Acute Coronary Syndrome (ACS)

Acute Coronary Syndromes include unstable angina and ST elevated myocardial infarction (STEMI)

Routine Medical Care

12-lead EKG (ASAP)

Aspirin 160 - 325mg[1] PO (chewed)

Stable Angina	Unstable Angina	AMI (STEMI)
NTG 0.4 mg[2] SL repeat q 3 min PRN X 3 doses with SBP >100 and/or Apply 1 inch NTG paste TD	**NTG** 0.4 mg[2] SL repeat q 3 min PRN X 3 doses with SBP >100 and/or Apply 1 inch NTG paste TD	**NTG** 0.4 mg[2] SL repeat q 3 min PRN X 3 doses with SBP >100 and/or Apply 1 inch NTG paste TD
	Chest Pain not relieved & SBP ≥ 100mm/Hg	Chest Pain not relieved & SBP ≥ 100mm/Hg
	Morphine Sulfate 2-4mg IV / IO q 2min. PRN to MAX of 10mg **OR** **Fentanyl** 25-50mcg IV/IN/IM q 2min. PRN to MAX of 200mcg	**Morphine Sulfate** 2-4mg IV / IO q 2min. PRN to MAX of 10mg **OR** **Fentanyl** 25-50mcg IV/IN/IM q 2min. PRN to MAX of 200mcg

Consider **Zofran** 4mg IV PRN for nausea/vomiting with active chest pain

<u>Stable Angina</u>
- can be controlled by NTG & lifestyle modification
- pain at rest is unusual
- precipitating factors are usually known and predictable
- relieved by rest or NTG

<u>Unstable Angina</u> (considered an ACS)
- pain at rest
- pain does not follow a pattern or the usual pain pattern worsens
- usually not relieved by rest or medication
- highly suggestive of impairment to vasculature and/or myocardium

Notifying the receiving ED as early as possible should take high priority when infarct is suspected. Transport to a hospital with cardiac catheterization capabilities.

[1] Aspirin (ASA) is contraindicated in pts with current or recent GI bleeding & known ASA allergic reactions . ASA is relatively contraindicated in patients with history of asthma and Medical Control is to be contacted prior to administration.

[2] **Nitroglycerin** (NTG) is contraindicated in patients who have taken Viagra or Levitra within the past 24 hours (Cialis in the past 48 hours). **NTG** SL tablets and **NTG** SL spray may be used interchangeably.

•Age and cardiac risk factors (defined in the *Protocol Preambles*) are a <u>key evaluation tool</u> in this protocol. Major risk factors should be documented on the EMS Run Report.

•<u>If the administration of one NTG results in a substantial decrease in blood pressure, discontinue further NTG use</u>; this response may be indicative of an MI involving the right ventricle. This hypotension usually responds well to a fluid bolus (NS). A common finding associated with a right sided inferior MI is ST elevation in V4R with bradycardia.

•Treat life-threatening arrhythmias per the appropriate protocol before initiating this *ACS* protocol.

• Consider a right sided 12-lead EKG (V4R) for suspected Inferior STEMI (leads II, III, AvF).

•Ventricular ectopy typically does not require treatment unless the ectopic beats are greater than the number of regular (non ectopic) beats and / or a patient is hemodynamically unstable.

•Paramedics treating patients within this protocol should minimize on scene time to 15 minutes for STEMI.

ASYSTOLE / PEA

AHA ACLS 2015 updates places special attention on the value of chest compressions & minimizing interruptions to < 5 seconds. Manual chest compression rate = 100-120/minutes pausing only to verify cardiac rhythm & check pulses every 2 minutes. Mechanical chest compressions are per manufacturer's recommendations. Ventilations are withheld during the first 8 minutes unless otherwise indicated.

Confirm absence of pulse, apnea & no signs of life. Immediately begin effective chest compressions

↓

Attach Monitor without interrupting Chest Compressions; confirm Asystole / PEA

↓

Consider Carotid or Femoral Doppler to confirm absence of pulse

↓

- Establish IV/IO access ASAP without interrupting chest compressions
- **Epinephrine** 1mg IV/IO **ASAP** repeat q 3 - 5min

↓

Search & treat for possible contributing factors[3] Hs & Ts ☐

↓

< 5 sec pause q 2 min for rhythm / pulse check

↓

Only if acidosis is suspected (i.e. prolonged down time) **Sodium Bicarbonate** 1mEq/kg*

↓

After 4 cycles of chest compressions, begin ventilations (unless indicated earlier) at 1 per 6 – 8 sec / 8 -10 min

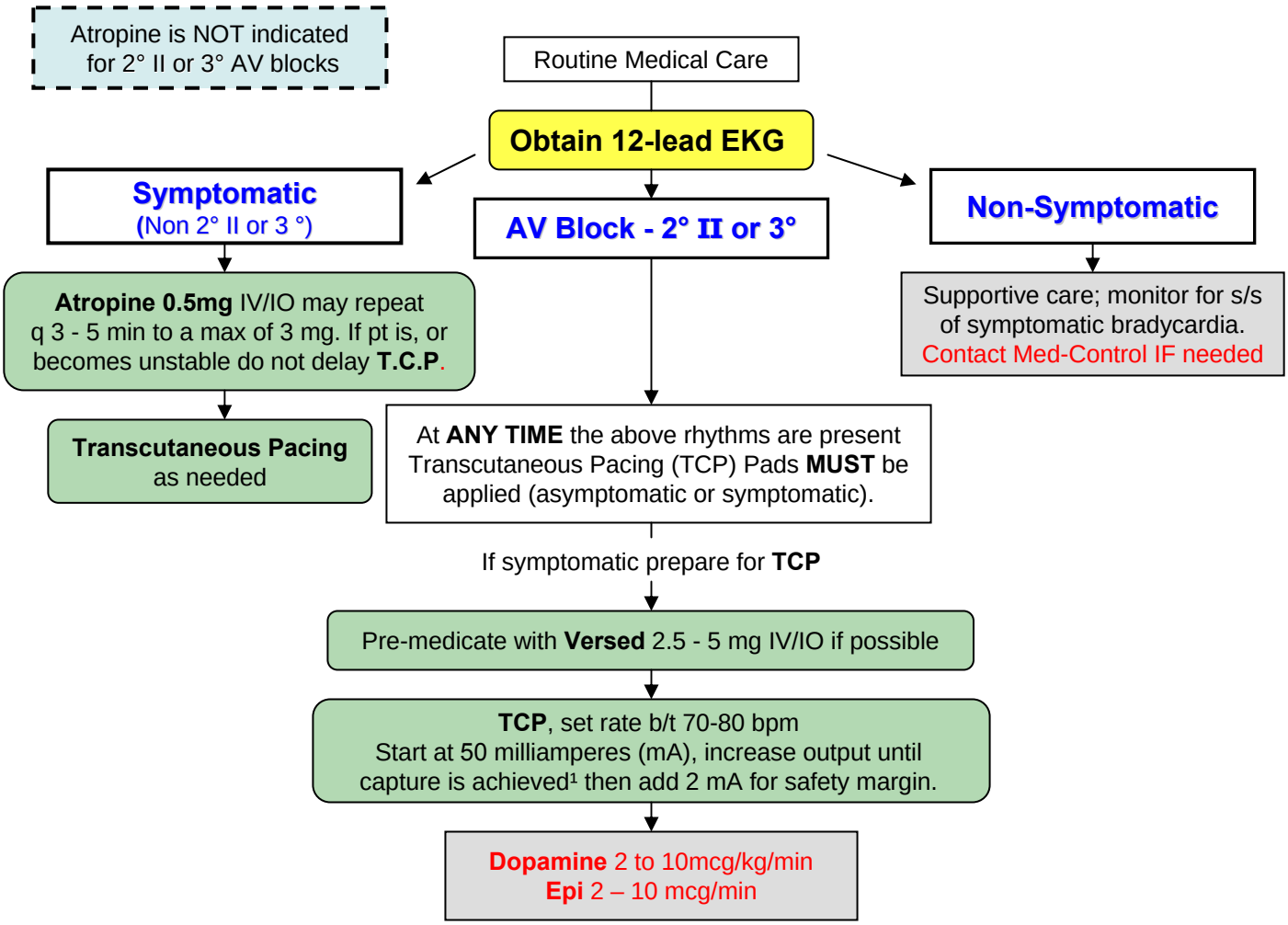
- **Effective chest compressions & Early defibrillation takes priority over ANY OTHER TREATMENT.**
- **Withhold ventilations during the first 4 cycles of chest compressions UNLESS indicated by nature of arrest (choking, peds, lung disease, etc)**
- **IV / IO access & First line medications (Early Epinephrine administration has priority over any advanced airway.**
- **ET without ventilations is a means of securing the airway if resources allow**
- **Pause for ≈ 5 sec q 2 min to verify EKG** & pulse check

[3]**Contributing Factors:**

- **Hypoglycemia – treat with Dextrose 50%**
- **Hyperkalemia – Calcium Chloride 8mg/kg for known hyperkalemia**
- **OD - of tricyclic antidepressants Sodium Bicarb and/or Narcan 2mg IV for narcotic OD**
- **Tension pneumothorax - Needle Decompression or Heimlich Valve Kit**
- **Hypothermia – avoid rigorous movement of patient; especially if patient regains pulse. Excessive movement could cause V-Fib or V-Tach. This is rare but when it occurs the VF/VT is almost always refractory.**
- **Hypovolemia – Fluid bolus**

*** With proper and effective CPR, acidosis, in the absence of prolonged down time, usually does not occur and therefore, Sodium Bicarbonate should not be needed.**

Bradycardia (Symptomatic)



Each patient will obviously present differently therefore, it is unrealistic to indicate when TCP is or is not needed. Paramedics should use their clinical judgment to make that decision; if in doubt call Medical Control.

[1] Widening of QRS and a broad T wave after each spike.

•Symptomatic bradycardia is defined as pulse < 60 beats per minute (bpm) with a SBP <100mm/Hg, SOB, altered mental status, and/or other signs of hypoperfusion. (Well conditioned athletes could have HR < 60 & SBP < 100 normally)

•Patients presenting with possible cardiac related chest pain and/or STEMI should NOT receive atropine, unless hemodynamically unstable, prior to consulting with Medical Control.

•Transplanted hearts will not respond to **Atropine**; **TCP** is the treatment of choice

• **TCP** is the treatment of choice for 2nd degree type II and 3rd degree AV heart blocks with serious S/S. Contact Medical Control if no serious S/S exist. Atropine is NOT indicated for AV blocks at this level.

SIGNS AND SYMTOMS:
Unresponsive, No Signs of Life, Apneic, Pulseless

Immediate Manual Chest Compressions at 120/Min x 2 Minutes
Without Ventilations unless indicated[1]
Mechanical Chest Compressions per Manufacturer's Recommendation

TEAM APPROACH
Team Leader Designates Assignments and Actions

Connect Patient to Defibrillator / AED While Continuing Chest Compressions

Rhythm Shockable?

YES

V-Fib / Pulseless V-Tach??

Defibrillate at Maximum Energy Level[3] &
Immediately Resume Effective Chest Compressions x 2 Minutes
Pause q 2 min for < 5 sec to determine pulse & rhythm

Early administration of Epinephrine 1:10,000 IV / IO

Anti-Arrhythmics should be attempted after the 2nd or 3rd Defibrillation (See V-Fib / Pulseless V-Tach Protocol)

IV / IO Access Without Interrupting Chest Compressions ASAP

Epi 1:10.000 q 3 – 5 minutes ASAP during the beginning of chest compressions cycles for optimum effectiveness

Secure an Airway without Ventilating (unless indicated) OPA, NRB & Provide High-Flow O2

After 4 Cycles of 2 minutes Chest Compressions, an Advanced Airway should be completed and the Appropriate Protocol continued

NO

Asystole / PEA

Effective Chest Compressions, Early administration of Epinephrine 1:10,000 IV / IO, and Focus on Treatment for Underlying Causes (Hs & Ts)

Pause q 2 min for < 5 sec to determine pulse & rhythm

Refer to Asystole / PEA Protocol

- **HISTORY:**
- Estimated down time; **Events leading to arrest,** DNR / Living Will, Underlying Causes, SAMPLE History, Crime Scene

Pearls:

- [1] Respiratory / Ventilatory management becomes a higher priority if indicated as cause for arrest (Choking, Pediatrics, COPD, etc.) otherwise an Oral Pharyngeal Airway with a NRB @ 15 LPM is appropriate. Also, endotracheal intubation connected to BVM & 100% O2 without ventilation is appropriate to secure an airway **without compromising chest compressions**
- [3] Regardless of defibrillator model, initial and subsequent joule settings will be at maximum energy
- High quality chest compressions with minimal interruptions have a greater impact on patient outcome than any intervention.
- Ventilations (when indicated) should be no more than 8 – 10 per minute. Avoid hyperventilation.

CHF / Pulmonary Edema

Recognition is Key

Medical History Indications

- Hx of CHF, MI, A-fib, renal failure
- Orthopnea (# of pillows under head to facilitate breathing)
- **P**aroxysmal **N**octurnal **D**yspnea
- Prior intubation
- Recent or increasing dyspnea upon exertion (DOE)
- Takes diuretic

Physical Exam Indications

- Dyspnea
- Hepatojugular Reflux[1]
- HTN
- JVD at 30° elevation
- Pitting edema
- Rales / Rhonchi (gurgles)
- Tachycardia

Routine Medical Care (including temperature)

Blood Pressure & Early **12 lead EKG** to assess for STEMI

Systolic BP > 100mm/Hg with pulmonary edema and/or R.R. ≥ 30

Early CPAP 5-10cm H2O for severe dyspnea related to acute pulmonary edema

- **Nitroglycerine** (NTG) 0.4mg SL, & may repeat q 5min as long as SBP >100mmHg,
  ALSO
- **NTG** paste 1in. TD may be used to supplement NTG SL per SBP >90mmHg

Systolic BP < 90 – 100mm/Hg

Dopamine Infusion 5 – 20 mcg/kg/min *or*
Norepinephrine 1 – 10 mcg/min

Contact Medical Control immediately after the starting the infusion. Because **CPAP** has the potential to further decrease blood pressure, contact Medical Control for the use of **CPAP**.

BVM's are NOT only for apneic patients! Positive Pressure Ventilation (PPV).

[1] Hepatojugular reflux indicates right sided heart failure. With the patient sitting at a 30° angle, palpate the abdomen over the liver lightly, if the jugular veins rise ≈ 4 cm = positive reflux.

- Consider **myocardial infarction** as a cause of pulmonary edema—transport to facility with cardiac catheterization lab.
- In the elderly and recently institutionalized patients consider pneumonia.
- Avoid NTG in patients that have taken Viagra or Levitra in the past 24 hours, or Cialis in the past 48 hours
- Consider the use of quantitative $ETCO_2$ as a diagnostic tool.

Resuscitation should not be attempted in the following situations **prior to contacting Medical Control:**

- Lividity
- Rigor mortis
- Body decomposition, decapitation, hemi-corpectomy or incineration
- Any reason to believe CPR is not indicated or desired, especially with known terminal illness.
- Presence of legal documents ("Advance Directives," "Living Wills," POLST (Physicians Orders for Life Sustaining Treatments) or "DNR") stating resuscitative efforts be withheld.

CRIME SCENE PRESERVATION

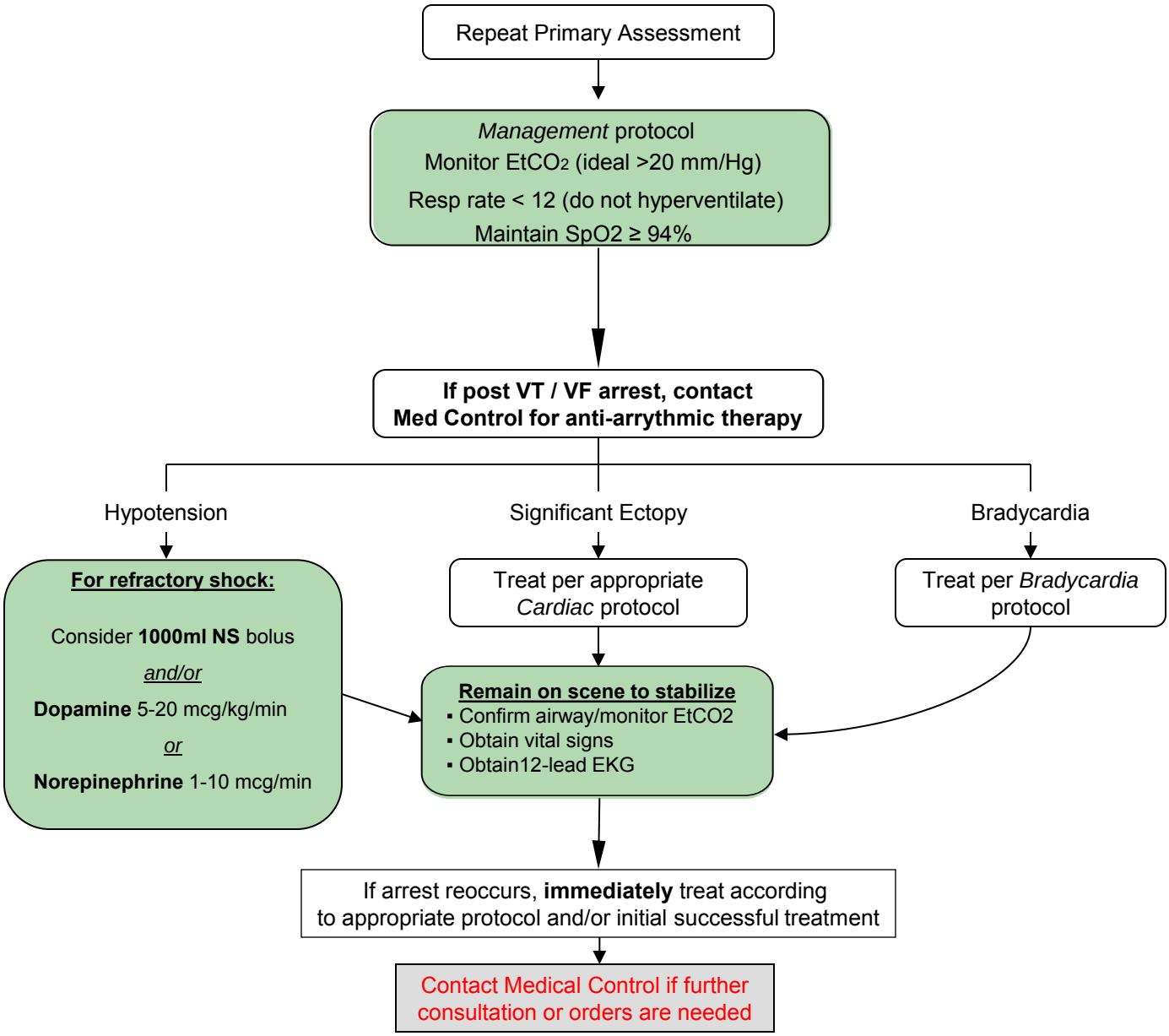
- EKG electrodes may be placed posteriorly or on limbs whenever necessary.
- Every effort possible should be made to preserve a crime scene

DOCUMENTATION

- Asystole EKG strip in <u>at least</u> two leads should be included in the EMS Run Report along with proper documentation.
- Document the scene findings including: medications, medical history, last time pt was spoken to, position found, skin temp, pupils, any trauma or deformity etc…

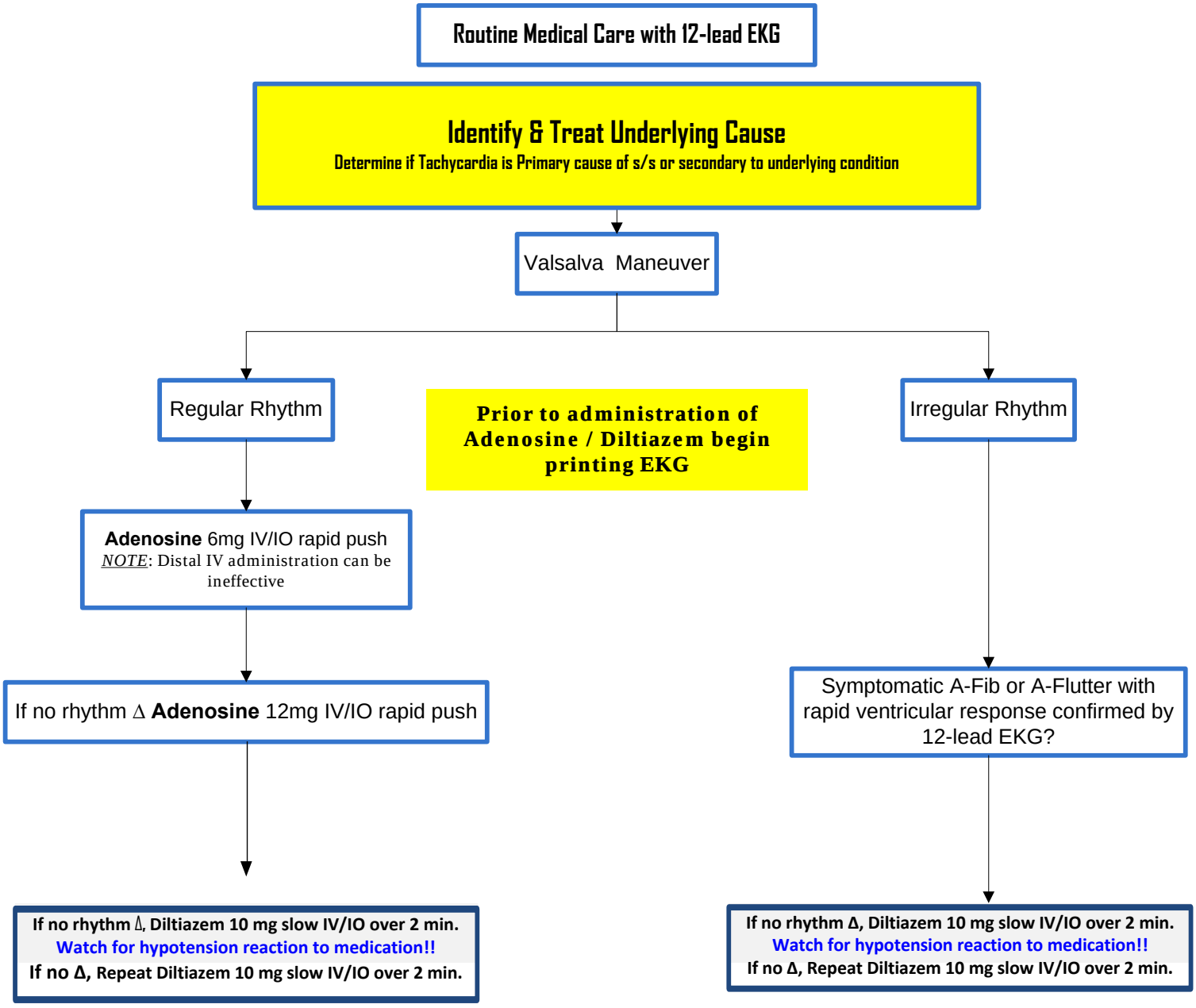
Contact Medical Control for DNAR & time of death

- If EMS arrives to find CPR in progress on a patient who is clearly deceased or a patient who meets the criteria listed above in the blue box, CPR can be stopped with orders from Medical Control.
- For traumatic DNAR, see the *Adult Traumatic Prehospital Termination of Resuscitation* Protocol.



- If upon successful electrical conversion of VF / VT prior to having administered an anti-arrhythmic, contact Medical Control before administering ~~150~~mg **Amiodarone** over 10 minutes.
- Titrate **Dopamine 5-20mcg/kg/min or Norepinephrine 1-10mcg/min** to MAP > 80 / SBP > 90 mm/Hg
- The condition of the post-resuscitation patients fluctuates rapidly, they require close monitoring and post ROSC care may be planned with online Medical Control
- Hyperventilation is a significant cause of hypotension by decreasing venous return to the heart in post-arrest patients; this must be avoided at all costs.

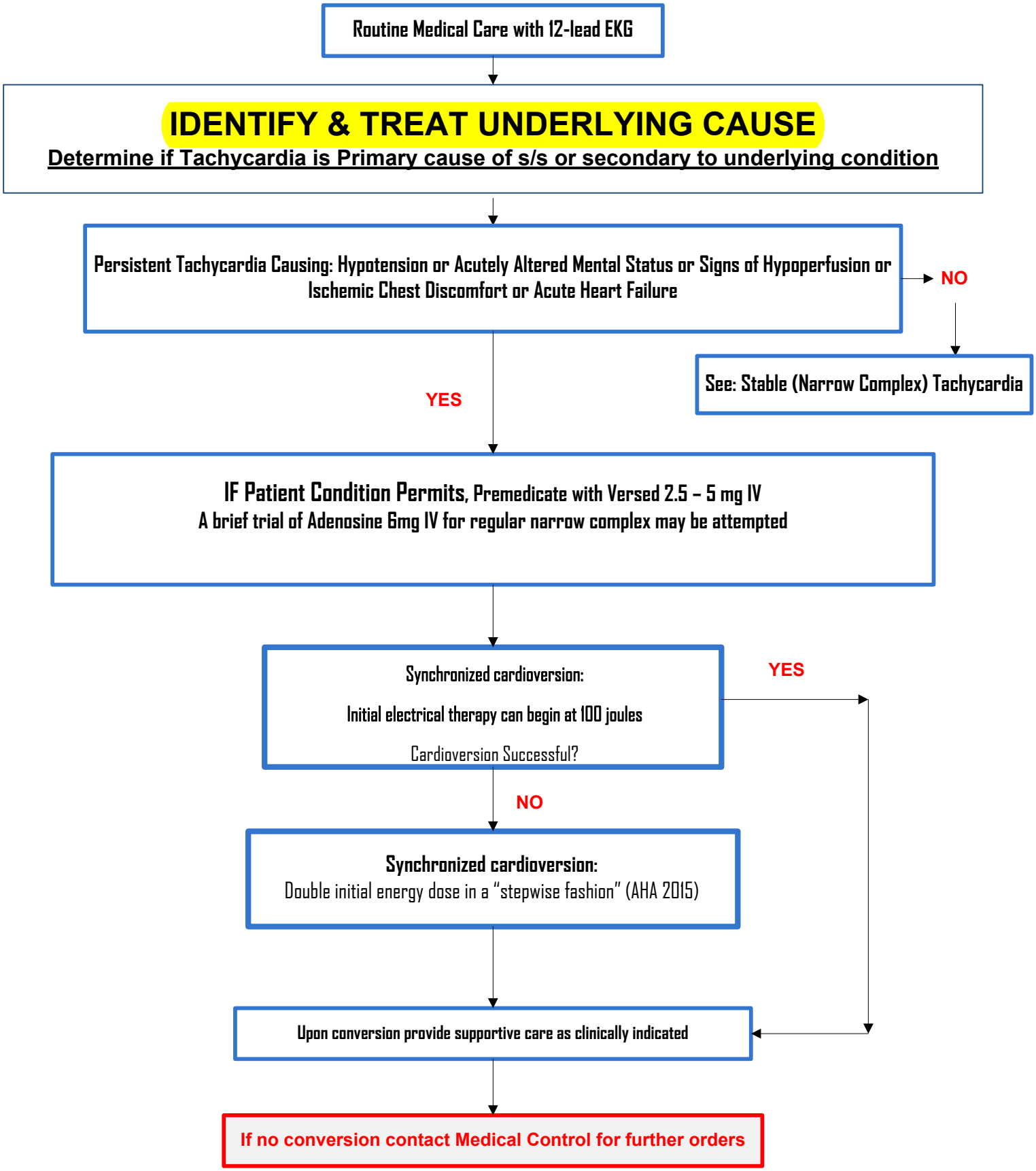
Stable Narrow Complex >150 bpm



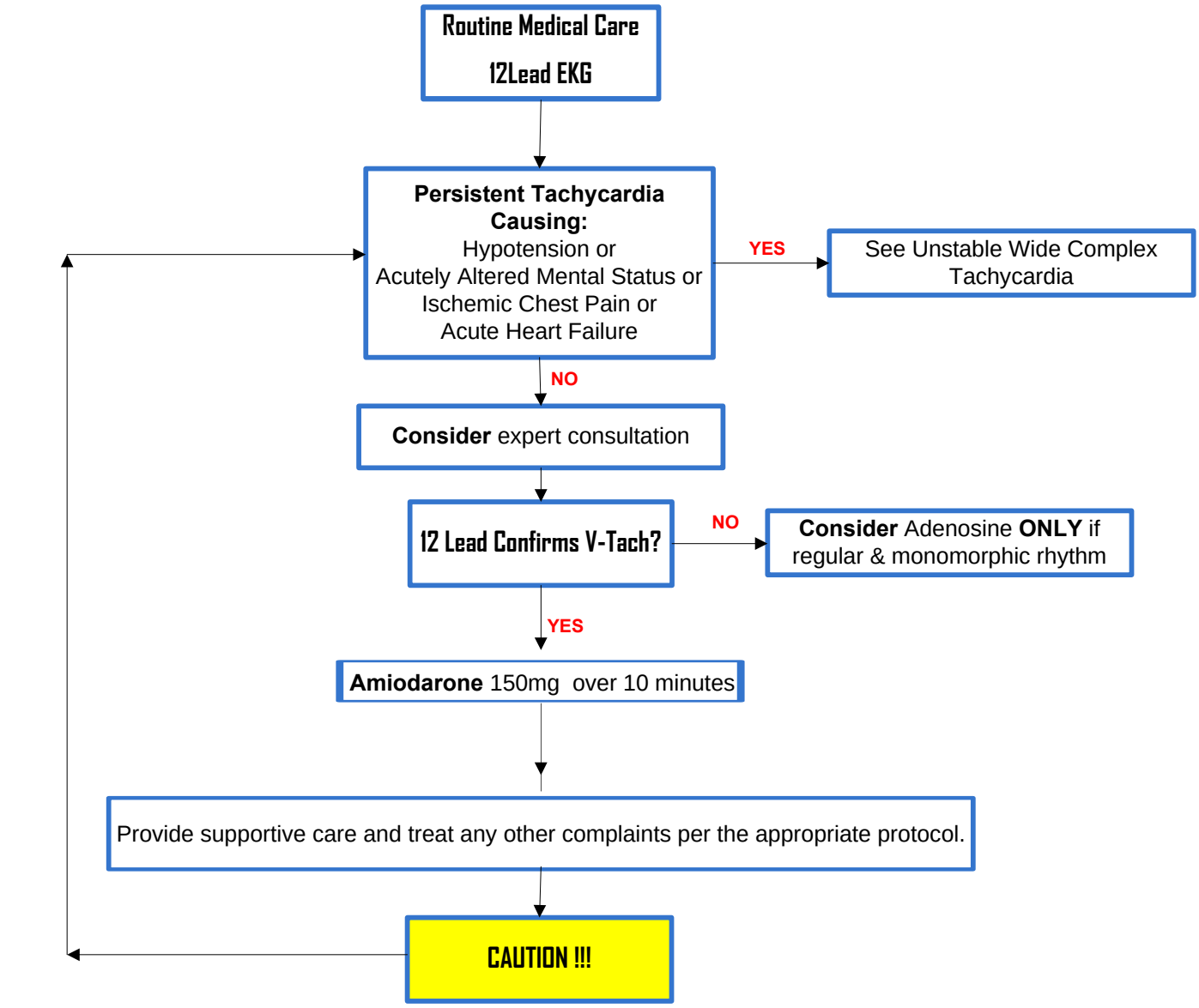
Despite 12-lead analysis, if still unable to determine whether the rhythm is regular or irregular and the QRS is ≤ .12 sec, give Adenosine 6mg IV as a diagnostic tool to slow the rate.

Persistent Tachycardia causing: Hypotension?, Acutely Altered Mental Status?, Signs of Hypoperfusion?, Heartfailure?

IF YES: Go to "UNSTABLE (NARROW COMPLEX) TACHYCARDIA"


Routine Medical Care with 12-lead EKG
IDENTIFY & TREAT UNDERLYING CAUSE
Determine if Tachycardia is Primary cause of s/s or secondary to underlying condition
Persistent Tachycardia Causing: Hypotension or Acutely Altered Mental Status or Signs of Hypoperfusion or Ischemic Chest Discomfort or Acute Heart Failure
NO
See: Stable (Narrow Complex) Tachycardia
YES
IF Patient Condition Permits, Premedicate with Versed 2.5 – 5 mg IV
A brief trial of Adenosine 6mg IV for regular narrow complex may be attempted
Synchronized cardioversion:
Initial electrical therapy can begin at 100 joules
Cardioversion Successful?
YES
NO
Synchronized cardioversion:
Double initial energy dose in a "stepwise fashion" (AHA 2015)
Upon conversion provide supportive care as clinically indicated
If no conversion contact Medical Control for further orders

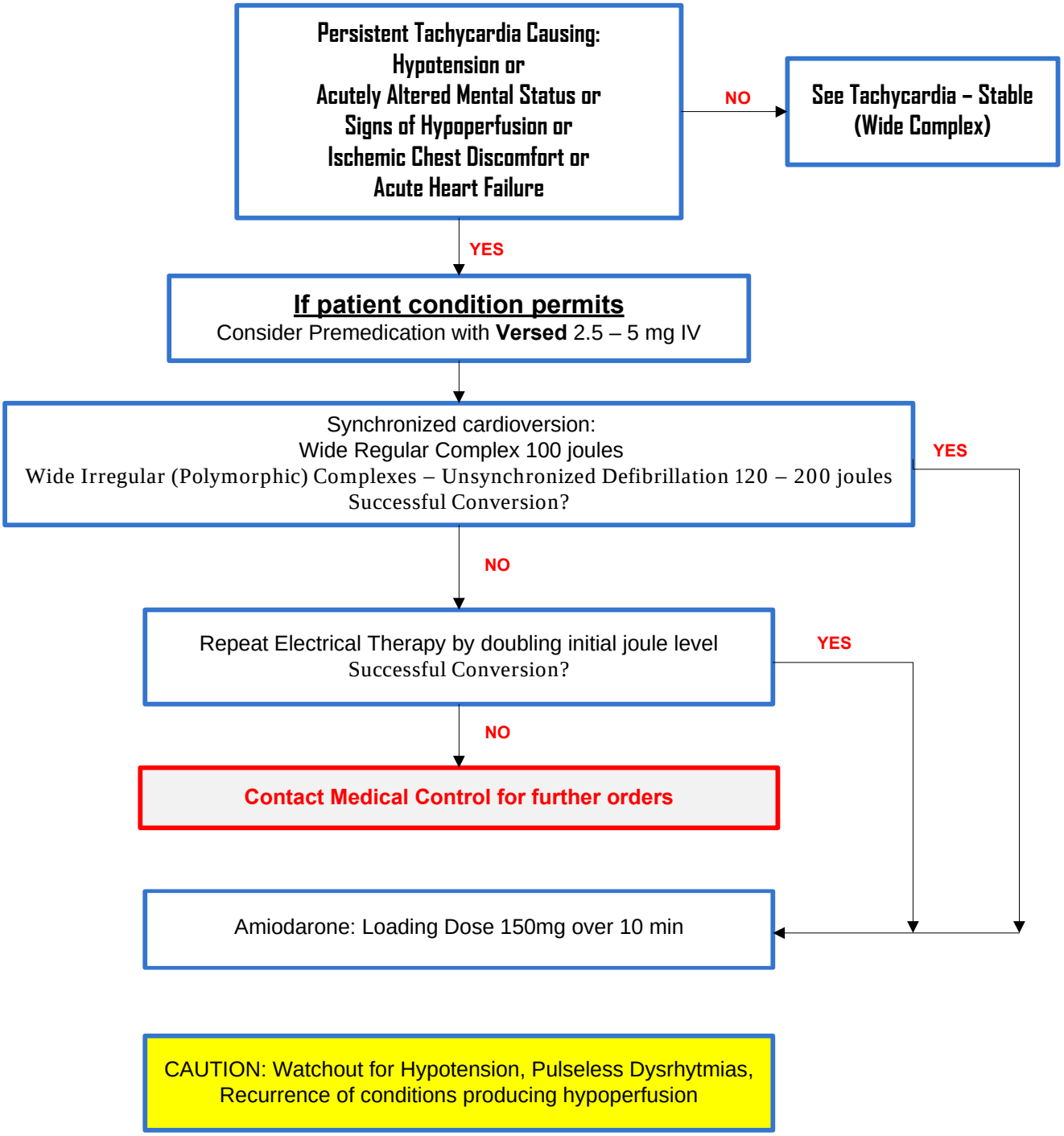
Stable Wide Complex (QRS > 0.12) Typically >150 bpm



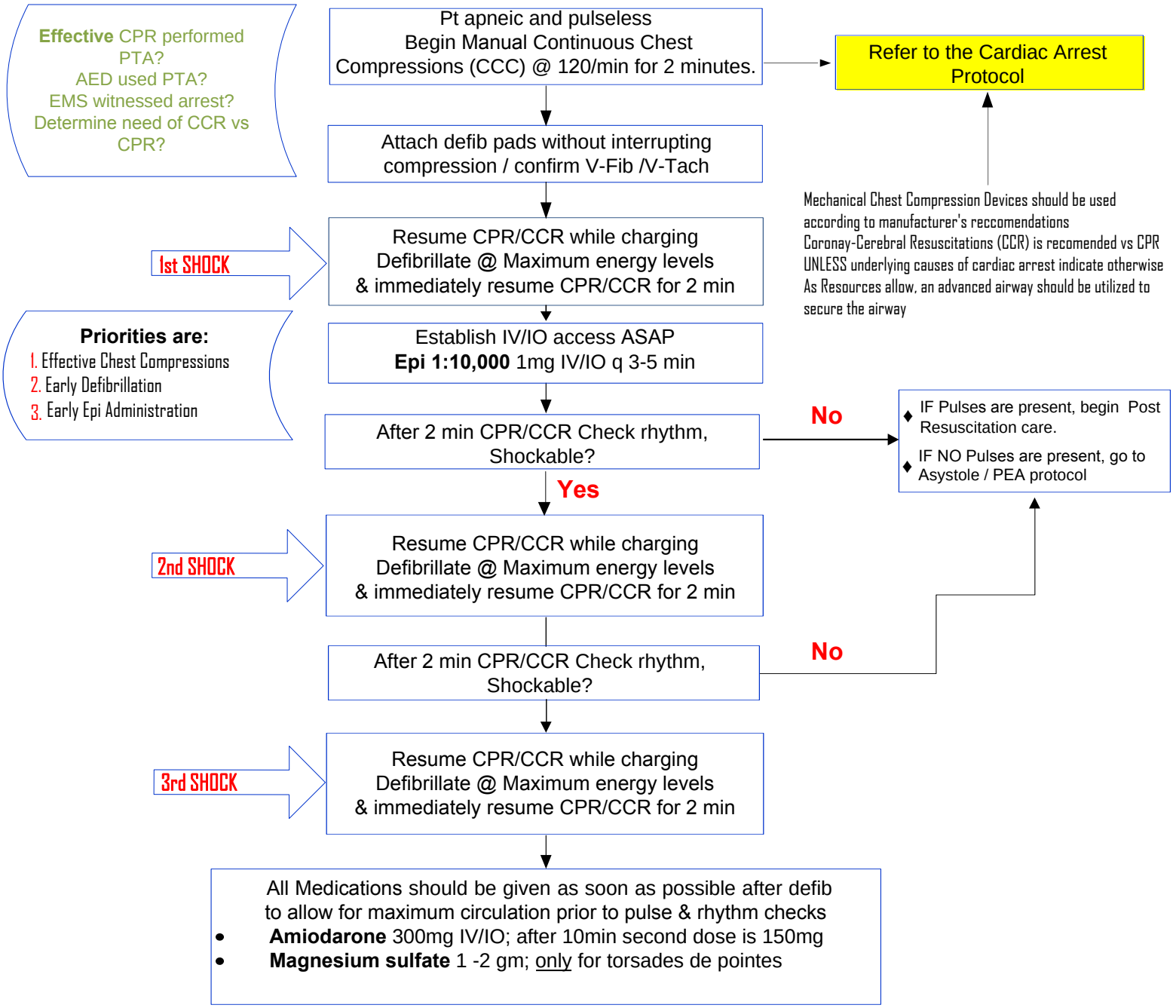
With polymorphic (irregular) VT, defibrillate at a high energy (150 – 200 joules) setting will most likely be the most effective treatment. **The pt is not likely to be stable** but stable pts should receive **Magnesium Sulfate** 1-2grams IV, Torsades de pointes.

If V-Tach exists after **Amiodarone** bolus contact Medical Control for further orders

Unstable Wide Complex > 150 bpm



American Heart Association's *Advanced Cardiopulmonary Life Support (ACLS)* 2015 updates places special attention on the value of chest compressions. New guidelines denote specific times when pausing chest compressions is permissible. Refer to the "Pulseless Rhythm Preamble" for more information



DOUBLE SEQUENTIAL DEFIBRILLATION MAY BE ATTEMPTED FOR SEVERE REFRACTORY V-FIB (AFTER 5TH SHOCK) WITH SIMILAR MONITORS (i.e. 2 Physio monitors or 2 Zoll monitors, etc.)

* First line medications should be given prior to placement of any advanced airway.
When CPR is being performed & Once the an advanced airway is confirmed, no longer deliver "cycles" of CPR. Give continuous chest compressions without stopping for ventilations. Pause for <10 sec q 2 min to verify ECG & Pulses. Ventilate q 6-8 seconds ≈ 8 - 10 times / min. CPR guidelines are listed in the Preambles.

- Cardiac arrests must be worked on scene for no less than 30 minutes.
- f acidosis is suspected (prolonged down time or possible tricyclic OD) **Sodium Bicarbonate** 1mEq/kg IV/IO
- **Amiodarone** is the antiarrhythmic of choice.

All of the following MUST be met to consider "*Termination of Resuscitation.*"

- Pulseless and apneic prior to EMS arrival
- **18 years of age or older**
- > 30 min resuscitation (by EMS) following appropriate pulseless protocol
- > 30 min of chest compressions with interruptions only for rhythm checks
- ETT or supraglottic airway with proper documentation of quantitative[1] capnography
- Patent IV / IO line
- When system configuration allows, it is preferable to have two on-duty paramedics, one of which is at a supervisory level and/or an on-line medical director, on scene verifying proper basic and advanced treatments.
- Patient could not have been in a prolonged perfusing rhythm at anytime (V-Fib is not a perfusing rhythm)
- Patient's immediate family members must have been fully informed of situation, if on scene A safe
- environment for EMS / first responders

- **If all the above are met, contact Medical Control with your patient report; The Medical Control Physician will determine whether to continue resuscitative efforts beyond this point.**
- **IF NOT, PACKAGE THE PATIENT FOR TRANSPORT TO THE NEAREST MOST APPROPRIATE EMERGENCY DEPARTMENT**

TERMINATION GRANTED ?

YES

Post Termination Procedures:

This patient/body becomes property of the Coroner's office once pronounced.

- ETT / Supraglottic Airways must remain in place.
- IV / IO's cannot be taken out.
- ECG electrodes & Defib pads remain.
- Do not remove decompression needles (if applicable).

NO

- Continue resuscitative efforts.
- Package patient and transport to the receiving facility.
- Advise medical direction of any additional changes in the patient's condition.

[1] Quantitative capnography is defined in the *Protocol Preambles*.

[2] Deterioration of a safe scene in which the EMT's are in danger takes priority over scene time on cardiac arrests. If the scene has become too dangerous to provide patient care, law enforcement must be dispatched with documentation reflecting such on the run report.

- **Termination of Resuscitation does not apply in public venues (areas that cannot be readily secured by law enforcement or the coroner) or at any time the medics feel their safety is compromised.**