 – 10 mL saline flush and 5 ventilations after the medication is administered.**

iv. **NOTE: No medications should be delivered through the KING airway, LMA or other supraglottic device.**

v. Amiodarone is **NOT to be administered via the endotracheal route**. Lidocaine should be administered via the ETT in lieu of Amiodarone when absent IV / IO access.

1. Given the setting where Lidocaine was given initially via the ETT, and IV / IO access is then achieved, Amiodarone should **NOT be administered**. Lidocaine administration should be continued (if necessary). In the event that ROSC is achieved following Lidocaine administration, a Lidocaine drip infused at 1-4mg/min would be required.

vi. **With Return of Spontaneous Circulation, the last antiarrhythmic medication given should be initiated in an IV drip format.**

5. Consider correctable causes of "H's and T's":

- Hypoxia
- Hydrogen Ion
- Hyper / Hypokalemia
- Hypothermia
- Hypovolemia
- Hypoglycemia
- Tablets / Toxins
- Tamponade (cardiac)
- Tension pneumothorax
- Thrombus (myocardial infarction)
- Thrombus (pulmonary embolism)
- Trauma

6. **Maternal Arrest -** Treat mother per appropriate guideline with immediate notification to Medical Control and rapid transport as per Cardiac Arrest Destination Plan. Place mother supine and perform Manual Left Uterine Displacement moving the uterus to the patient's left side. IV/IO access preferably above the diaphragm. Defibrillation is safe at all energy levels.
7. If any underlying cause of arrest is suspected (i.e., hypothermia, diabetes, overdose), it would be appropriate to integrate those treatment guidelines during the resuscitative process. Do not, however, delay administration of cardiac medications while integrating treatments from other guidelines.
    a. **<u>The most common cause of pediatric cardiac arrest is HYPOXIA</u>** for this reason our primary responsibilities differ somewhat from that of an adult. If intervention is swift and

effective, the child can often be restored to full health. This makes the psychological burden and reward for you as providers all the greater.

b. Sudden Infant Death Syndrome (SIDS) will be one of the most frequent causes of cardiopulmonary arrests in infants between the ages of 1 month to 1 year. The parents or caretakers will have a great deal of guilt feelings. If you recognize and address these feelings, you can help prevent some of the long-term effects of this devastating occurrence. Unfortunately, SIDS can be very hard to distinguish from child abuse and vice versa. Therefore, it is most important not to be judgmental or suggest a diagnosis when you do not have enough information to be acute.

c. Refer to Dialysis / Renal Failure protocol caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.

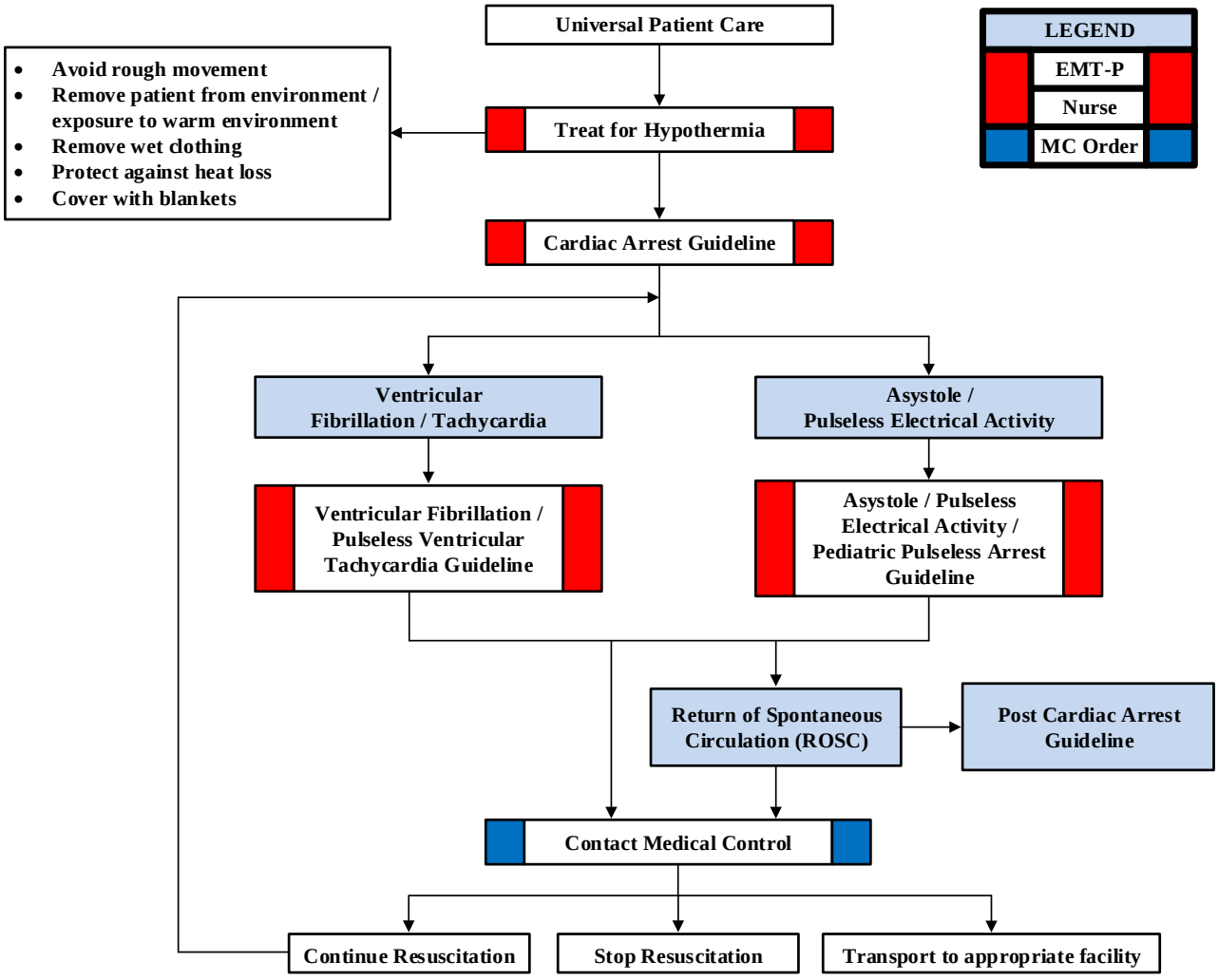
8. Consider Opioid Overdose: Naloxone 2 mg IM / IV / IO / IN.
9. Consider transport ventilator use on an advanced airway for better ventilatory control. Set tidal volume at approximately 6 – 8 ml / kg.
10. Reassess, document endotracheal tube placement and EtCO2 frequently, after every move, and at transfer of care.

COMPONENT	ADULT	CHILD	INFANT
Recognition	**Unresponsive (for all ages)**		
	No breathing, not breathing normal (gasping)	Not breathing or only gasping	
ACTIVATE Emergency response	Activate when victim found unresponsive. HCP: if respiratory arrest likely, call after 5 cycles (2 minutes of CPR)	Activate after performing 5 cycles of CPR. For sudden, witness collapse, activate after verifying that victim unresponsive	
CPR Sequence	**CAB**	**CAB**	**CAB**
CIRCULATION HCP: Pulse check (≤ 10 sec)	Carotid (HCP can use femoral in child)		Brachial or femoral
Compression landmarks	Center of chest, between nipples		Just below nipple line
Compression method	2 hands: Heel of 1 hand, other hand on top	2 Hands: Heel of 1 hand with second on top or 1 Hand: Heel of 1 hand only	1 rescuer: 2 fingers HCP: 2 rescuers: 2 thumb-encircling hands
Compression depth	At least 2 inches	Approximately 1/3 to 1/2 the depth of the chest	
Compression rate	Approximately 100 – 120 beats / minute (push hard, fast, allow full chest recoil)		
Compression - ventilation ratio (5 cycle / 2 minutes)	30 to 2 (1 or 2 rescuers)	30 to 2 (single rescuer) HCP: 15 to 2 (2 rescuers)	
	(1 cycle should take 18 - 23 seconds)		
AIRWAY	Head tilt-Chin Lift (HCP: suspected trauma, use jaw trust)		
BREATHS			
Initial	2 breaths at 1 second / breath	2 effect breaths at 1 second / breath	
HCP: Rescue breathing without chest compressions	10 to 12 breaths / minute (approximately 1 breath every 5 to 6 seconds)	12 to 20 breaths / minute (approximately 1 breath every 3 to 5 seconds)	
HCP: Recue breaths for CPR with advanced airway	**10 breaths / minute (approximately 1 breath every 6 seconds)**		
DEFIBRILLATION			
AED	USE adult pads. Do not sue child pads / child system. HCP: For out-of-hospital response may provide 5 cycles / 2 minutes of CPR before shock. If response > 4 to 5 minutes and arrest not witnessed.	HCP: Use AED as soon as available for sudden collapse and in-hospital All: After 5 cycles of CPR (out-of-hospital). Use child pads / child system for child 1 to 8 years if available. If child pads / system not available use, adult AED and pads.	No recommendation for infants < 1 year of age.

TAB 2 GUIDELINE 5

CARDIAC ARREST – HYPOTHERMIC

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Hypothermia • Time of arrest • Medical history • Medications	• Unresponsive • Cardiac arrest	• Hypothermia • Exposure • H's and T's



Moderate Hypothermia (30°C to 34°C)	Severe Hypothermia (< 30°C)
Start CPR Attempt defibrillation Establish IV / IO access Give medications spaced at longer intervals	Start CPR Attempt defibrillation (x 1) Withhold medications until temperature > 30°C

SPECIAL CONSIDERATIONS:

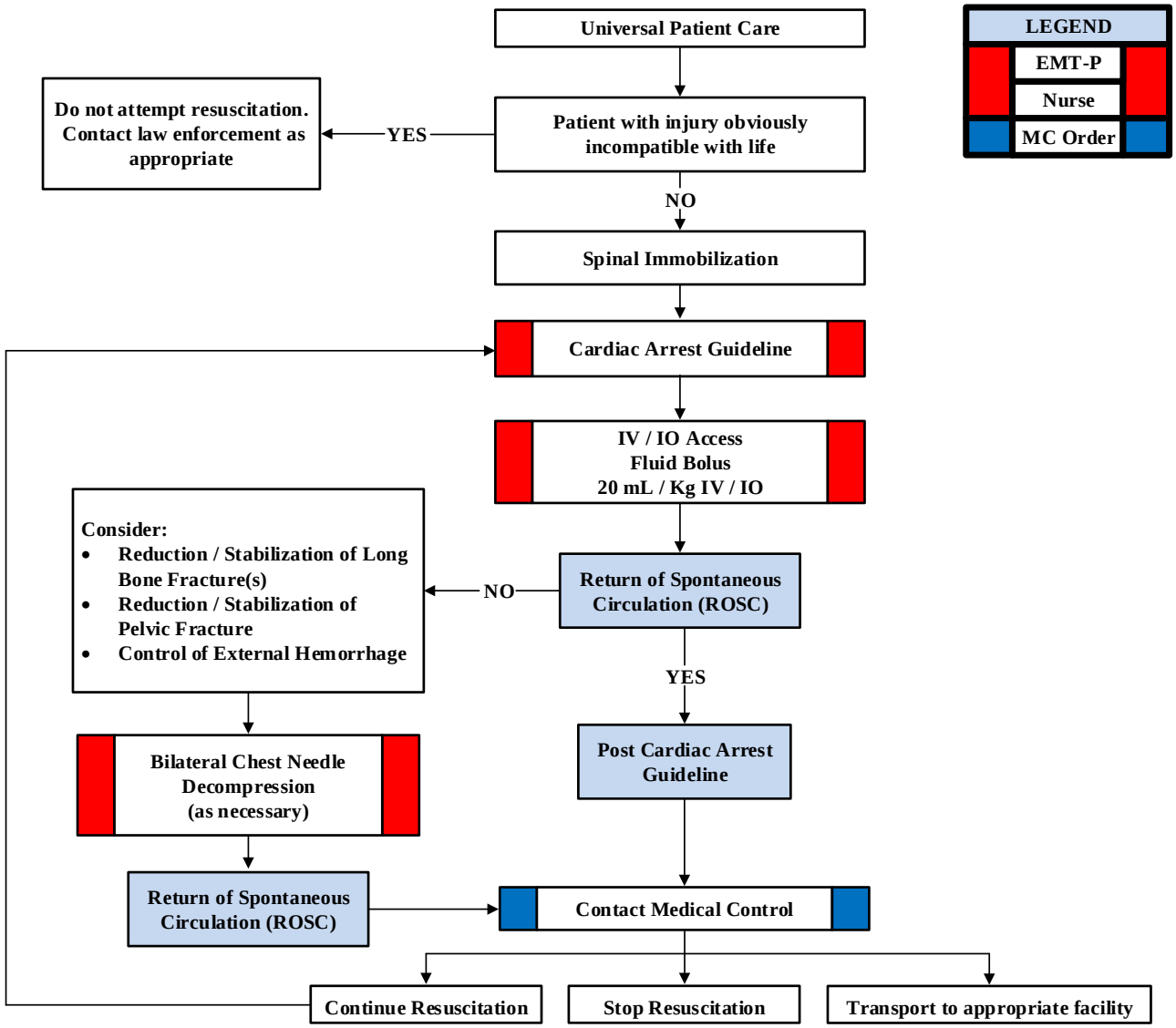
1. This guideline applies to patients with suspected hypothermic cardiac arrest (less than 32 ºC). These patients are **LOAD** and **GO** situations.
2. Patients in hypothermic cardiac arrest will require CPR with some modifications of conventional BLS and ACLS care.
    a. When the victim is hypothermic, pulse and respiratory rates may be slow or difficult to detect.
    b. For these reasons breathing and pulse should be assessed for 30-45 seconds to confirm respiratory arrest, pulseless cardiac arrest, or bradycardia that is profound enough to require CPR.
    c. ACLS management of cardiac arrest due to hypothermia focuses on more aggressive active core re-warming techniques as the primary therapeutic modality.
3. The hypothermic heart may be unresponsive to cardiovascular drugs, pacemaker stimulation, and defibrillation. In addition, drug metabolism is reduced and cardioactive medications can accumulate to toxic levels in the peripheral circulation if given repeatedly.
    a. Acquire tympanic temperatures in the hypothermic arrest patient and factor into the overall approach to treatment.
    b. The temperature at which defibrillation should first be attempted in the severely hypothermic patient and the number of defibrillation attempts that should be made have not been established. The following guidelines should be considered:
        i. **Moderate Hypothermia (30ºC to 34ºC):** Start CPR, attempt defibrillation, establish IV / IO access, give IV / IO medications spaced at longer intervals, initiate re-warming.
        ii. **Severe Hypothermia (<30ºC):** Start CPR, attempt defibrillation (x 1), withhold medications until temperature > 30ºC, initiate re-warming.
    c. If the patient fails to respond to the initial defibrillation attempt or initial drug therapy, defer subsequent defibrillation attempts or additional boluses of medication until the core temperature rises above 30ºC (86ºF).
4. Passive re-warming can be initiated in the field with application of blankets and movement of the victim to a warm environment. Severely hypothermic patients will require active internal warming upon arrival to the emergency department. To prevent further core heat loss, remove wet garments and protect the victim from further environmental exposure.

TAB 2 GUIDELINE 6

CARDIAC ARREST – TRAUMATIC

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL

• Patient who has suffered traumatic injury and is now pulseless
• Mechanism of injury
• Time of arrest
• Medical history
• Medications
	• Evidence of penetrating trauma
	• Evidence of blunt trauma
	• Unresponsiveness
	• Cardiac arrest
		• Medical condition preceding traumatic event as cause of arrest
		• Tension Pneumothorax
		• Hypoxia secondary to respiratory arrest
		• Hypovolemic shock
		  • External hemorrhage
		  • Unstable pelvic fracture
		  • Displaced long bone fracture(s)
		  • Hemothorax
		  • Intra-abdominal hemorrhage
		  • Retroperitoneal hemorrhage
		• Injury to vital structures
		• Head injury with secondary cardiovascular collapse



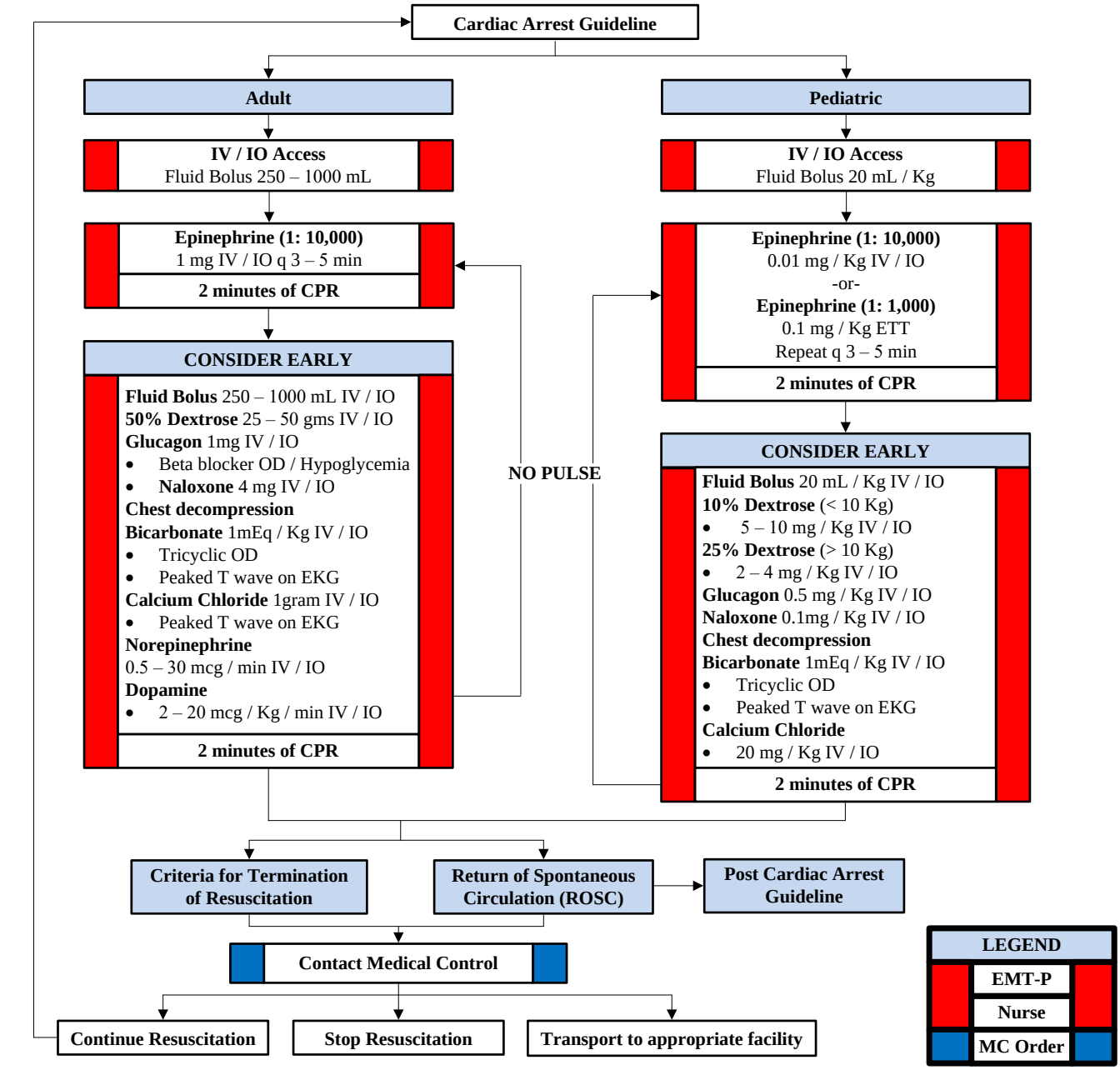
SPECIAL CONSIDERATIONS:

1. Traumatic arrest patients have a high mortality rate.
    a. Common errors in adult and pediatric trauma resuscitation include failure to open and maintain the airway, failure to provide appropriate fluid resuscitation, and failure to recognize and treat internal bleeding.
2. The patient should have no delay in transport after extrication, except as needed for c-spine and airway control.
3. When the mechanism of injury is compatible with spinal injury, restrict motion of the cervical spine and avoid traction or movement of the head and neck. Open and maintain the airway with a jaw thrust, and do not tilt the head.
4. In cases of suspected head injury, do not hyperventilate the patient.
5. Suspect thoracic injury in all thoracoabdominal traumas, even in the absence of external injuries. Tension pneumothorax, hemothorax, or pulmonary contusion may impair breathing.
6. Consider intra-abdominal hemorrhage, tension pneumothorax, pericardial tamponade, spinal cord injury in infants and children. Consider intracranial hemorrhage in infants with signs of shock.
7. Treat signs of volume depletion with a bolus of 20 mL / Kg of Normal Saline. Repeat as necessary.
8. On-line Medical Control radio report (TAG-EM):
    a. **T**raumatic arrest.
    b. **A**ge.
    c. **G**ender.
    d. **E**TA.
    e. **M**echanism and **M**ajor Injuries.
    f. Vital signs – including HR / BP / RR / SpO_2 and if appropriate $EtCO_2$

TAB 2 GUIDELINE 7

ASYSTOLE | PULSELESS ELECTRICAL ACTIVITY (PEA)

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Past medical history • Medications • Events leading to arrest • Do Not Resuscitate Paperwork • End Stage Renal Disease • Estimated down time • Suspected hypothermia • Suspected overdose • Suspected trauma • Family history of SIDS • Possibility of Foreign body	• Pulseless • Apneic • Airway obstruction • Electrical Activity on ECG • Peaked T waves on EKG • Dialysis fistula / catheter • No auscultated heart tones	• Hypovolemia (Trauma, AAA, other) • Cardiac tamponade • Hypothermia • Drug overdose (Tricyclics, Digitalis, Beta Blockers, Calcium channel blockers) • Massive myocardial infarction • Hypoxia • Tension Pneumothorax • Pulmonary embolus • Hyperkalemia



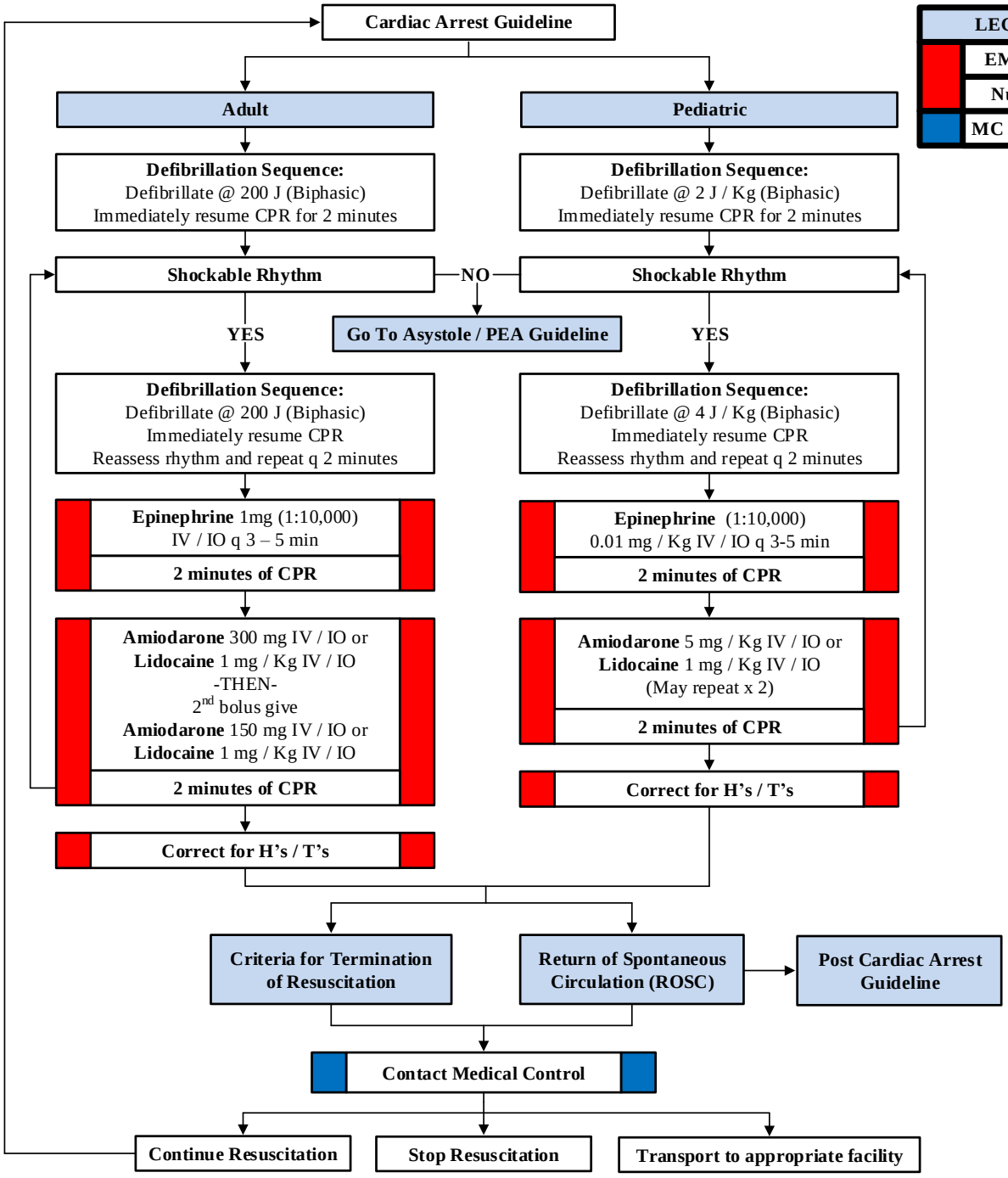
SPECIAL CONSIDERATIONS:

1. This guideline applies to any non-perfusing rhythm other than VF or VT including:
    - Asystole
    - EMD (Electrical Mechanical Dissociation)
    - Pseudo EMD
    - Idioventricular Rhythm
    - Post Defibrillation Idioventricular Rhythms
    - Ventricular Escape Rhythms
2. Consider correctable causes of "H's and T's":
    - Hypoxia
    - Hydrogen Ion
    - Hyper / Hypokalemia
    - Hypothermia
    - Hypovolemia
    - Hypoglycemia
    - Tablets / Toxins
    - Tamponade (cardiac)
    - Tension pneumothorax
    - Thrombus (myocardial infarction)
    - Thrombus (pulmonary embolism)
    - Trauma
3. **SPECIAL CONSIDERATIONS:**
    a. Atropine is no longer recommended in the Asystole PEA algorithm
    b. Pacing is no longer recommended in the Asystole algorithm.

TAB 2 GUIDELINE 8

VENTRICULAR FIBRILLATION | PULSELESS VENTRICULAR TACHYCARDIA

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Estimated down time • Past medical history • Medications • Events leading to arrest • Renal failure/ dialysis • DNR	• Unresponsive, apneic, pulseless • Ventricular fibrillation or ventricular tachycardia on ECG	• Asystole • Artifact/ Device failure • Cardiac • Endocrine/ Metabolic • Drugs • Pulmonary



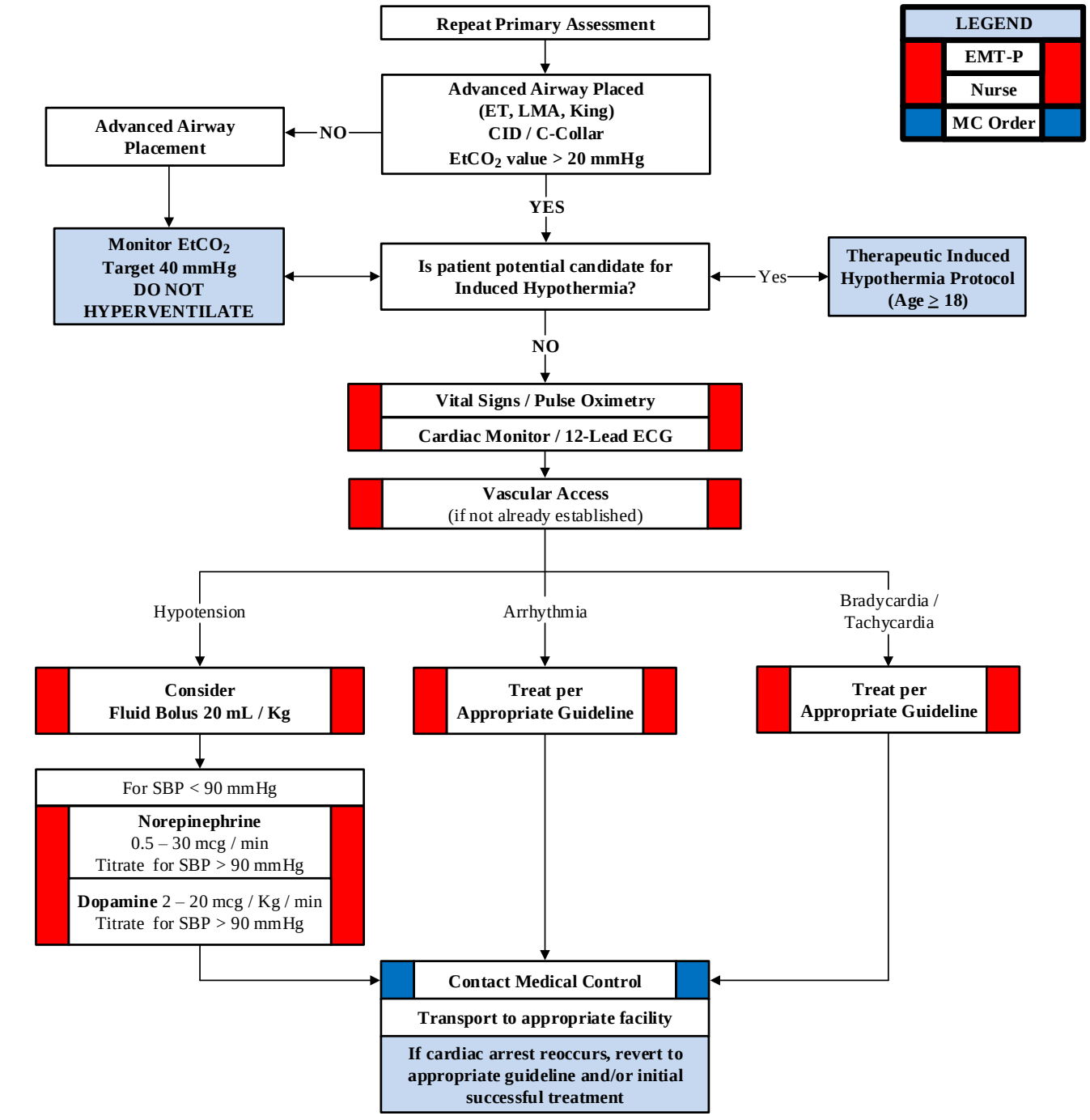
SPECIAL CONSIDERATIONS:

1. Effective CPR and prompt defibrillation are the keys to successful resuscitation.
2. **Defibrillation sequence:**
    a. Per manufacture recommendations.
    b. Immediately resume CPR.
    c. Reassess rhythm and repeat q 2 minutes.
3. Reassess and document advanced airway placement and $EtCO_2$ frequently, after every move, and upon delivery to ED.
4. In the absence of IV / IO access, drugs that can be given via ET route should have doses doubled and then flushed with 5 – 10 mL saline. IV / IO is the preferred route when available.

TAB 2 GUIDELINE 9

POST CARDIAC ARREST GUIDELINE

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Cardiac Arrest	• Return of Pulse (ROSC)	• Continue to address specific differentials associated with the original dysrhythmia • Shock



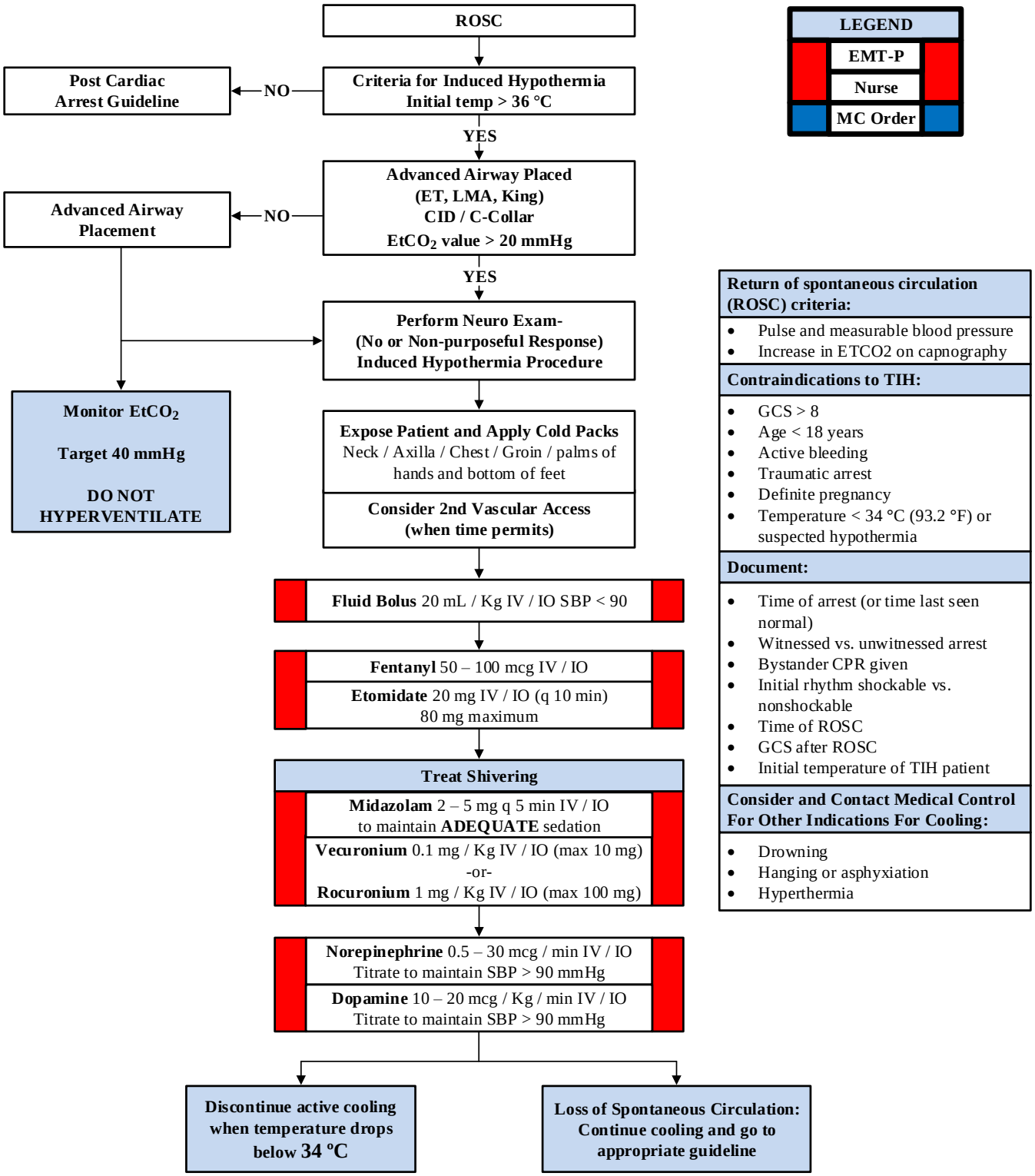
SPECIAL CONSIDERATIONS:

1. Perform complete exam:
    a. Mental Status, Neck, Skin, Lungs, Heart, Abdomen, Extremities, Neurologic
2. Common causes of post-resuscitation hypotension include hyperventilation, hypovolemia, pneumothorax, and medication reaction to ALS drugs.
3. Most patients during post–resuscitation care will require ventilatory assistance.
4. Titrate Dopamine to maintain SBP > 90 mmHg. Ensure adequate fluid resuscitation.
5. The condition of post -resuscitation patients fluctuates rapidly and continuously, and they require close monitoring.
    a. Almost all patients with ROSC will need vasopressor support after their epinephrine wears off.
    b. Vitals should be checked every 1-3 minutes since BP will likely drop precipitously about 3 – 5 minutes after ROSC.
    c. The post-arrest brain is very sensitive to hypotension and therefore EMS providers should have a low threshold for starting Dopamine.

TAB 2 GUIDELINE 10

THERAPEUTIC INDUCED HYPOTHERMIA GUIDELINE

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• ROSC not related to blunt/penetrating trauma or hemmorhage	• Return of Pulse	• Continue to address specific differentials associated with the original dysrhythmia



Return of spontaneous circulation (ROSC) criteria:

- Pulse and measurable blood pressure
- Increase in ETCO2 on capnography

Contraindications to TIH:

- GCS > 8
- Age < 18 years
- Active bleeding
- Traumatic arrest
- Definite pregnancy
- Temperature < 34 °C (93.2 °F) or suspected hypothermia

Document:

- Time of arrest (or time last seen normal)
- Witnessed vs. unwitnessed arrest
- Bystander CPR given
- Initial rhythm shockable vs. nonshockable
- Time of ROSC
- GCS after ROSC
- Initial temperature of TIH patient

Consider and Contact Medical Control For Other Indications For Cooling:

- Drowning
- Hanging or asphyxiation
- Hyperthermia

SPECIAL CONSIDERATIONS:

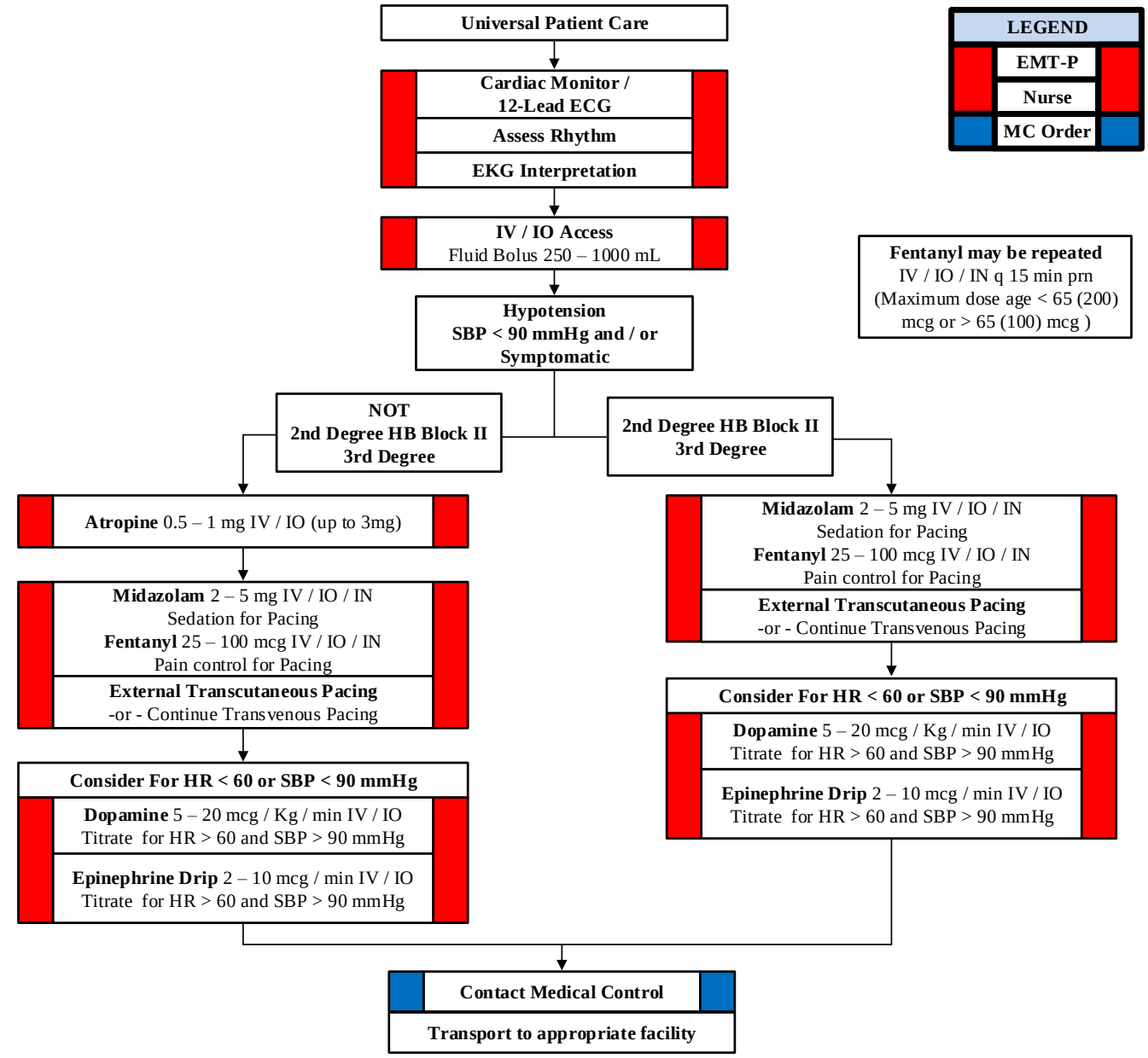
1. Brain damage will continue for several hours following resuscitation; it doesn't simply stop because the patient's heart starts beating again. Therapeutic hypothermia can help increase the odds of these patients recovering completely.
2. EMS providers play an important role in beginning the therapeutic hypothermia process, which usually must continue for a minimum of 12 hours following cardiac arrest. Since therapeutic hypothermia benefits decrease drastically after a delay of even a few minutes following successful cardiac arrest resuscitation, EMS providers are in the best position to begin immediate treatment.
3. Patients with ROSC and/or induced hypothermia should be triaged to the closest "STEMI"/ "Hypothermia" Center. A ROSC or "ICE" Alert should be declared through Dispatch for determination of closest open facility and med channel assignment.
4. When exposing patient for purpose of cooling with cold packs, undergarments may remain in place. Be mindful of your environment and take steps to preserve the patient's modesty.
5. The hypothermia process **may** be initiated on the scene. Do not delay transport to initiate the cooling process. Patient assessment is critical upon achieving ROSC. Assure sustained perfusing rhythm and vital signs before initiation of sedation and chilled saline administration. Patient should be prepared for transport to the closest assigned hypothermia center.
6. Measure patient temperature with tympanic thermometer and document in patient care report. Assure temperature > 36°C. For temperature measurements < 34°C do not initiate cooling measures. Consider periodic temperature measurements throughout care. If temperature measurements fall below 34°C at any time during post-resuscitation care, discontinue cold saline infusion and reinitiate if temperature > 36°C.
7. During the induced hypothermic process, patient assessment is critical for ongoing care:
    a. With any new signs of patient movement (i.e., gasping, eye fluttering, shivering, seizure activity, movement) during ICE therapy, re-dosing of Etomidate (0.3 mg / Kg to max of 20 mg) and 1/10 the original dose of Vecuronium (0.01mg / kg) or Rocuronium (0.1 mg / Kg) are required.
    b. Should always insure that the patient is **"<u>ADEQUATELY</u>"** sedated when using paralytic agents.
8. Maintaining cerebral perfusion is essential during the therapeutic hypothermia process. Maintain SBP > 90 mmHg. Cold saline is a strong vasoconstrictor. SBP values < 90 mmHg after cold saline infusion may require pressor administration (Dopamine) for adequate perfusion pressures.

TAB 2 GUIDELINE 11

BRADYCARDIA | HEART BLOCKS

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL

• Past medical history
• Medications
  • Beta Blockers
  • Calcium channel blockers
  • ClonidinE
  • Digitalis
• Pacemaker
	• HR < 60/min
	• Chest pain
	• Respiratory Distress
	• Hypotension or shock
	• Altered Mental Status
	• Syncope
		• Acute myocardial infarction
		• Hypoxia
		• Hypothermia
		• Sinus Bradycardia
		• Athletes
		• Head Injury (elevated ICP) or Stroke
		• Spinal cord lesion
		• Sick sinus syndrome
		• Junctional rhythms
		• AV Blocks (1st, 2nd, 3rd degree)
		• Overdose



SPECIAL CONSIDERATIONS:

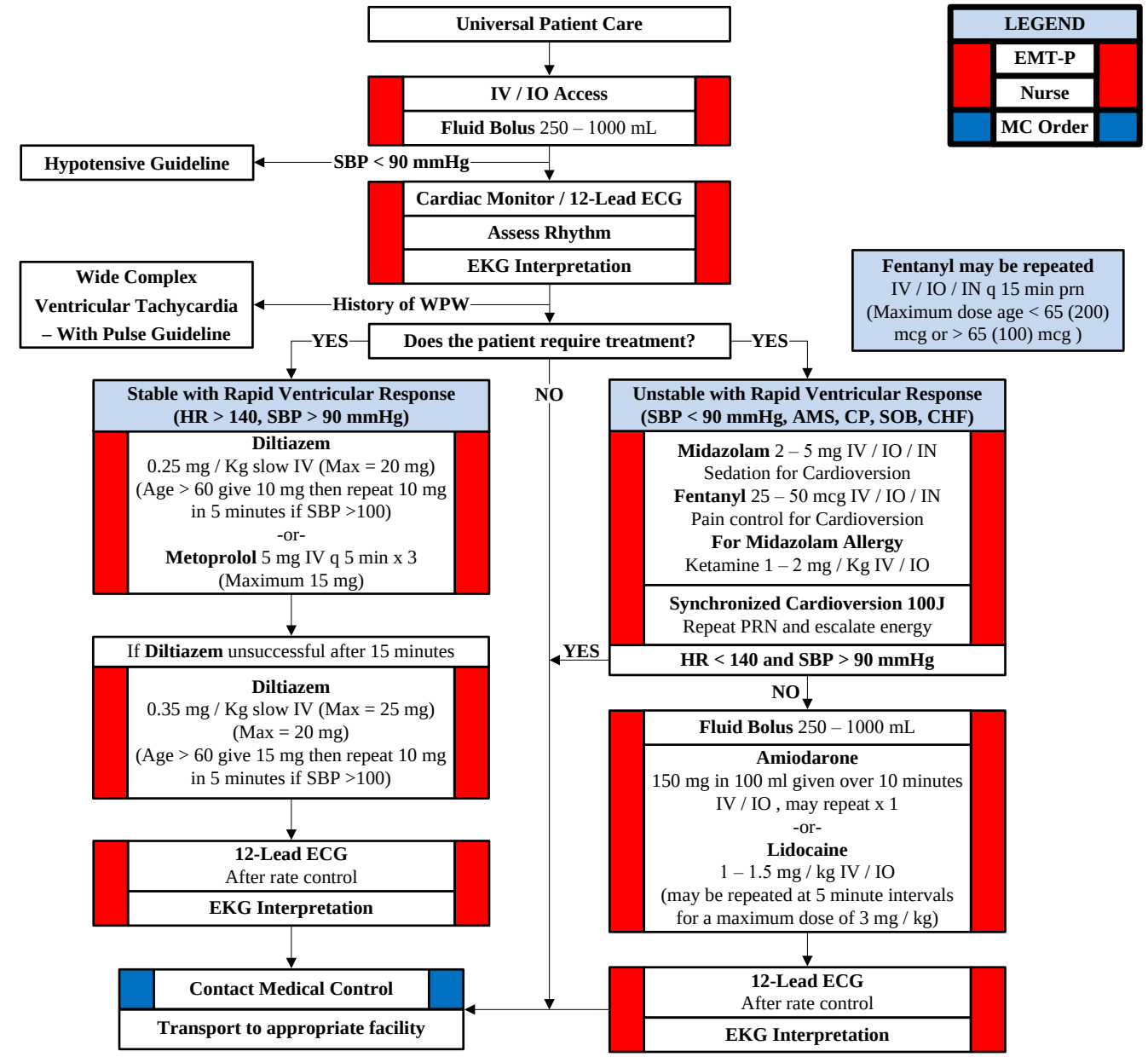
1. This guideline applies to the following rhythms:
    a. Sinus bradycardia.
    b. First Degree AV Block.
    c. Second Degree Block – Mobitz II.
    d. Second Degree Block – Mobitz I (Wenchebach).
    e. Third Degree Block.
    f. This guideline does not apply to any patient in cardiac arrest.
2. **Bradycardia does not require treatment unless patient is symptomatic.**
    a. Hypotension, mental status changes, CHF or Chest Pain.
3. Bradycardia can be caused by many underlying factors. Possible causes include the "H's and T's". These should be considered and, if verified, the appropriate treatment administered.
    a. Hypoxemia, acidosis, and hypotension interfere with sinus node function and slow cardiac conduction. In addition, excessive vagal stimulation (i.e. suctioning) may produce bradycardia.
4. It should also be noted that if IV access is delayed, go immediately to Transcutaneous Pacing (TCP).
5. Denervated transplanted hearts (patients who have had a heart transplant) will not respond to Atropine.
6. Transcutaneous pacing should be considered early in patients with severe hemodynamic compromise due to bradycardia. Denervated transplanted hearts will not respond to Atropine and TCP is indicated as the initial intervention for symptomatic bradycardia.
7. For severely symptomatic patients, and refractory to Atropine dosing, initiate transcutaneous pacing at 80 BPM. Increase milliamperage until electrical capture is realized.

TAB 2 GUIDELINE 12

ATRIAL FIBRILLATION | ATRIAL FLUTTER

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL

• Medications
  • Aminophylline
  • Diet pills
  • Thyroid supplements
  • Decongestants
  • Digoxin
• Diet (caffeine, chocolate)
• Drugs (nicotine, cocaine)
• Past medical history
• Hx of palpitations / heart racing
• Syncope / near-syncope
	• HR > 140 / min
	• QRS < 0.12 sec
	• Dizziness, CP / MI, SOB, Syncope, CHF / Pulmonary Edema, AMS / Decreased LOC, Hypotension with inadequate perfusion
	• Potential presenting rhythm:
	  • Sinus Tachycardia
	  • Atrial Fibrillation / Flutter
	  • Multifocal Atrial Tachycardia
		• Heart disease (WPW, Valvular)
		• Sick sinus syndrome
		• Myocardial infarction
		• Electrolyte imbalance
		• Exertion, pain, emotional stress
		• Fever
		• Hypoxia
		• Hyovolemia or anemia
		• Drug effect / Overdose
		• Hyperthyroidism
		• Pulmonary embolus



SPECIAL CONSIDERATIONS:

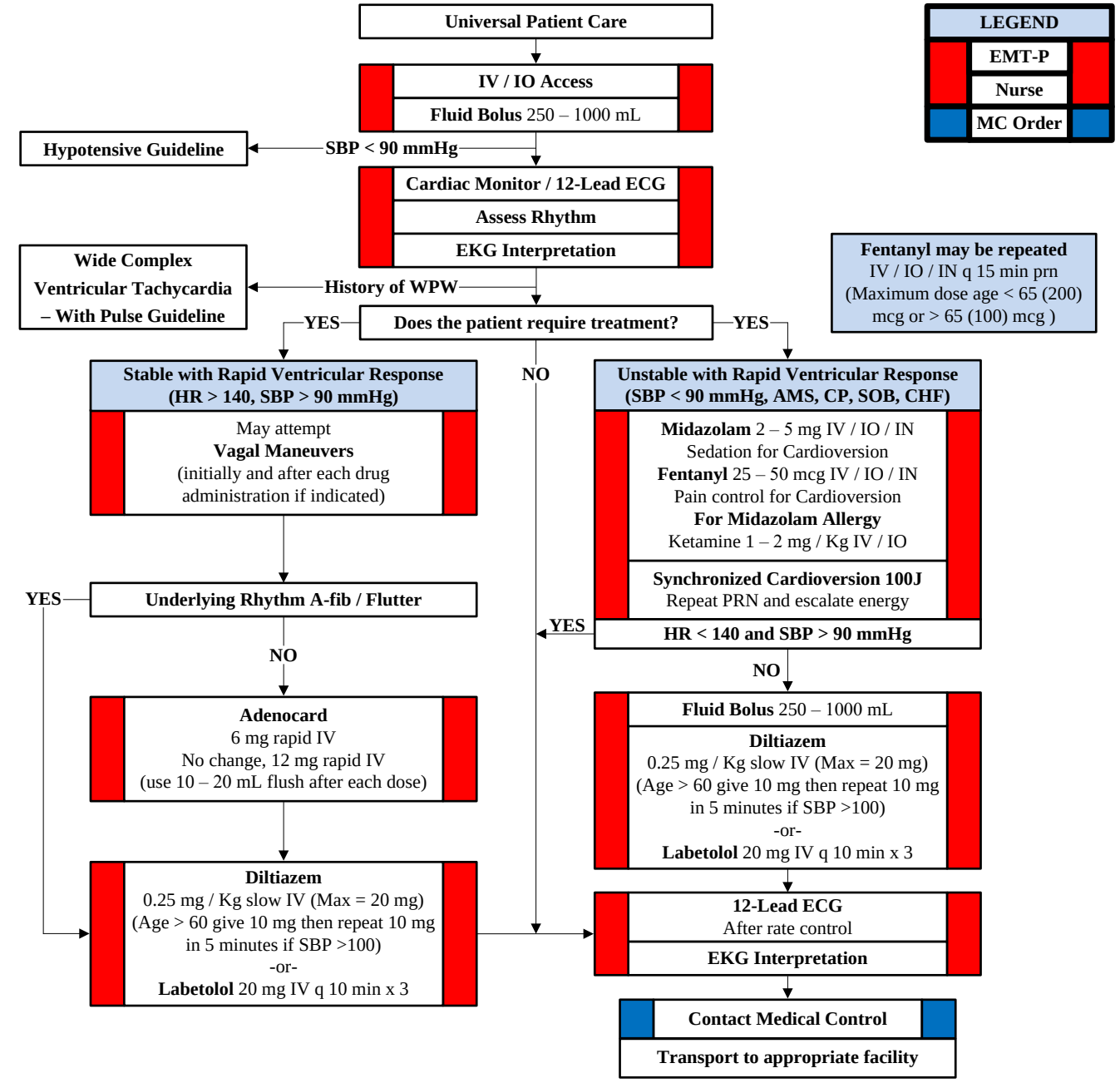
1. **<u>Not all patients will require therapy for the atrial fibrillation</u>.**
2. This guideline applies to patients with narrow QRS complex tachycardia suggestive of Atrial Fibrillation | Atrial Flutter with irregularly irregular rhythm. A-flutter commonly has a 2:1 AV block resulting in heart rate in the 150 BPM range.
3. There are multiple causes for atrial fibrillation / flutter including pulmonary embolism, sepsis, acute myocardial infarction, overdose, hyperthyroidism and metabolic imbalances, AHA H's / T's.
4. **<u>Signs and symptoms of the unstable patient are as follows:</u>**
    a. Chest pain with hypotension (SBP < 90 mmHg).
    b. Shortness of breath with tachypnea.
    c. Decreased level of consciousness / Altered mental status.
    d. Hypotension (SBP < 90 mmHg with other indications of inadequate perfusion).
    e. Pulmonary edema from heart failure.
    f. Syncope.
    g. Evidence of Acute Myocardial Infarction.
5. Cardioversion
    a. If allergic to Versed, administer:
        i. Fentanyl IV (< 50 Kg = 1 mcg / Kg; > 50 Kg = 50 mcg).
        ii. Absent IV access, administer Fentanyl (weight appropriate dose) IN.
6. If the patient develops an adverse reaction to Diltiazem infusion (i.e., hypotension, bradycardia, heart-block), administer Calcium Chloride 1 gram over 5 minutes.
    a. Mix 1 gram of Calcium Chloride in a 50 mL bag of D5W. With (10 gtt) administration set, run at 100 gtts / minute.
    b. Continue Calcium Chloride drip until adverse symptoms resolve.
7. If a known pre-excitation syndrome is identified by either ECG or patient history (i.e., Wolff-Parkinson-White Syndrome [WPW]), do not administer Diltiazem. This may cause a paradoxical increase in the ventricular response to the rapid atrial impulses passing through an accessory AV pathway.
8. **If WPW is suspected, treat per the Ventricular Tachycardia / Wide Complex with a Pulse Guideline.**

TAB 2 GUIDELINE 13

SUPRAVENTRICULAR TACHYCARDIA (SVT)

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL

• Medications
  • Aminophylline
  • Diet pills
  • Thyroid supplements
  • Decongestants
  • Digoxin
• Diet (caffeine, chocolate)
• Drugs (nicotine, cocaine)
• Past medical history
• Hx of palpitations / heart racing
• Syncope / near-syncope
	• HR > 150 / min
	• QRS < 0.12 sec
	• **QRS > 0.12 sec - Go to V-Tach Protocol**
	• **If history of WPW, go to V-Tach Protocol**
	• Dizziness, CP, SOB
	• Potential presenting rhythm
	  • Sinus Tachycardia
	  • Atrial Fibrillation / Flutter
	  • Multifocal Atrial Tachycardia
		• Heart disease (WPW, Valvular)
		• Sick sinus syndrome
		• Myocardial infarction
		• Electrolyte imbalance
		• Exertion, pain, emotional stress
		• Fever
		• Hypoxia
		• Hyovolemia or anemia
		• Drug effect / Overdose
		• Hyperthyroidism
		• Pulmonary embolus



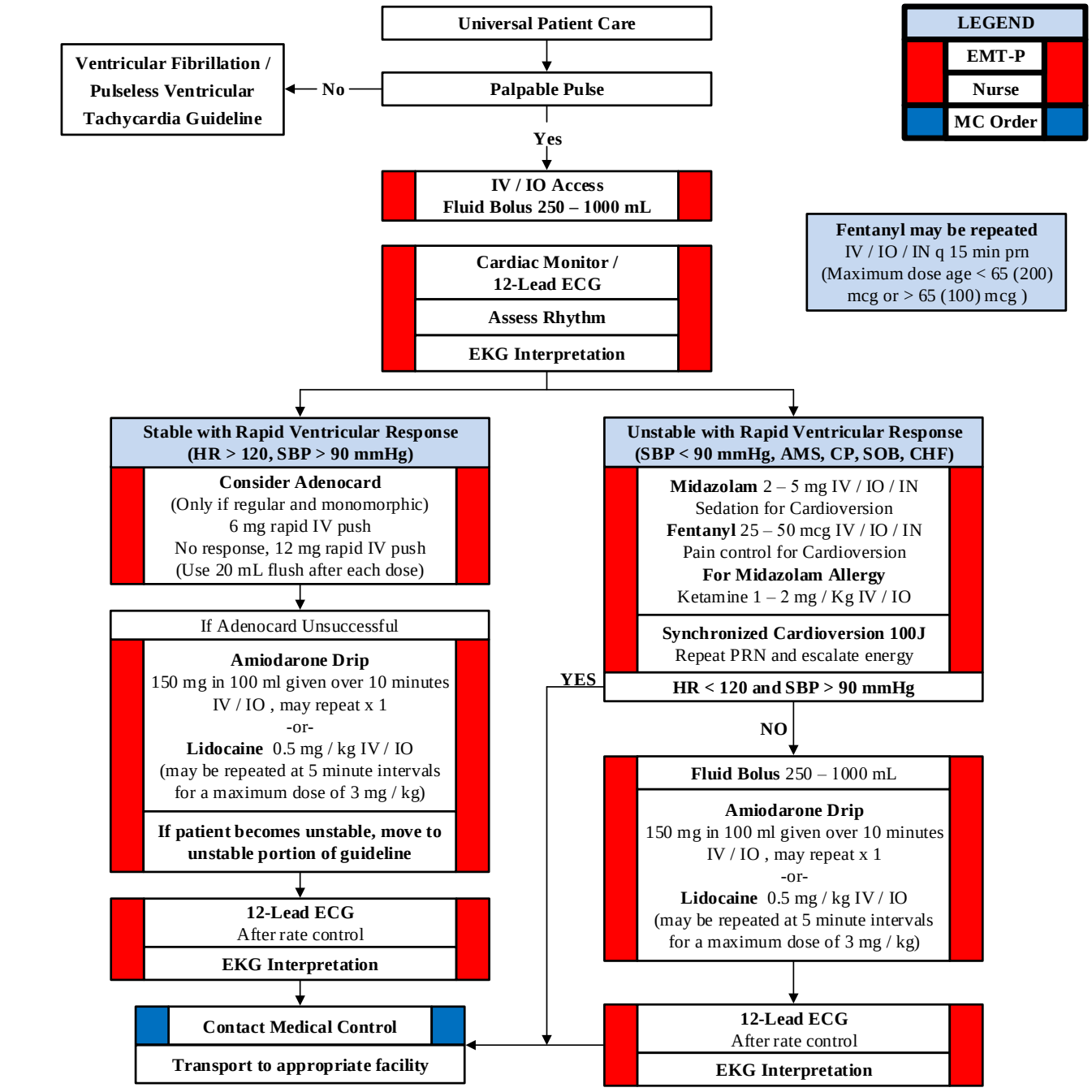
SPECIAL CONSIDERATIONS:

1. This guideline applies to the patient who is slightly symptomatic or whose condition has deteriorated since initial assessment.
2. Signs and symptoms of the unstable patient are as follows:
    a. Chest pain / Shortness of breath.
    b. Decreased level of consciousness.
    c. Hypotension (SBP < 90 mmHg with other indications of inadequate perfusion).
    d. Pulmonary edema from heart failure.
    e. Evidence of Acute Myocardial Infarction or Ischemia.
3. Reentry SVT is a regular tachycardia that is caused by reentry, an abnormal rhythm circuit that allows a wave of depolarization to travel in a circle. The rate of reentry SVT exceeds the typical upper limits of sinus tachycardia at rest (> 150 beats per minute) with or without discernible P waves. Vagal maneuvers and Adenosine are the preferred initial therapeutic choices for the termination of stable reentry SVT.
4. If patient develops an adverse reaction to Diltiazem infusion (i.e., hypotension, bradycardia, heart-block), administer Calcium Chloride 1 gram over 5 minutes.
    a. Mix 1 gram of Calcium Chloride in a 50 mL bag of D5W. With (10 gtt) administration set, run at 100 gtts / min.
    b. Continue Calcium Chloride drip until adverse symptoms resolve.
5. If a known pre-excitation syndrome is identified by either ECG or patient history (i.e., Wolff-Parkinson-White Syndrome [WPW]), do not administer Adenosine or Diltiazem. These drugs can cause a paradoxical increase in the ventricular response to the rapid atrial impulses passing through an accessory AV pathway. **If WPW is suspected, treat per the Ventricular Tachycardia / Wide Complex with a Pulse Guideline.**

TAB 2 GUIDELINE 14

WIDE COMPLEX VENTRICULAR TACHYCARDIA – WITH PULSE

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Past medical history / medications, diet, drugs • Syncope / near syncope • Palpitations • Pacemaker • Allergies: lidocaine / novacaine	• Ventricular Tachycardia on ECG (Runs or sustained) • Conscious, rapid pulse • Chest pain, shortness of breath • Dizziness • Rate usually 150-180 bpm for sustained V-Tach • **QRS > 0.12 sec**	• Artifact / Device failure • Cardiac • Endocrine / Metabolic • Hyperkalemia • Drugs • Pulmonary



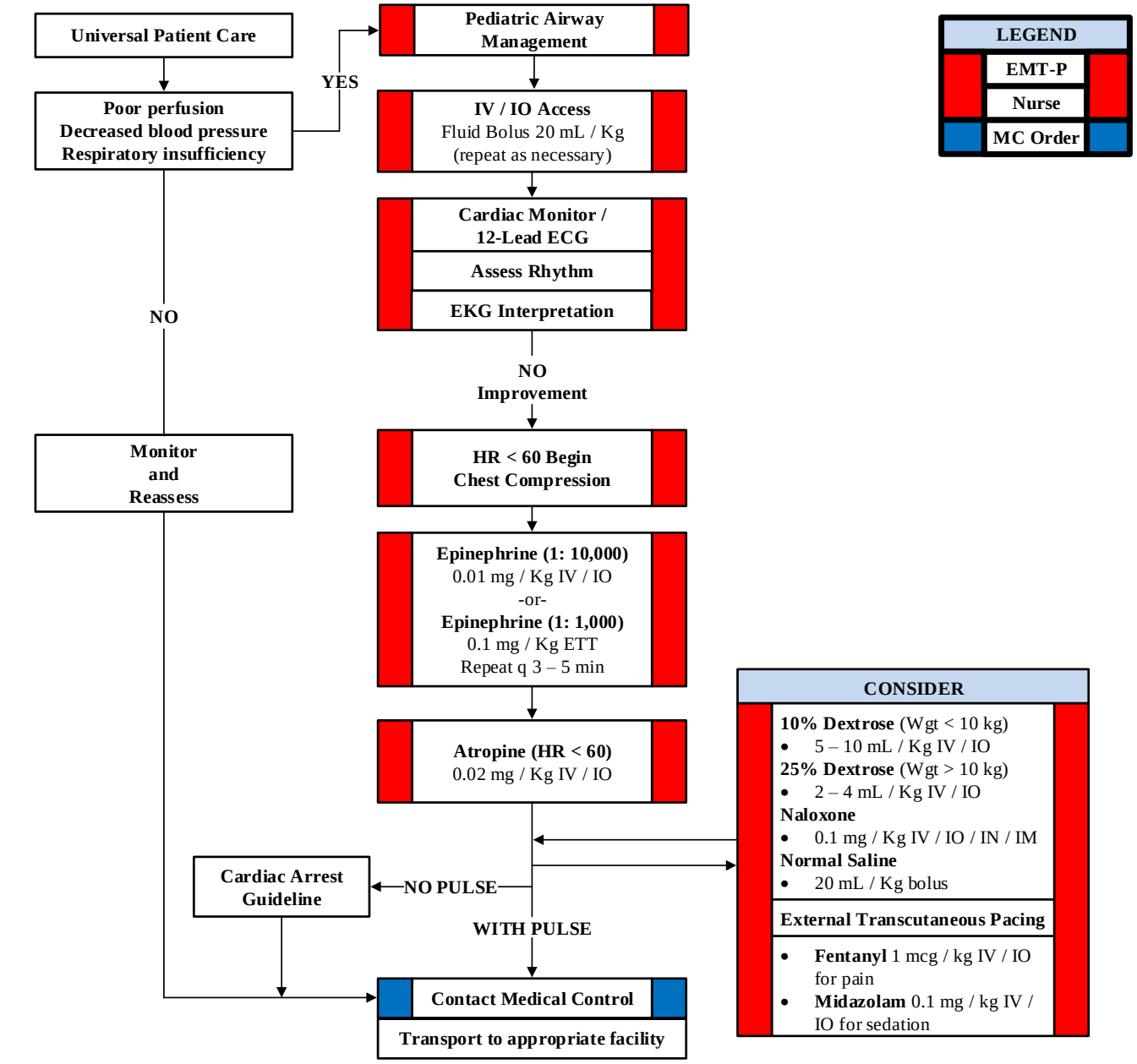
SPECIAL CONSIDERATIONS:

1. Signs and symptoms of the unstable patient are as follows:
    a. Chest pain
    b. Shortness of breath
    c. Decreased level of consciousness
    d. Hypotension (SBP < 90 mmHg with other indications of inadequate perfusion)
    e. Pulmonary edema from heart failure
    f. Evidence of Acute Myocardial Infarction
2. Stable Ventricular Tachycardia may terminate with an increase in vagal tone
    a. Cough several times
    b. Bear down like having a bowel movement
    c. Perform carotid sinus massage – (1) side only
3. Cardioversion
    a. If allergic to Versed, administer either
        i. Fentanyl IV / IO (< 50 Kg = 1 mcg / Kg; > 50 Kg = 50 mcg)
        ii. Ketamine 1 – 2 mg / Kg IV / IO
4. Lidocaine Toxicity
    a. Symptoms of lidocaine toxicity progress in the following predictable pattern.
    b. Begins with numbness of the tongue, lightheadedness, and visual disturbances and progresses to muscle twitching, unconsciousness, and seizures, then coma, respiratory arrest, and cardiovascular depression
    c. Maximum dose of lidocaine is 3 mg / kg

TAB 2 GUIDELINE 15

PEDIATRIC BRADYCARDIA WITH PULSE

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• < 16 years of age • Past medical history • Foreign body exposure • Respiratory distress or arrest • Apnea • Possible toxic or poison exposure • Congenital disease • Medication (maternal or infant)	• Decreased heart rate • Delayed capillary refill or cyanosis • Mottled, cool skin • Hypotension or arrest • Altered level of consciousness	• Respiratory effort • Respiratory obstruction • Heart Block • Hypovolemia / Hypothermia • Infection / Sepsis • Medication or Toxin • Hypoglycemia • Trauma



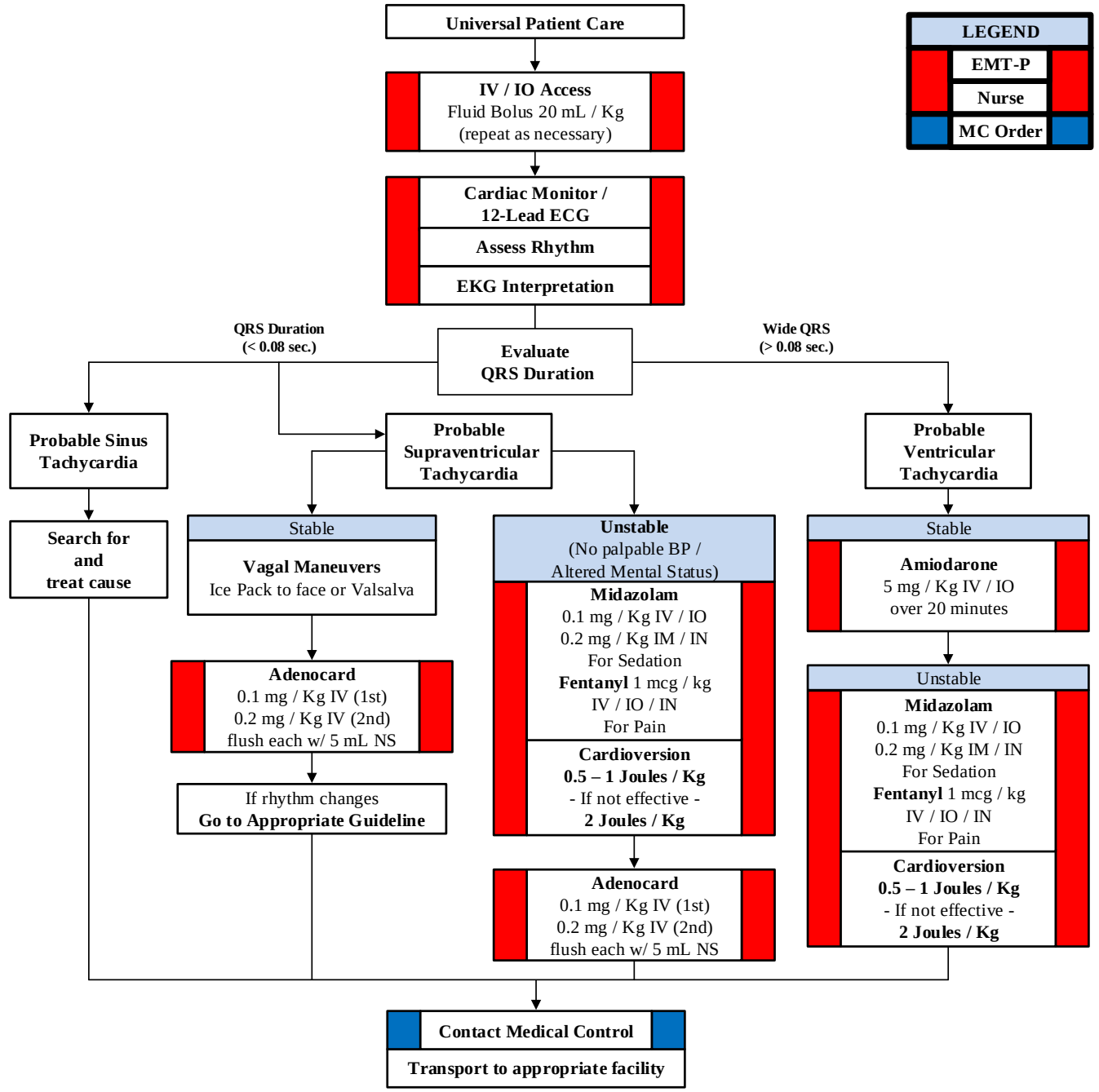
SPECIAL CONSIDERATIONS:

1. This guideline applies to pediatric patients (< 16 years of age) who are in a symptomatic bradyarrhythmia (i.e., Sinus Bradycardia, First Degree Heat Block, Relative Bradycardia**,** Absolute Bradycardia, Second Degree Heart Block Mobitz I, Second Degree Heart Block Mobitz II, and Third Degree Heart Block). **Treatment is not indicated if the patient is asymptomatic.**
2. If the patient displays any of the following symptoms, treatment should be initiated:
    a. Shortness of breath
    b. Decreased level of consciousness
    c. Hypotension
    d. Multiple PVC's
3. Hypoxemia, acidosis, and hypotension interfere with sinus node function and slow cardiac conduction. In addition, excessive vagal stimulation (i.e. suctioning) may produce bradycardia.
4. AV Block or vagal induced bradycardia may respond better to Atropine than Epinephrine unless accompanied by hypotension.
5. Atropine is administered at 0.02mg / Kg IV/IO/ET. The minimum dosage of Atropine is 0.1mg. The following Atropine dosing guidelines are recommended:
    a. Child: Single dose maximum = 0.5mg
    b. Adolescent: Single dose maximum = 1 mg
6. Hypoglycemia, severe dehydration and narcotic effects may produce bradycardia. The following Dextrose concentrations and dosing are recommended:
    a. Pediatrics < 10 kg – Dextrose 10 % give 5 – 10 mL / Kg
    b. Pediatrics > 10 kg – Dextrose 25 % give 2 – 4 mL / Kg
7. Pediatric patients requiring external transcutaneous pacing require the use of pads appropriate for pediatric patients per manufacturer's guidelines.
8. Transcutaneous pacing for the pediatric patient should be initiated at 100 BPM and 20mA. Increase milliamperage by increments of 5 until electrical capture is realized.

TAB 2 GUIDELINE 16

PEDIATRIC TACHYCARDIA WITH PULSE

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• < 16 years of age • Past medical history • Medications or toxic ingestion • Drugs • Congenital heart disease • Respiratory distress • Syncope or near-syncope	• Heart rate: Child > 180/bpm Infant > 220/bpm • Pale or cyanosis • Diaphoresis • Tachypnea • Vomiting • Hypotension • Altered level of consciousness • Pulmonary congestion • Syncope	• Heart disease (congenital) • Hypo / Hyperthermia • Hypovolemia or Anemia • Electrolyte imbalance • Anxiety / Infection / Sepsis • Hypoxia • Hypoglycemia • Medication / Toxin / Drugs • Pulmonary embolus • Trauma / Tension pneumothorax



SPECIAL CONSIDERATIONS:

1. This guideline applies to pediatric patients (< 16 years of age) who present with symptomatic tachycardia which may include:
    a. Atrial Fibrillation / Flutter
    b. SVT (Supraventricular Tachycardia)
    c. Ventricular Tachycardia with a pulse
    d. Wide Complex Tachycardia of uncertain type
2. If there are no palpable pulses proceed with the Pulseless Arrest Guideline. If pulses are palpable, look for signs of hemodynamic compromise (i.e., poor perfusion, tachypnea, weak pulses).
3. Sinus tachycardia should be differentiated from SVT:

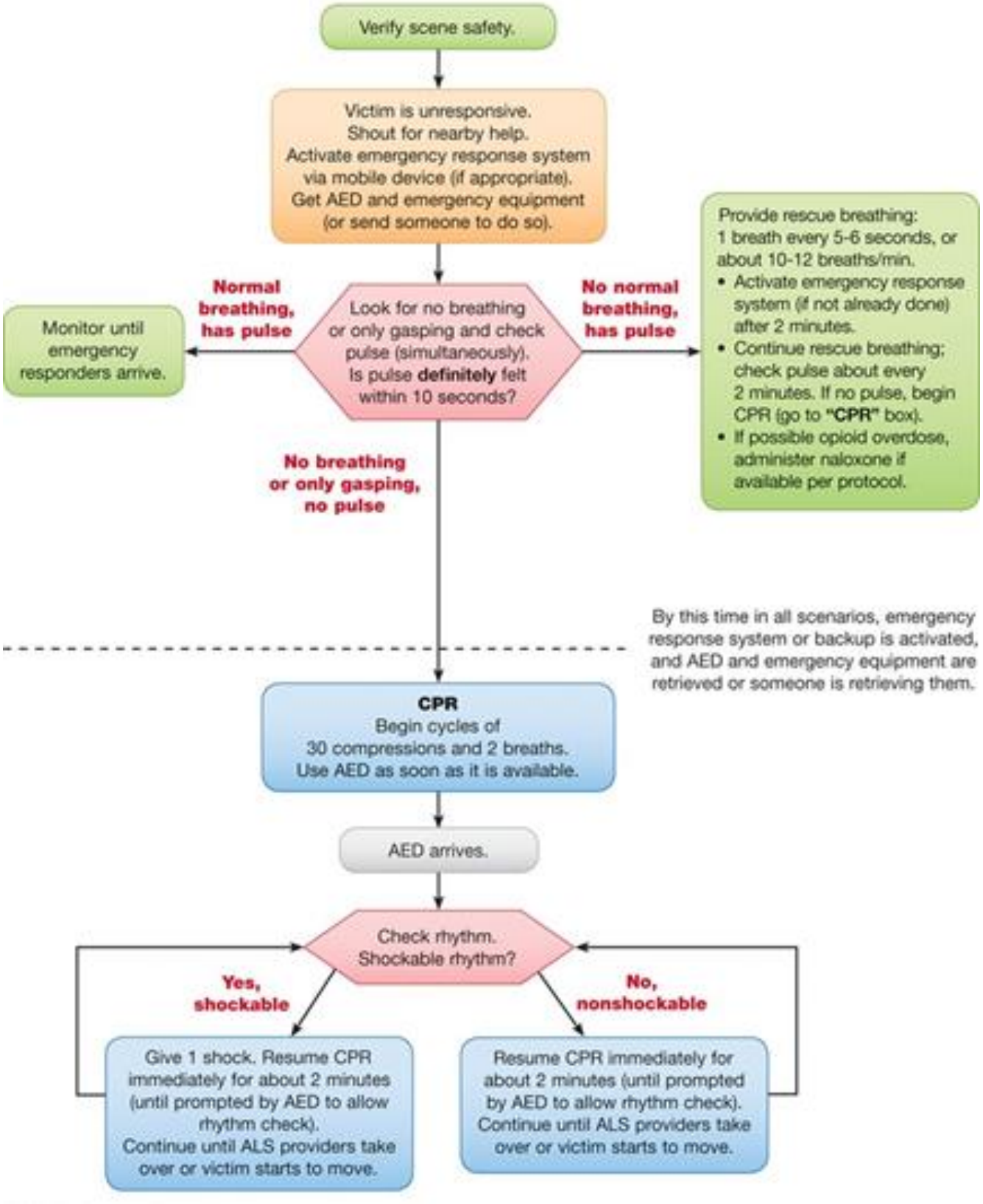
Sinus Tachycardia	SVT
Compatible history consistent with known cause	Compatible history (vague, nonspecific); history of abrupt rate changes
P waves present / normal	P waves absent / abnormal
Variable R-R; constant PR	HR not variable
Infants: rate usually < 220bpm	Infants: rate usually > 220 bpm
Children: rate usually < 180bpm	Children: rate usually > 180 bpm

4. For symptomatic SVT, attempt vagal stimulation first unless the patient is very unstable and if it does not unduly delay chemical or electrical cardioversion. In infants and young children, apply ice to the face without occluding the airway. In older children, Valsalva maneuvers are safe.

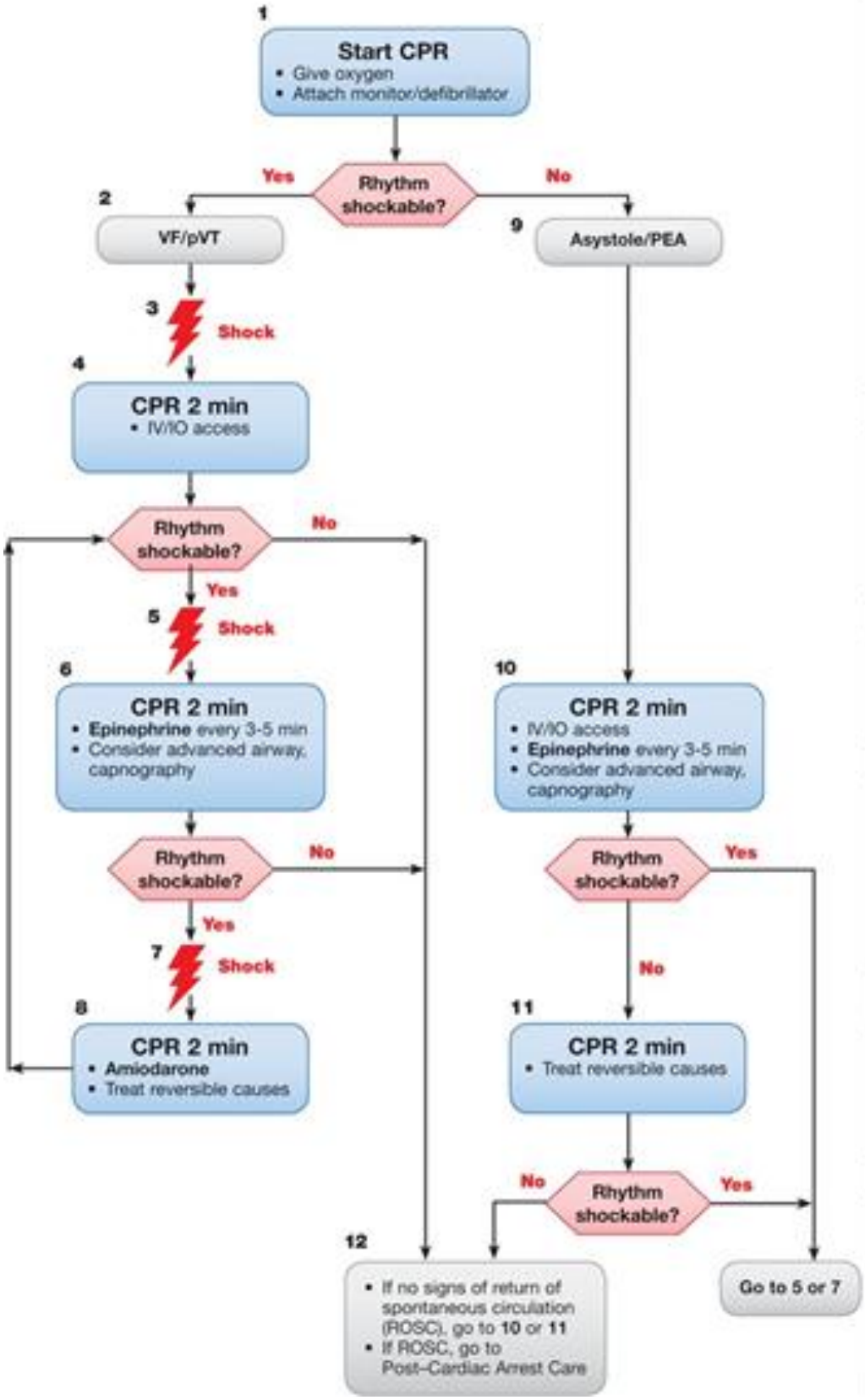
TAB 2 GUIDELINE 17

2015 AHA GUIDELINES

ADULT BASIC LIFE SUPPORT



ADULT ADVANCED CARDIAC LIFE SUPPORT



CPR Quality

- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
  - If P_{ETCO_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.

Shock Energy for Defibrillation

- **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
- **Amiodarone IV/IO dose:** First dose: 300 mg bolus. Second dose: 150 mg.

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 seconds (10 breaths/min) with continuous chest compressions

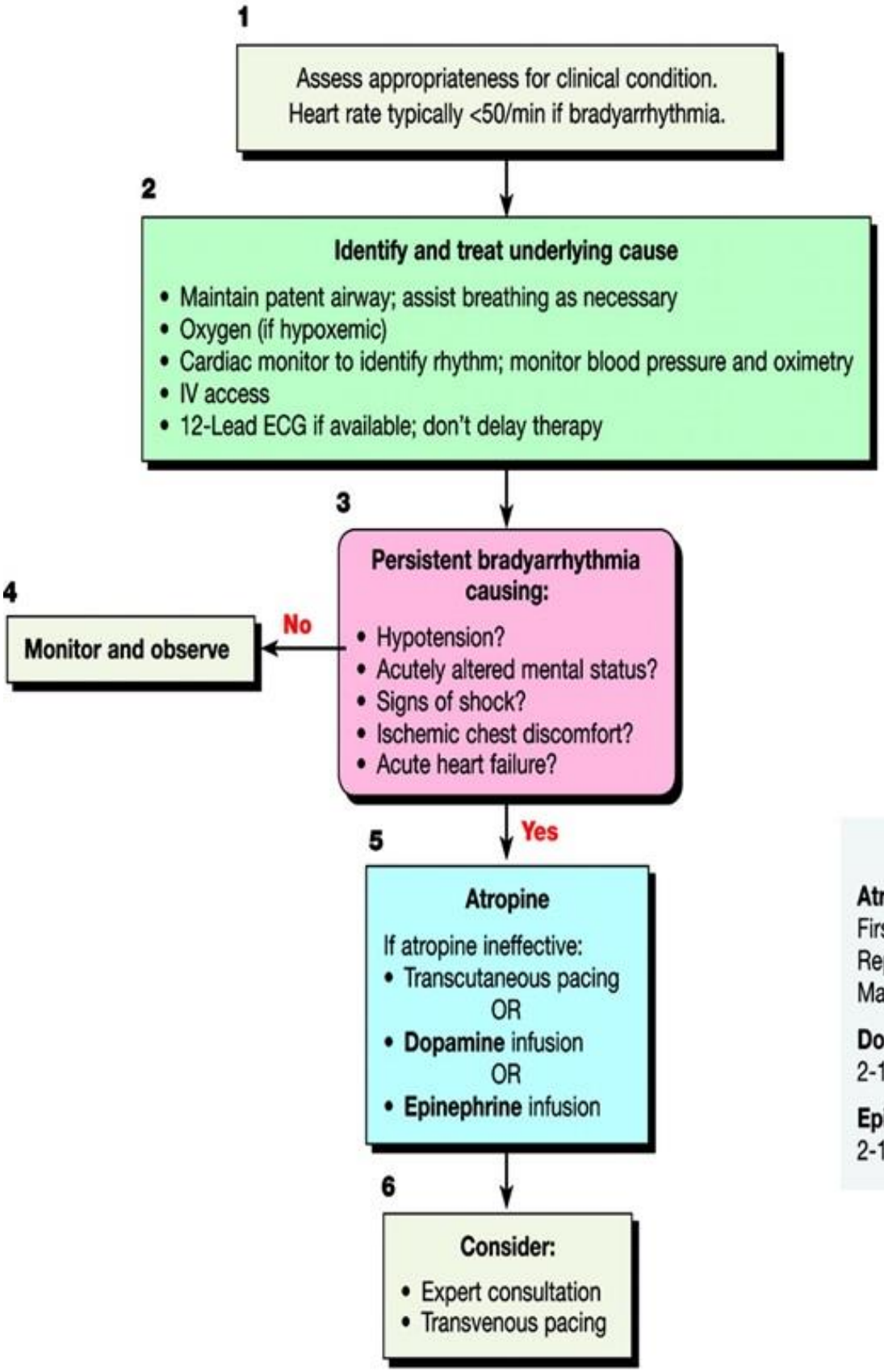
Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in P_{ETCO_2} (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

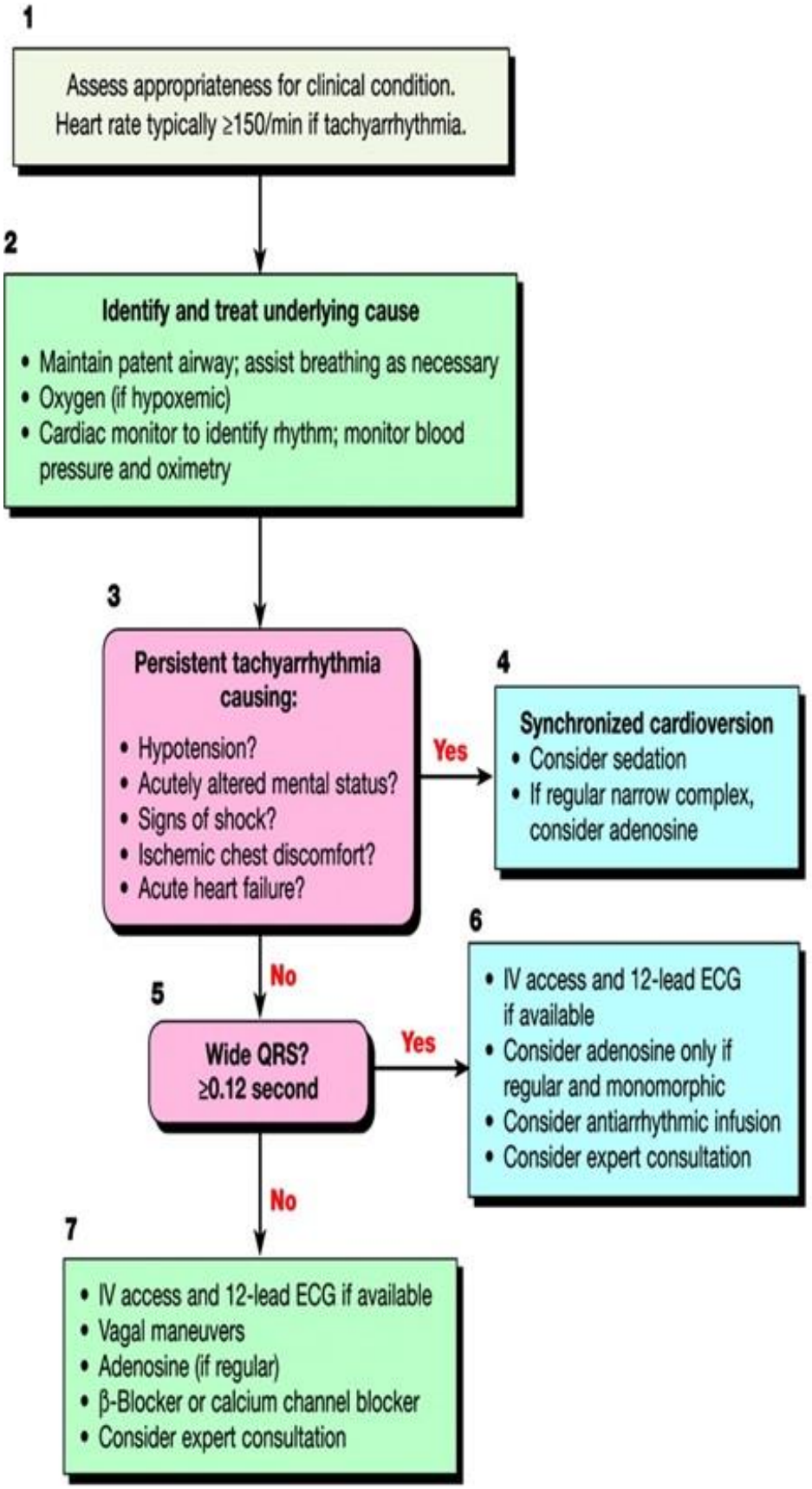
Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

ADULT BRADYCARDIA WITH PULSE



ADULT TACHYCARDIA WITH PULSE



Doses/Details

Synchronized Cardioversion
Initial recommended doses:
- Narrow regular: 50-100 J
- Narrow irregular: 120-200 J biphasic or 200 J monophasic
- Wide regular: 100 J
- Wide irregular: defibrillation dose (NOT synchronized)

Adenosine IV Dose:
First dose: 6 mg rapid IV push; follow with NS flush.
Second dose: 12 mg if required.

Antiarrhythmic Infusions for Stable Wide-QRS Tachycardia

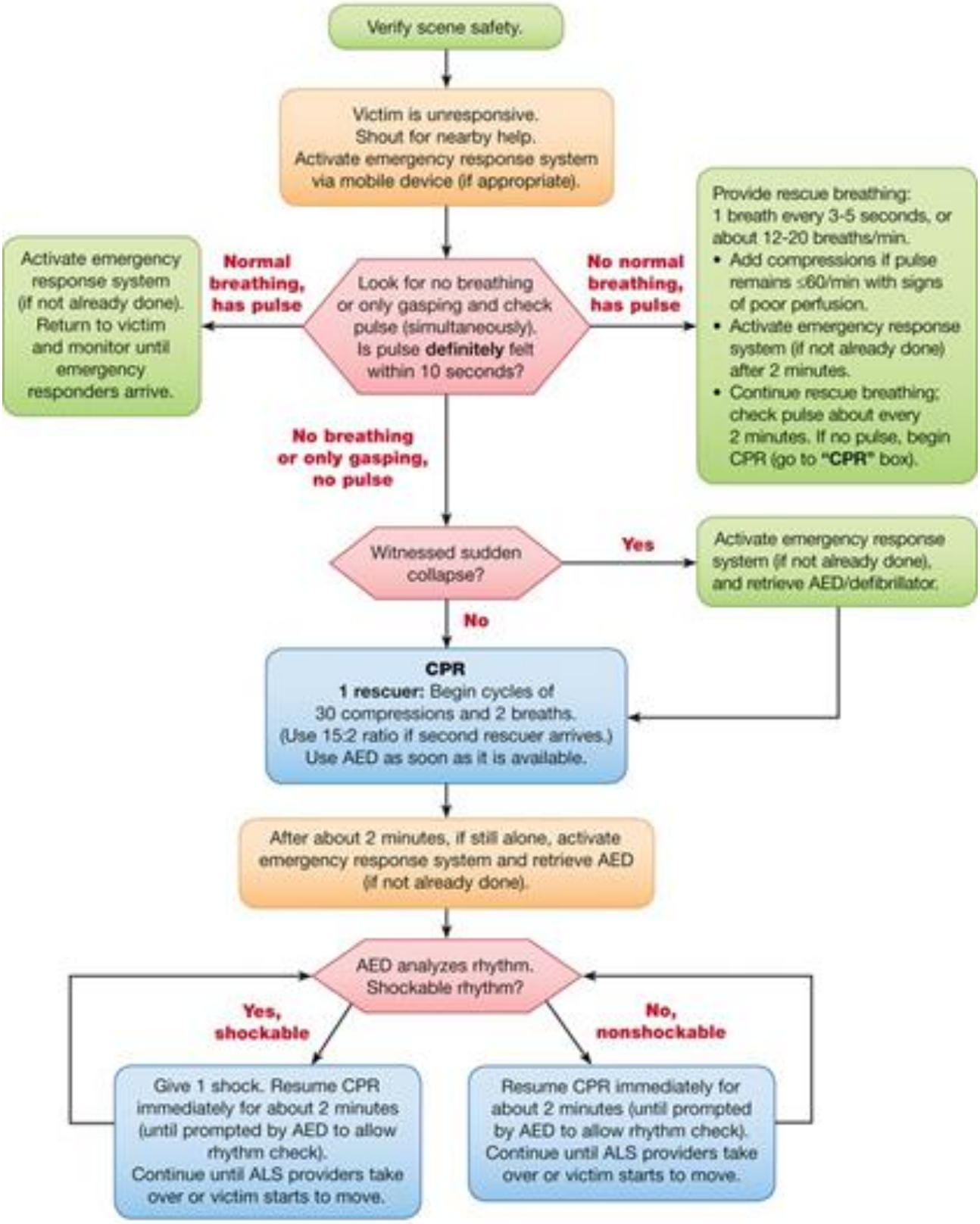
Procainamide IV Dose:
20-50 mg/min until arrhythmia suppressed, hypotension ensues, QRS duration increases >50%, or maximum dose 17 mg/kg given.
Maintenance infusion: 1-4 mg/min.
Avoid if prolonged QT or CHF.

Amiodarone IV Dose:
First dose: 150 mg over 10 minutes.
Repeat as needed if VT recurs.
Follow by maintenance infusion of 1 mg/min for first 6 hours.

Sotalol IV Dose:
100 mg (1.5 mg/kg) over 5 minutes.
Avoid if prolonged QT.

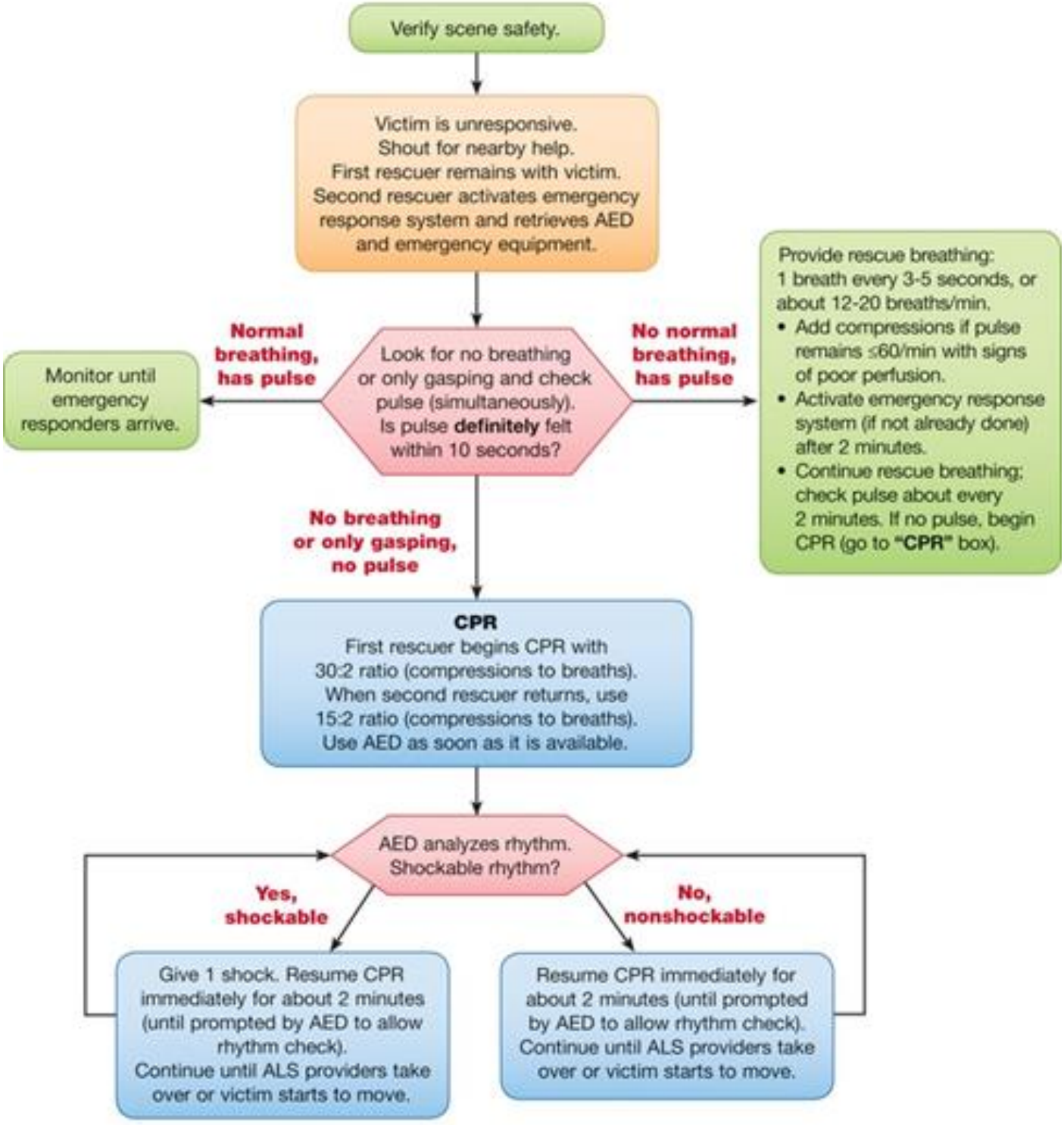
PEDIATRIC BASIC LIFE SUPPORT

SINGLE RESCUER

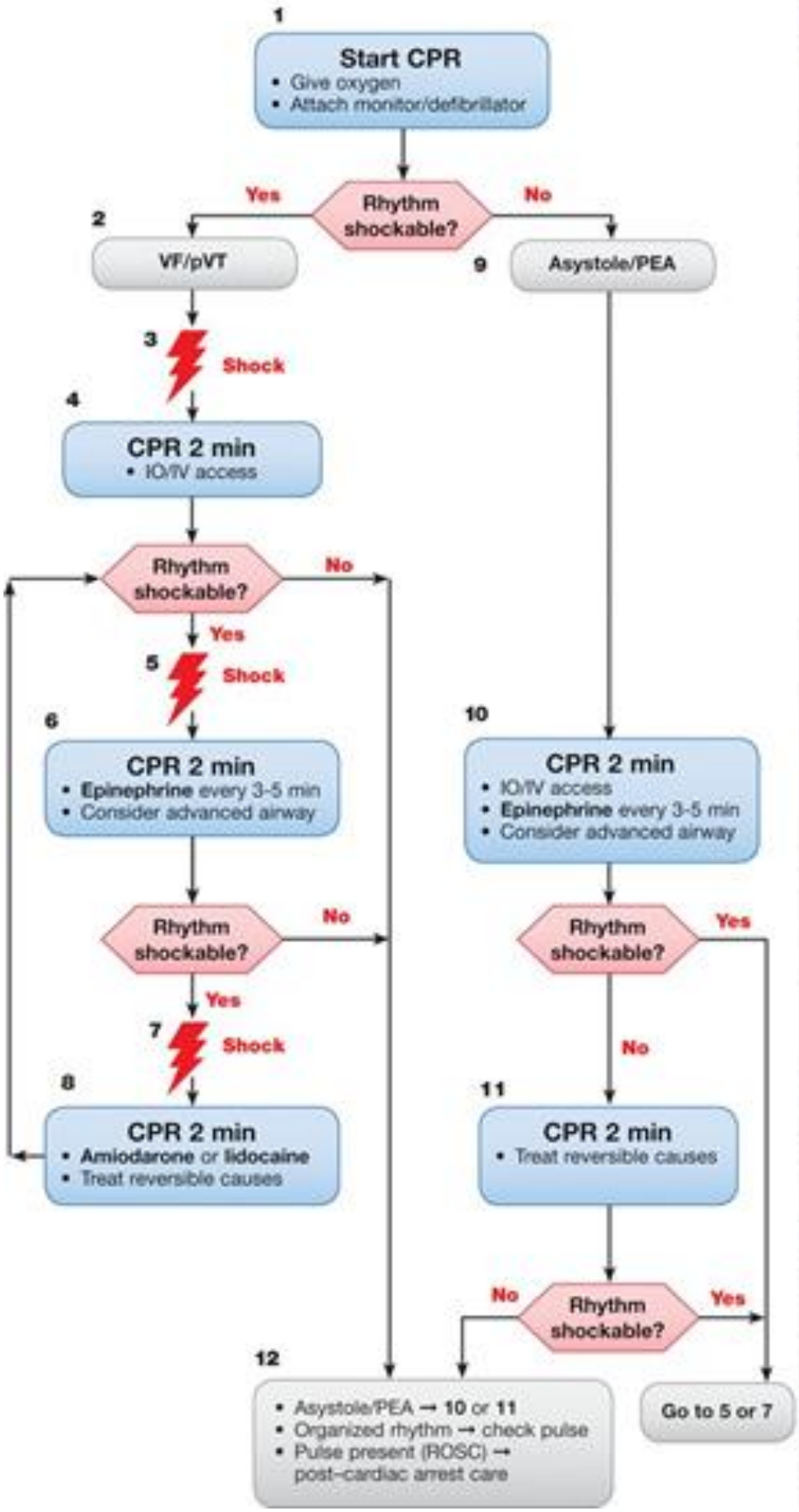


PEDIATRIC BASIC LIFE SUPPORT

2 OR MORE RESCUERS



PEDIATRIC ADVANCED CARDIAC LIFE SUPPORT



CPR Quality

- Push hard (≥⅓ of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 15:2 compression-ventilation ratio.

Shock Energy for Defibrillation

First shock 2 J/kg, second shock 4 J/kg, subsequent shocks ≥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.
- **Lidocaine IO/IV dose:** Initial: 1 mg/kg loading dose. Maintenance: 20-50 mcg/kg per minute infusion (repeat bolus dose if infusion initiated >15 minutes after initial bolus therapy).

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 seconds (10 breaths/min) with continuous chest compressions

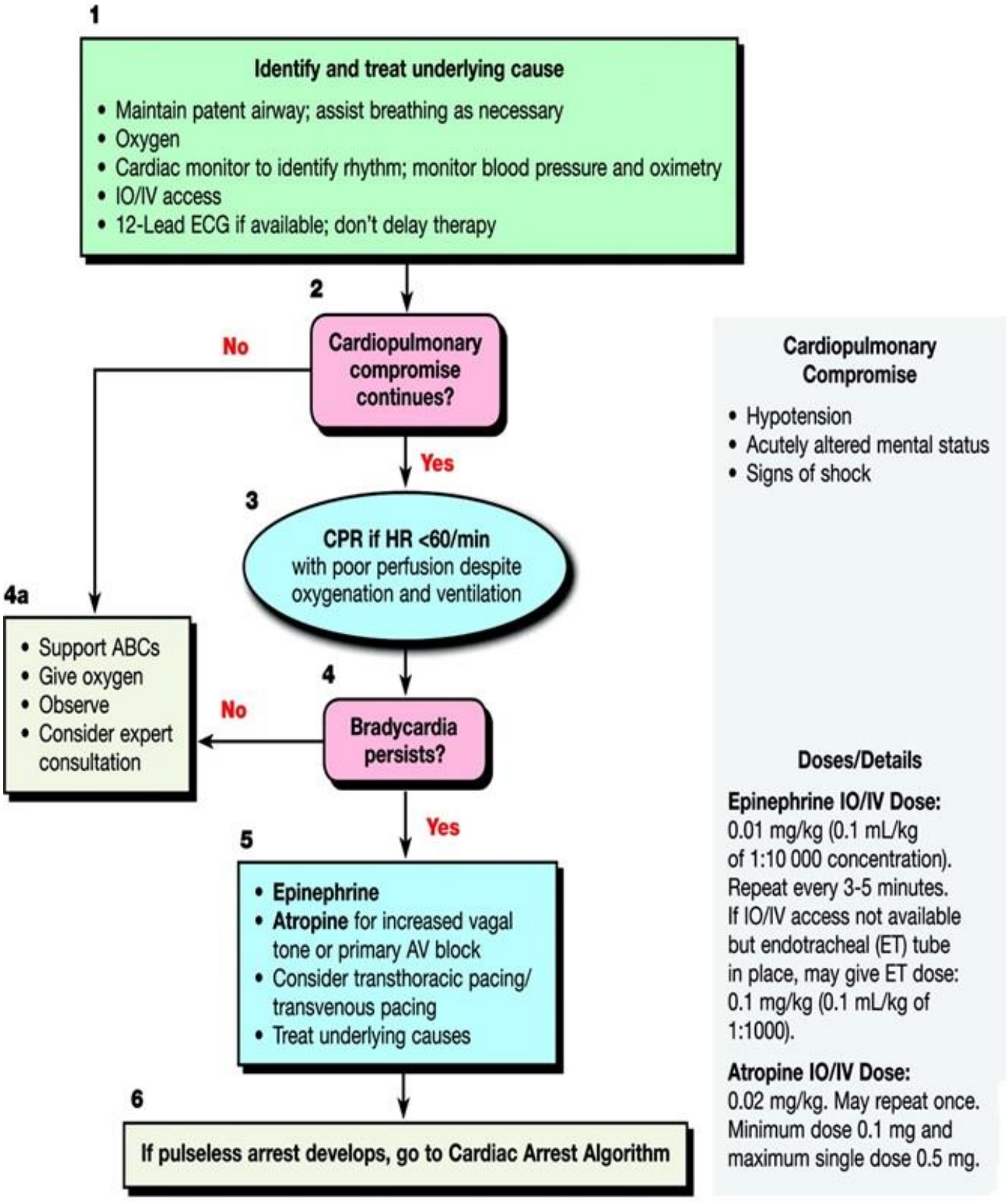
Return of Spontaneous Circulation (ROSC)

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

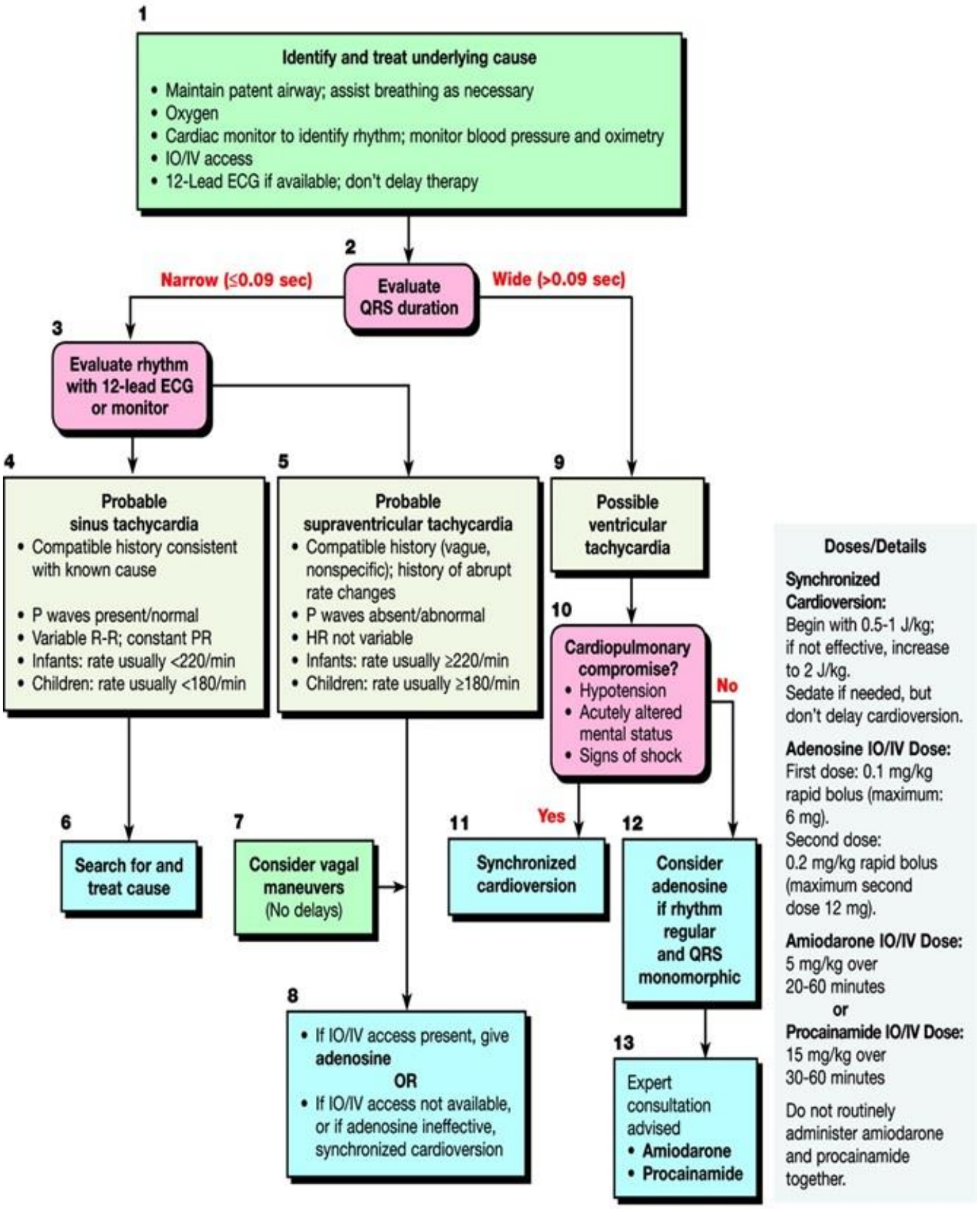
Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypoglycemia
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

PEDIATRIC BRADYCARDIA WITH PULSE AND POOR PERFUSION



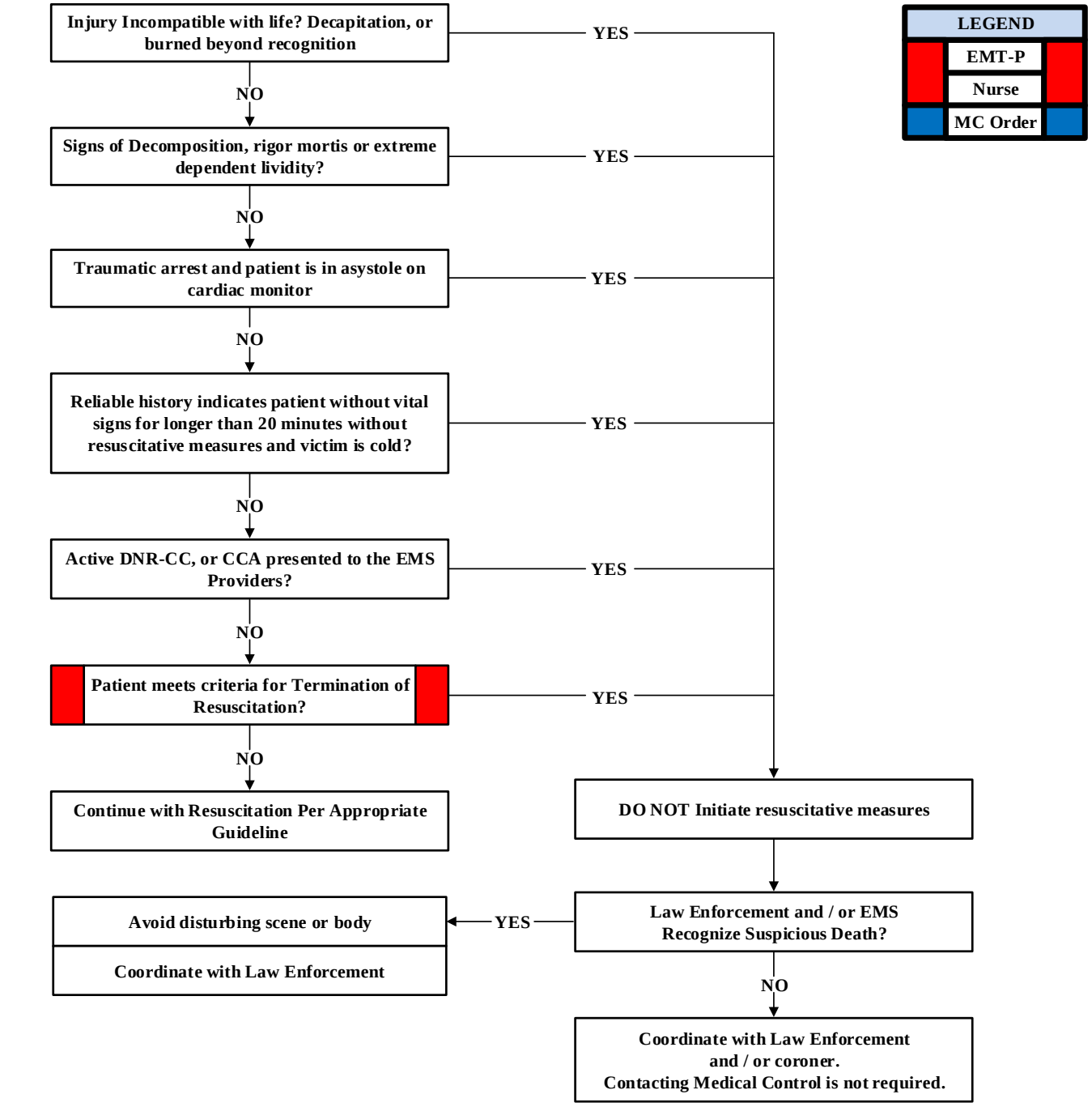
PEDIATRIC TACHYCARDIA WITH PULSE AND POOR PERFUSION



TAB 5 GUIDELINE 18

DEAD ON ARRIVAL (DOA) GUIDELINE

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• Known medical conditions • Last time known to be alive • Patient encountered by EMS who meet criteria for obvious death • Patient with DNR order in place who is pulseless and apneic • Patient for whom resuscitation efforts are ceased on-scene	• Apnic / pulseless • Signs of decomposition • Decapitated • Burned beyond recognition • Rigor mortis • Dependent lividity	• Death of apparent medical causes • Suspicious death (law enforcement)



TAB 2 GUIDELINE 19

TERMINATION OF RESUSCITATION (TOR)

1. All decisions to withhold or terminate CPR and resuscitation efforts should be sufficiently documented and readily supported by this guideline.
2. Criteria:
    a. For patient's meeting **Do Not Resuscitate** criteria refer to DNR Guideline.
        i. Whenever resuscitative measures are instituted, they must be continued until an appropriate DNR Form is verified.
    b. For patient with obvious death refer to DOA guideline.
    c. Blunt traumatic arrest and the patient is in **ASYSTOLE** on the monitor, resuscitative measures can be immediately terminated.
    d. All EMS personnel involved in the patient's care agree that discontinuation of the resuscitation is appropriate.
    e. **Requirements to be meet for termination of resuscitative efforts:**
        i. If a reliable history indicates that the patient has been without vital signs for longer than 20 minutes without any resuscitative measures being instituted.
        ii. Non-hypothermic.
            1. Any victim, who appears dead but is hypothermic from environmental cold, should be provided with resuscitative measures immediately via the Cardiac Arrest – Hypothermic Guideline.
        iii. ECG of Asystole is confirmed and documented in two (2) leads, ventricular standstill or pulseless idioventricular rhythm with a rate < 10 beats per minute; or AED does not advise "shock".
            1. ECG confirmation of death is not required for:
                a. Injuries incompatible with life.
                b. Victim exhibits signs of decomposition, rigor mortis or extreme dependent lividity.
        iv. If resuscitative measures were initiated, then cardiac arrest guidelines have been followed for at least 20 minutes, including adequate CPR, successful intubation or advanced alternative airway with End-Tidal CO_2 levels < 10 mmHg after 20 minutes of resuscitation or a falling $EtCO_2$ sustained below 20 mmHg after 20 minutes of resuscitation., IV / IO access with appropriate pharmacologic therapy

(if applicable), and there has been no return of a perfusing cardiac rhythm at any time.

v. Appropriate emotional support by family, neighbors, clergy or police is available at the scene if the family is present.

3. For patients who have had CPR initiated prior to the squad arrival, and the EMS Provider determines the patient meets the criteria set forth by the DOA Policy CPR may be stopped.
    a. If, while obtaining a reliable history, the patient indeed does meet the criteria for DOA, all life support measures may be stopped with permission from on-line MEDICAL CONTROL.
    b. Avoid disturbing a potential crime scene unless it is necessary to do so to effect patient resuscitative efforts.
4. If the EMS Provider is unsure if the patient meets the exact criteria set forth by the DOA policy then on-line MEDICAL CONTROL should be contacted and the case discussed. CPR should be continued during this time period.
5. For patients who have had CPR initiated prior to the squad arrival and it is determined that the patient has a DNR Comfort Care or DNR Comfort Care / Comfort Care Arrest order in place, CPR will be discontinued .
6. **In any case where doubt exists, clear documentation cannot be distinguished, or EMS feels that discontinuation of efforts at the scene would not be appropriate, the patient is to receive full resuscitative efforts and transported to the closest available hospital.**

TAB 2 GUIDELINE 20

DNR COMFORT CARE GUIDELINE

1. The State of Ohio has enacted legislation (2133.21 to 2133.26) that provides guidelines to manage the class of patients designated as Do Not Resuscitate or DNR. Prehospital EMS Providers are protected under Ohio's law from the following, resulting from withholding or withdrawal of CPR after a DNR Comfort Care is discovered, and after reasonable efforts have been made to determine that the DNR applies to their patient:
    a. Criminal prosecution.
    b. Professional disciplinary action.
    c. Liability damages in a tort or other civil action.
2. Patients with DNR forms from other states will be followed as such from that state while the patient is in care of Mercy Health Life Flight / Mobile Life / Mobile Stroke Unit providers.
3. There are two (2) official types of DNR orders:
    a. DNR Comfort Care.
        i. DNR Comfort Care guidelines are activated immediately when DNR order is issued or when an appropriate living will specifies no CPR.
        ii. Comfort care means a dying person receives care that eases the pain and suffering during the final days or hours of life, but no resuscitative measures to sustain life will be implemented.
        iii. DNR Comfort Care does **NOT** mean, "Do Not Treat".
        iv. For patients that have a valid DNR Comfort Care order:

YOU WILL	YOU WILL NOT
• Suction the airway • Administer oxygen • Place in position of comfort • Splint or immobilize • Control bleeding • Provide pain medication • Provide emotional support • Contact other appropriate health care providers such as Hospice, Home health care, attending physician / Nurse Practitioner	• Administer chest compressions • Insert an artificial airway • Administer resuscitative drugs • Defibrillate or cardiovert • Provide respiratory assistance (other than that listed above) • Initiate resuscitative IV (this does not include an IV for providing pain medications) • Initiate cardiac monitoring

v. For those patients where any of the **will not** measures have been initiated prior to confirmation of the DNR Comfort Care status, discontinue these actions upon DNR Comfort Care confirmation.

b. DNR Comfort Care – Arrest.

i. Unlike DNR Comfort Care, which is effective at the time the order is written, DNR Comfort Care – Arrest is activated only when a patient experiences a cardiac or respiratory arrest.

ii. "Cardiac Arrest" means the absence of a palpable pulse and / or absence of spontaneous respirations and / or presence of agonal breathing.

iii. DNR Comfort Care – Arrest allows for interventions to forestall cardiac and / or respiratory arrest. Interventions to forestall cardiac arrest include:

1. Insert oral / nasal airway.
2. Administer resuscitative drugs.
3. Initiate resuscitative IV.
4. Initiate cardiac monitoring.

4. Identification of status.

a. The following page shows the types of identification being used in Ohio for the DNR Comfort Care Policy.

b. EMS workers are not required to search a person to see if they have DNR identification. If an EMS or other health care worker discovers one of these items in the possession of the patient, the worker must make reasonable effort to establish identity of the patient, in appropriate circumstances. Examples of ways to verify identity include:

i. The patient, family member, caregiver or friend gives the patients name.

ii. The health care worker knows the patient personally.

iii. Institution identification band.

iv. Driver's license, passport or other picture ID.

5. Interaction with patient, family and bystanders.

a. The patient always may request resuscitation even if he or she is a DNR Comfort Care patient and this guideline has been activated. The request for resuscitation amounts to a revocation of the DNR Comfort Care status.

b. If family or bystanders request or demand resuscitation for a person for whom the DNR Comfort Care Guideline has been activated, **DO NOT** proceed with resuscitation. Provide

comfort measures as outlined above and try to help the family understand the dying process and the patient's choice not to be resuscitated.

6. Documentation.
    a. If the EMS provider implements the DNR Comfort Care Guideline, the following shall be documented.
        i. The item that identified the patient as DNR Comfort Care.
        ii. The method of verifying the patient's identity, if any was found through reasonable efforts.
        iii. Whether the patient was a DNR Comfort Care or DNR Comfort Care – Arrest patient.
        iv. The actions taken to implement the DNR guideline.
7. The DNR law does not govern all DNR orders; it applies only to DNR orders, which specific the Comfort Care Guideline. Physicians, CNS or CNP may write DNR orders which use a different guideline and which may better meet the patient's needs.

3701-62-04 APPENDIX A

DNR IDENTIFICATION FORM

(Check only one box)

☐ **DNRCC** (If this box is checked the DNR Comfort Care Protocol is activated immediately.)

☐ **DNRCC-Arrest** (If this box is checked, the DNR Comfot Care Protocol is implemented in the event of a cardiac arrest or a respiratory arrest.)

Patient Name:		
Address:		
City:	State:	Zip:
Birthdate:	Gender: ☐ M ☐ F	
Signature: (optional)		

Certification of DNR Comfort Care Status (to be completed by the physician)*

(Check only one box)

☐ **Do-Not-Resuscitate Order**—My signature below constitutes and confirms a formal order to emergency medical services and other health care personnel that the person identified above is to be treated under the State of Ohio DNR Protocol. I affirm that this order is not contrary to reasonable medical standards or, to the best of my knowledge, contrary to the wishes of the person or of another person who is lawfully authorized to make informed medical decisions on the person's behalf. I also affirm that I have documented the grounds for this order in the person's medical record.

☐ **Living Will (Declaration) and Qualifying Condition**—The person identified above has a valid Ohio Living Will (declaration) and has been certified by two physicians in accordance with Ohio law as being terminal or in a permanent unconscious state, or both.

Printed name of physician*:	
Signature:	Date:
Address:	Phone:
City/State:	Zip:

*A DNR order may be issued by a certified nurse practitioner, clinical nurse specialist, or a physician assistant when authorized by section 2133.211 of the Ohio Revised Code.

See reverse side for DNR Protocol

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3701-62-04

DO NOT RESUSCITATE COMFORT CARE PROTOCOL

After the State of Ohio DNR Protocol has been activated for a specific DNR Comfort Care patient, the Protocol specifies that emergency medical services and other health care workers are to do the following:

WILL:

- Suction the airway
- Administer oxygen
- Position for comfort
- Splint or immobilize
- Control bleeding
- Provide pain medication
- Provide emotional support
- Contact other appropriate health care providers, such as hospice, home health, attending physicians, CNPs, and CNSs

WILL NOT:

- Administer chest compressions
- Insert artificial air way
- Administer resuscitative drugs
- Defibrillate or cardiovert
- Provide respiratory assistance (other than that listed above)
- Initiate resuscitative IV
- Initiate cardiac monitoring

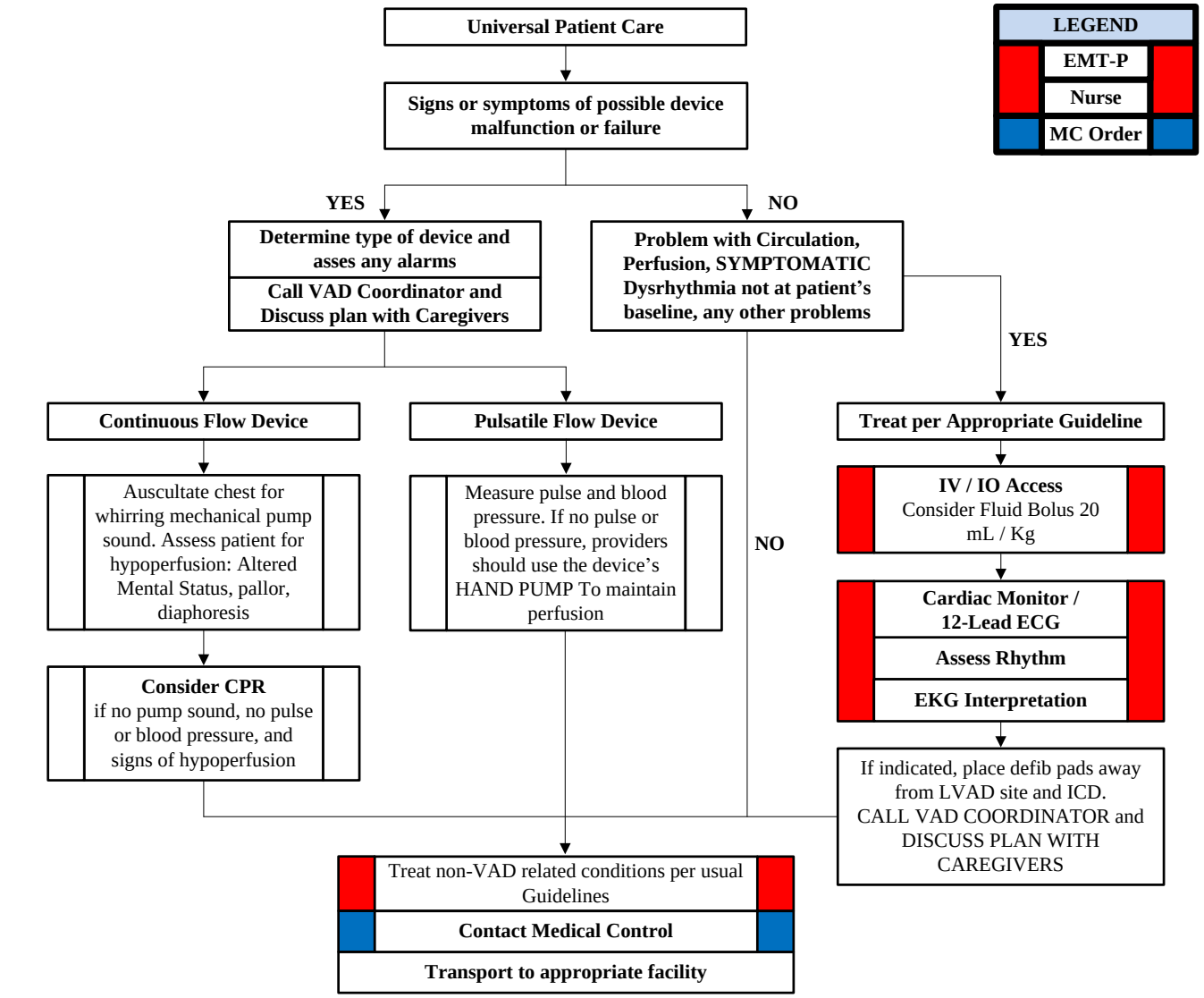
If you have responded to an emergency situation by initiating any of the WILL NOT actions prior to confirming that the DNR Comfort Care Protocol should be activated, discontinue them when you activate the Protocol. You may continue respiratory assistance, IV medications, etc., that have been part of the patient's ongoing course of treatment for an underlying disease.

If family or bystanders request or demand resuscitation for a person for whom the DNR Comfort Care Protocol has been activated, do not proceed with resuscitation. Provide comfort measures as outlined above and try to help the family members understand the dying process and the patient's choice not to be resuscitated.

TAB 2 GUIDELINE 21

LEFT VENTRICULAR ASSIST DEVICES (LVAD)

HISTORY	SIGNS / SYMPTOMS	DIFFERENTIAL
• End-Stage Heart Failure • Patient has surgically-implanted pump that assists the action of one or both ventricles • Patient may or may not be on a list for cardiac transplantation	• The flow through many of these devices is not pulsatile, therefore THE PATIENT MAY NOT HAVE A PULSE AT BASELINE. For this reason pulse oximetry readings may also be inaccurate • Altered Mental Status may be the only indicator of a problem • Consider both VAD-related and non-VAD-related problems	• Stroke • Cardiac Arrest • Dysrhythmia different from patient's baseline • Infection • Bleeding • Dehydration • Cardiac Tamponade • Device problem such as low battery or disconnected cable



1. **ALWAYS talk to family / caregivers as they have specific knowledge and skills. CALL THE VAD COORDINATOR EARLY as per patient / family instructions or as listed on the device. They are available 24 / 7 and should be an integral part of the treatment plan**
2. There are a growing number of patients in the area who have a LVAD system. The LVAD system is continuously augments the left ventricle with pumping of blood
    a. System Components:
        - System Controller
        - Power Base Unit (PBU) and cable
        - Batteries and battery clips
        - Emergency Power Pack (EPP)
        - System Monitor
        - Display Module

2. **Precautions / Warning Specific to EMS Assessment and Treatment**
    a. LVAD patients will pose a challenge in the approach to assessment and treatment. ALS transport is strongly encouraged for an ill patient even with normal LVAD function.
    b. Peripheral pulses may be absent with normal LVAD function and blood pressures may be unobtainable. Assessment must be based upon overall patient presentation including respiratory status, skin color and temperature, mentation and ECG findings.
        i. Patient may have VF / VT and be asymptomatic
        ii. In the event of cardiac arrest, external chest compressions pose a risk to the location of the outflow graft on the aorta and the inflow conduit in the left ventricular apex.
        iii. Patients who present in cardiac arrest with a functioning LVAD unit should **NOT** have CPR performed.
        iv. LVAD function can be assessed by placing a stethoscope over the device and listening for a whirling sound. All other standard therapies should be rendered as per guideline (i.e., airway control, defibrillation, medication administration).
    c. The LVAD System Controller has a number of “advisory” and “hazard” alarms that may have to be addressed for optimal LVAD function. Rely on the patient or family member’s familiar with the device to troubleshoot the operation. Patients and family members have been educated in the function of the LVAD device.
3. SPECIAL CONSIDERATIONS:
    a. Batteries and the emergency power pack can provide 24 – 36 hours of power
    b. Patients are frequently on three different anticoagulants and are prone to bleeding complications
    c. **Precautions / Warnings Specific to Patient or System Management**

i. The LVAD should NOT be disconnected during external defibrillation or cardioversion
ii. In the event that the LVAD stops operating, attempt to restore pump function immediately. In the event that the LVAD stops operating and blood is stagnant in the pump for more than a few minutes, there is a risk of stroke or thromboembolism should the device be restarted. There is also a risk for retrograde flow within the LVAD
iii. Disconnecting both System Controller power leads at the same time will result in loss of pump function. One System Controller power lead must be connected to a power source (i.e., batteries, PBU, or EPP) at all times to maintain support
iv. Avoid unnecessary pulling or moving of the external portion of the percutaneous lead, especially as the exit site is healing
v. The use of automated blood pressure monitoring devices may not yield accurate blood pressure data. Manual auscultation to assess blood pressure is recommended. In circumstances where the flow is not sufficient for auscultation, Doppler or invasive blood pressure monitoring may be required

4. Utilizing the emergency contact information supplied, EMS Providers are encouraged to contact the LVAD specialists for questions related to LVAD function, power management, alarms, device management or patient assessment and treatment