# ACLS Course Outline
# 2011 Olton/Plainview EMT-P Courses

**I. ACLS Course Overview/Registration**

**II. ACLS Science Overview Video**

**III. Review of Handouts**
- Defibrillation/Safety
- Access for Medications

**IV. Review of ACLS Priorities**
- CPR
- Defibrillation
- IV Access/Medications
- Advanced Airway Management

**V. Review of Rhythm Treatment Priorities**
- Rate
- Rhythm
- Blood Pressure

**VI. BLS Primary and ACLS Secondary Survey Video**

**VII. Management of Respiratory Arrest Video**

**VIII. BLS Review Video**

**IX. Megacode and Team Resuscitation Concepts Video**

**X. Review of Pulseless Arrest VF/VT Algorithm**
- AHA Algorithm
- SPEMS Algorithm
- Class Participation Megacodes

**XI. Review of Asystole/PEA Algorithms**
- AHA Algorithm
- SPEMS Algorithms
  a. Asystole
  b. PEA
- Class Participation Megacodes

**XII. Review of Bradycardia Algorithm**
- AHA Algorithm
- SPEMS Algorithm

**XIII. Review of the Tachycardia (Stable and Unstable) Algorithms**
- AHA Algorithms
- SPEMS Algorithms
  a. SVTs
  b. V-Tach with a pulse

**XIV. Acute Coronary Syndrome Video**

**XV. Review of ACS Algorithm**
- AHA Algorithm
- SPEMS Chest Pain Algorithm

**XVI. Acute Ischemic Stroke Video**

**XVII. Review of Stroke Algorithm**

**XVIII. Putting it all Together**
- Let's Play Megacode Presentations (Class)
- Review of Megacode Testing Sheet

**XIX. Practice, Practice, Practice**

Teams of 4 or 5
- Team Leader
- Airway
- Compressions
- IV/Drugs
- Recorder (if 5 available). If not, IV/Drugs is recorder

Rotation of Assignments

**XX. Megacode Testing**
- Only Team Leader is Evaluated
- No input from team members

**XXI. Written Exam**
- 25 Questions
- Minimum Passing Grade: 84%

**XXII. Retesting (As Needed)**

# Manual Defibrillation

**Using a Manual Defibrillator/ Monitor**

When using a manual defibrillator/monitor, perform a rhythm check as indicated by the Pulseless Arrest Algorithm. This can be performed by attaching the adhesive defibrillator electrode pads or placing the defibrillator paddles on the chest (with appropriate conduction surface or gel) and using the paddle "quick look" feature.

Because adhesive monitor/defibrillator electrode pads are as effective as gel pads or paste and paddles, and the pads can be placed before cardiac arrest to allow for monitoring and rapid administration of a shock when necessary, adhesive pads should be used routinely instead of standard paddles. Whether using the adhesive electrode pads or paddles, the ACLS provider should be very careful not to delay the shock and during CPR to minimize the time between last compression and shock delivery. Delays in delivery of the first shock have been shown to last approximately 20 to 30 seconds, which is no longer acceptable. If CPR is in progress, chest compressions should continue until the defibrillator electrode adhesive pads are attached to the chest and the manual defibrillator is ready to analyze the rhythm.

When you identify VF/pulseless VT, *immediately* deliver 1 shock. Use the following energy levels:

- Manual biphasic: device-specific (typically a selected energy of 120 J with a rectilinear biphasic waveform and a selected energy of 150 J to 200 J with a biphasic truncated exponential waveform); if you do not know the device-specific dose shown to be effective for elimination of VF, use 200 J
- Monophasic: 360 J

After delivering the shock, immediately resume CPR, pushing hard and fast (compression rate 100 per minute). Allow full chest recoil after each compression, and minimize interruptions in compressions.

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**Attaching the 3 Monitor Leads**

Most monitors use three leads: white, red, and black.

*"WHITE to RIGHT"*
*"RED to RIBS"*
*"The LEAD LEFT OVER goes to LEFT SHOULDER"*

The following table explains these directions in more detail.

| Attach... | Where... |
|---|---|
| WHITE lead to RIGHT | Right side of the chest, just beneath the right clavicle |
| RED lead to RIBS | Left midaxillary line, below the expected point of maximum impulse of the heart |
| The LEAD [that is] LEFT OVER goes to LEFT SHOULDER | Left side of the torso, just beneath the distal end of the left clavicle |

## Safety and Clearing the Patient

**Clearing You and Your Team**

To ensure the safety of defibrillation, whether manual or automated, the defibrillator operator must always announce that a shock is about to be delivered and perform a visual check to make sure no one is in contact with the patient. The operator is responsible for "clearing" the patient and rescuers before each shock is delivered. Whenever you use a defibrillator, firmly state a "defibrillation clearing or warning" before each shock. The purpose of this warning is to ensure that no one has any contact with the patient and that no oxygen is flowing across the patient's chest or openly flowing across the electrode pads. You should state the warning quickly to minimize the time from last compression to shock delivery. For example:

- *"I am going to shock on three. One, I am clear."* (Check to make sure you have no contact with the patient, the stretcher, or other equipment.)
- *"Two, you are clear."* (Check to make sure no one is touching the patient. "No one" includes providers performing chest compressions, starting IVs, inserting catheters, or performing ventilation and airway maintenance.)

  *Make sure all personnel step away from the patient, remove their hands from the patient, and end contact with any device or object touching the patient. Any personnel in indirect contact with the patient, such as the team member holding a ventilation bag attached to an endotracheal tube, must also end contact with the patient. The person responsible for airway support and ventilation should ensure that oxygen is not openly flowing around the electrode pads (or paddles) or across the patient's chest.*

- *"Three, everybody is clear."* (Perform a visual check to make sure no one has contact with the patient or stretcher.)

You do not need to use these exact words. But it is imperative that you warn others that you are about to deliver a shock and that everyone stand clear.

**A Final Note About Defibrillators**

Most modern AEDs and manual defibrillators use biphasic waveforms. Take the time to learn to operate the defibrillator used in your workplace and its energy settings. Remember, *early* defibrillation increases the patient's chance of survival. This principle holds true regardless of the type of defibrillator or waveform.

# Access for Medications

**Correct Priorities**

Historically in ACLS, drugs were administered by the intravenous (IV) or endotracheal (ET) route. But new science and consensus opinion have prioritized both access routes and drug administration. Remember, no drug given during cardiac arrest has been shown to improve survival to hospital discharge or improve neurologic function after cardiac arrest.

- High-quality CPR and early defibrillation are the top priorities during cardiac arrest.
- Drug administration is of secondary importance.
- Insertion of an advanced airway whether for drug administration or ventilation, unless bag-mask ventilation is ineffective, is of secondary importance. Absorption of drugs given by the ET route is unpredictable, and optimal dosing is unknown. For this reason the IO route is preferred when IV access is not available.

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**Intravenous Route**

A peripheral IV is preferred for drug and fluid administration. Central line access is not needed during most resuscitation attempts. Attempts to insert a central line may interrupt CPR. In addition, CPR can cause complications during central line insertion, such as vascular laceration, hematomas, and bleeding. Insertion of a central line in a noncompressible area of a vein is a relative contraindication to fibrinolytic therapy (eg, for the patient with an STEMI and sudden cardiac arrest).

Establishing a peripheral line should not require interruption of CPR. And drugs typically require 1 to 2 minutes to reach the central circulation when given by the peripheral IV route. Keep this in mind during CPR. The drug you give based on a rhythm check will not take effect until it is flushed into the patient and has been circulated by the blood flow generated during CPR.

If you choose the peripheral venous route, give the drug by bolus injection and follow with a 20-mL bolus of IV fluid. Elevate the extremity for 10 to 20 seconds to facilitate delivery of the drug to the central circulation.

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**Intraosseous Route**

Use the IO route to deliver drugs and fluids during resuscitation if IV access is unavailable. IO access is safe and effective for fluid resuscitation, drug delivery, and blood sampling for laboratory evaluation. IO access can be established in all age groups.

Any drug or fluid that can be given by the IV route can also be given by the IO route. The IO route is preferred over the ET route.

IO cannulation provides access to a noncollapsible venous plexus in bone marrow. This vascular network provides a rapid, safe, and reliable route for administration of drugs, crystalloids, colloids, and blood during resuscitation. It is often possible to achieve IO access in 30 to 60 seconds. The technique uses a rigid needle, preferably a specially designed IO or bone marrow needle. Use of an IO needle with stylet may be preferred to use of a needle without stylet because the stylet prevents obstruction of the needle with cortical bone during insertion. Butterfly needles and standard hypodermic needles also can be used.

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**Endotracheal Route**

The IV and IO routes of administration are preferred over the ET route of administration during CPR. When considering use of the ET route during CPR, keep these concepts in mind:

- The optimal dose of most drugs given by the ET route is unknown.
- The typical dose of drugs administered by the ET route is 2 to 2½ times the dose given by the IV route.
- To give drugs via the ET route, dilute the dose in 5 to 10 mL of water or normal saline and inject the drug directly into the endotracheal tube. Follow with several positive-pressure breaths.
- You can give the following drugs by the ET route during cardiac arrest: atropine, vasopressin, epinephrine, and lidocaine. The memory aid NAVEL is often used to recall drugs that can be given by the ET route. Arrest drugs that can be given are: atropine (A), epinephrine (E), vasopressin (V) and lidocaine (L). "N" stands for naloxone, which is often used for respiratory depressions due to opioids. Note that the drug absorption and drug effect are much less predictable when drugs are administered by the ET rather than by the IV/IO route.

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# Part 2—Intravenous Access

**Using Peripheral Veins for IV Access**

The most common sites for IV access are in the hands and arms. Favored sites are the dorsum of the hands, the wrists, and the antecubital fossae. Ideally only the antecubital veins should be used for drug administration during CPR.

***Anatomy: Upper Extremities (Figure 27)***

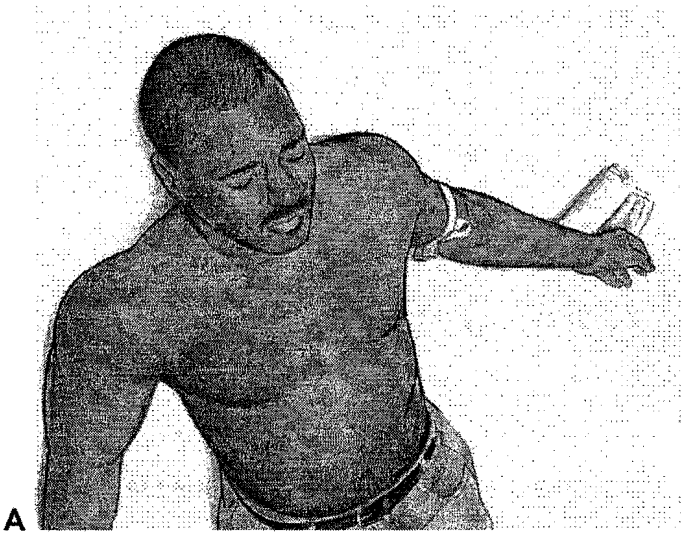
Starting at the radial side of the wrist, a thick vein, the superficial radial vein, runs laterally up to the antecubital fossa and joins the median cephalic vein to form the cephalic vein. Superficial veins on the ulnar aspect of the forearm run to the elbow and join the median basilic vein to form the basilic vein. The cephalic vein of the forearm bifurcates into a Y in the antecubital fossa, becoming the median cephalic (laterally) and the median basilic (medially).

The basilic vein passes up the inner side of the arm, where it joins the brachial vein to become the axillary vein. The cephalic vein continues laterally up the arm, crosses anteriorly, and courses deep between the pectoralis major and deltoid muscles. After a sharp angulation it joins the axillary vein at a 90° angle. This sharp angulation makes the cephalic vein unsuitable for insertion of central venous pulmonary artery catheters.

***Technique: Antecubital Venipuncture***

The largest surface veins of the arm are in the antecubital fossa. Select these veins first for access if the patient is in circulatory collapse or cardiac arrest (Figure 27). Select a point between the junctions of 2 antecubital veins. The vein is more stable here, and venipuncture is more often successful.

Self-contained kits allow easy central venous access, so today providers rarely use peripheral leg veins for vascular access.



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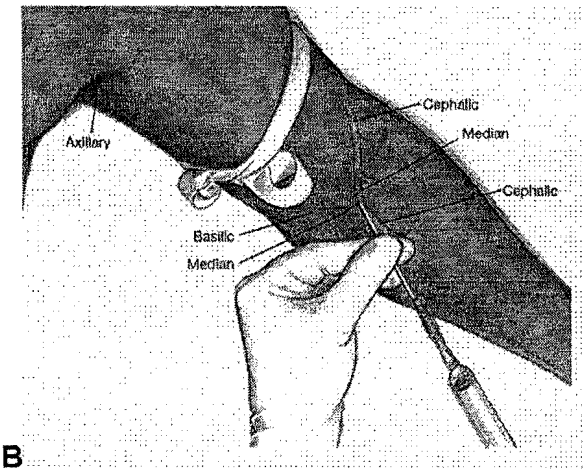


B

**Figure 27.** Antecubital venipuncture. **A,** Scene perspective from a distance. **B,** Close-up view of antecubital area: anatomy of veins of upper extremity.

**General IV Principles**

Once you gain vascular access, follow these important principles for administering IV therapy:

- After a cardiac arrest patient becomes stable, remove the cannula inserted emergently and replace it with a new one under sterile conditions. Strict aseptic technique is compromised in most emergency venipunctures, where speed is essential. This compromise is particularly likely when emergency vascular access is established outside the hospital, because personnel and equipment are limited.
- IV solutions are usually packaged in nonbreakable plastic bottles or bags. Squeeze plastic bags before use to detect punctures that may lead to contamination of the contents.
- Avoid adding drugs that may be adsorbed by the plastic bag or tubing (eg, IV nitroglycerin). If you must administer these drugs without specialty infusion systems, allow for drug adsorption when you titrate the drug administration rate.
- Ideally set the rate of infusion to at least 10 mL/h to keep the IV line open.
- Saline lock catheter systems are particularly useful for patients who have spontaneous circulation and require drug injections but not IV volume infusion.
- Most contemporary systems use needleless injection sites. These systems permit drug and flush infusions without the use of needles and the associated risk of needle sticks.
- Avoid letting the arm with the IV access hang off the bed. Place the arm at the level of heart or slightly above the heart, to facilitate delivery of fluids and medications to the central circulation.
- During cardiac arrest follow all peripherally administered drugs with a bolus of at least 20 mL of IV flush solution. This flush will facilitate delivery to the central circulation. Elevate the extremity for 10 to 20 seconds to facilitate drug delivery to the central circulation.
- Be aware of complications common to all IV techniques. Local complications include hematomas, cellulitis, thrombosis, and phlebitis. Systemic complications include sepsis, pulmonary thromboembolism, air embolism, and catheter fragment embolism.

# Part 3—Intraosseous Access

**Introduction**

When venous access cannot be rapidly achieved, intraosseous (IO) access can serve as a rapid, safe, and reliable route for administration of drugs, crystalloids, colloids, and blood. IO cannulation provides access to a noncollapsible venous plexus in bone marrow and can often be achieved in 30 to 60 seconds. This vascular access technique is suitable for all age groups, from preterm neonates through adulthood.

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**Needles**

The technique uses a rigid needle, preferably a specially designed IO or Jamshidi-type bone marrow needle. An IO needle with stylet is preferred to one without a stylet because the stylet can prevent obstruction of the needle by cortical bone during insertion. Commercial kits with specially designed needles are available.

In the past the higher bone density in older children and adults made it difficult for smaller IO needles to penetrate the bone without bending. With the development of IO cannula systems for adults, IO access is now easier to obtain in older children and adults.

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**Sites**

Many sites are appropriate for IO infusion. For young children, the proximal tibia, just below the growth plate, is the most common site used. In older children and adults, successful IO insertion sites include the sternum, the distal tibia just above the medial malleolus, the lateral or medial malleolus, the distal radius and distal ulna, the distal femur, and the anterior-superior iliac spine.

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**Indications and Administration**

Resuscitation drugs, fluids, and blood products can be administered safely by the IO route. Continuous catecholamine infusions can also be provided by this route.

The onset of action and drug levels following IO infusion during CPR are comparable to those for vascular routes of administration, including central venous access. When providing drugs and fluids by the IO route, remember the following:

- Flush all IO medications with 5 to 10 mL of normal saline to facilitate delivery into the central circulation.
- Administer viscous drugs and solutions and fluid for rapid volume resuscitation under pressure using an infusion pump, pressure bag, or forceful manual pressure to overcome the resistance of the emissary veins.

Some have expressed concern that high-pressure infusion of blood might induce hemolysis. But animal studies have failed to document this problem.

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**Complications**

Complications of IO infusion include tibial fracture, lower extremity compartment syndrome or severe extravasation of drugs, and osteomyelitis. But <1% of patients have complications after IO infusion. Careful technique helps to prevent complications.

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**Contraindications**

Absolute contraindications to IO access are as follows:

- Fractures and crush injuries near the access site
- Conditions in which the bone is fragile, such as osteogenesis imperfecta
- Previous attempts to establish access in the same bone

Avoid IO cannulation if infection is present in overlying tissues.

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**Equipment Needed**

The following equipment is needed to establish IO access:

- Gloves
- Skin disinfectant
- IO needle (16 or 18 gauge) or bone marrow needle
- Tape
- Syringe
- Isotonic crystalloid fluid and intravenous tubing

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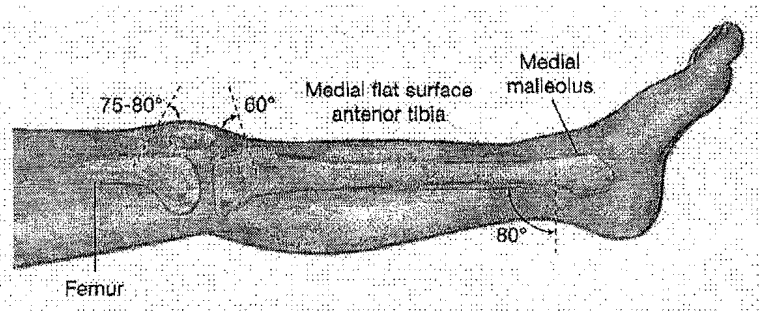
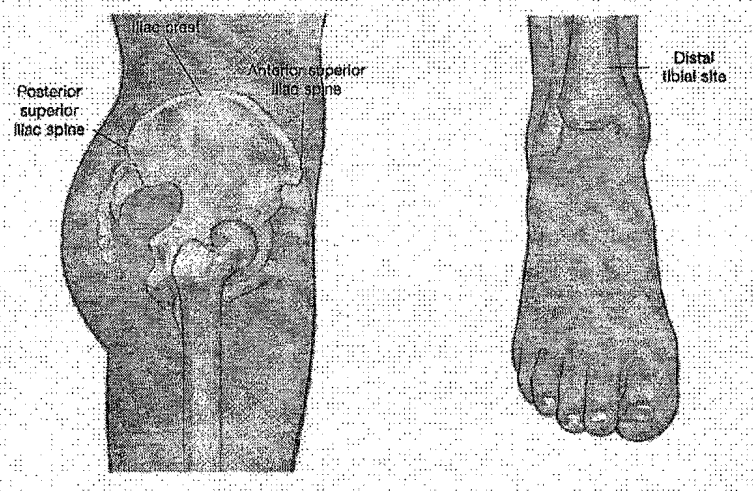
**Procedure**

The steps to establish IO using the tibial tuberosity as an access site example are as follows:

| Step | Action |
|---|---|
| 1 | • Always use universal precautions when attempting vascular access. Disinfect the overlying skin and surrounding area with an appropriate agent.<br>• Identify the tibial tuberosity just below the knee joint. The insertion site is the flat part of the tibia, 1 or 2 finger widths below and medial to this bony prominence. Figure 28 shows sites for IO access. |
| 2 | • The stylet should remain in place during insertion to prevent the needle from becoming clogged with bone or tissue.<br>• Stabilize the leg to facilitate needle insertion. *Do not place your hand behind the leg.* |

| | |
|---|---|
| 3 | • Insert the needle so that it is perpendicular to the tibia. (When placing an IO needle in other locations, aim slightly away from the nearest joint space to reduce the risk of injury to the epiphysis or joint but keep the needle as perpendicular to the bone as possible to avoid bending.)<br><br>*TWIST, DON'T PUSH, THE NEEDLE.*<br><br>• Use a twisting motion with gentle but firm pressure. Some IO needles have threads. These threads must be turned clockwise and screwed into the bone. |
| 4 | Continue inserting the needle through the cortical bone until there is a sudden release of resistance. (This release occurs as the needle enters the marrow space.) If the needle is placed correctly, it will stand easily without support. |
| | A<br>  <br><br>B C<br>  <br><br>**Figure 28. A,** Locations for IO insertion in the distal tibia and the femur. **B,** Location for IO insertion in the iliac crest. **C,** Location for IO insertion in the distal tibia. |

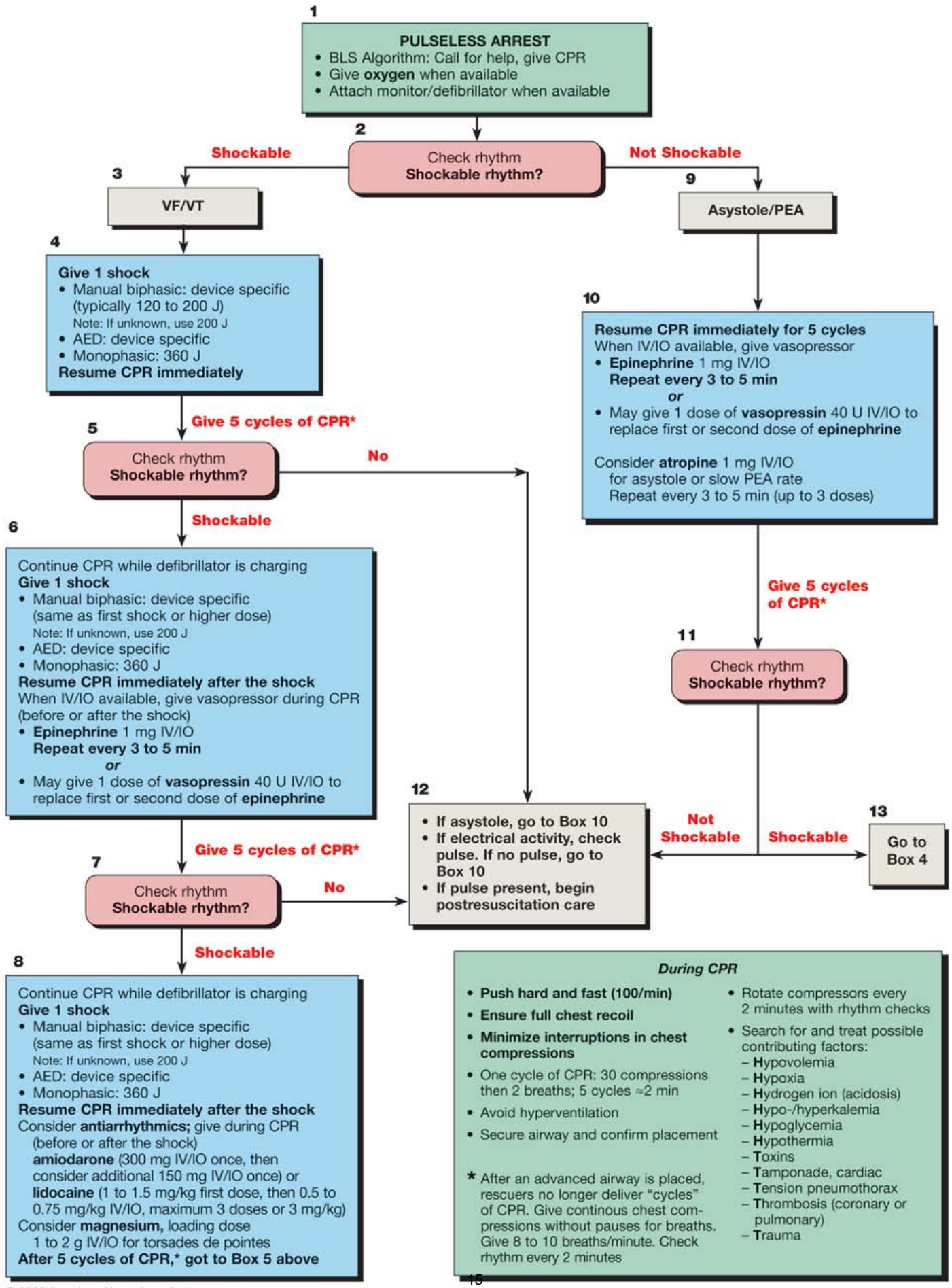
| | |
|---|---|
| **5** | • Remove the stylet and attach a syringe.<br>• Aspiration of bone marrow contents and blood in the hub of the needle confirms appropriate placement. You may send this blood to the lab for study. (Note: Blood or bone marrow may *not* be aspirated in every case.)<br>• Infuse a small volume of saline and observe for swelling at the insertion site. Also check the extremity behind the insertion site in case the needle has penetrated into and through the posterior cortical bone. Fluid should easily infuse with saline injection from the syringe with no evidence of swelling at the site.<br>• If the test injection is unsuccessful (ie, you observe infiltration/swelling at or near the insertion site), remove the needle and attempt the procedure on *another bone*. If the cortex of the bone is penetrated, placing another needle in the same extremity will permit fluids and drugs to escape from the original hole and infiltrate the soft tissues, potentially causing injury. |
| **6** | There are a number of methods to stabilize the needle. Place tape over the flange of the needle to provide support. Position gauze padding on both sides of the needle for additional support. |
| **7** | When connecting IV tubing, tape it to the skin to avoid displacing the needle by placing tension on the tubing. |
| **8** | Volume resuscitation can be delivered via a stopcock attached to extension tubing or by infusion of fluid under pressure. When using a pressurized fluid bag, take care to avoid air embolism.<br><br>Other methods include the following:<br>• Use a syringe bolus via a medication port in the IV tubing (3-way stopcock not needed).<br>• Attach a saline lock to the IO cannula and then provide syringe boluses through the lock. |
| **9** | Any medication that can be administered by the IV route can be given by the IO route, including vasoactive drug infusions (eg, epinephrine drip).<br><br>All medications should be followed with a saline flush. |

**Follow-up**

Follow-up is important after you establish IO access. Use these guidelines:

- Check the site frequently for signs of swelling.
- Check the site often for needle displacement. Delivery of fluids or drugs through a displaced needle may cause severe complications (eg, tissue necrosis or compartment syndrome).
- Replace the IO access with vascular access as soon as reasonable. IO needles are intended for short-term use, generally <24 hours. Replacement with long-term vascular access is usually done in the intensive care unit.

# ACLS Pulseless Arrest



# VENTRICULAR FIBRILLATION, or PULSELESS VENTRICULAR TACHYCARDIA* - ADULT

EMT-Paramedic

***** In all witnessed or known short duration (<4-5 minutes) cardiac arrest where defibrillation is indicated immediate defibrillation should be performed.

In all other arrest situations where defibrillation is indicated the provider should perform 5 cycles (2 minutes) of CPR prior to defibrillation.

******* IV Fluid Should be Infused at a Wide Open Rate to a Max of 3000cc

1. ABCs
2. CPR (2005 Guidelines)**
3. Ventilate with **Oxygen** (Insert OPA/NPA)
4. ResQPOD
5. Attach Defibrillator
6. Defibrillate @ 360 Joules, or Biphasic Equivalent
7. Resume CPR

Rhythm Change? → YES

NO

1. Resume CPR
2. IV or IO, **NS** ***
3. Intubate Patient
4. **Epinephrine (1:10,000)**, 1mg, IV, Repeat Every 3-5 Minutes
5. Defibrillate @ 360 Joules, or Biphasic Equivalent
6. Resume CPR

Rhythm Change? → YES

NO

1. Resume CPR
2. **Amiodarone,** 300mg IV, repeat once 150mg IVP in 3 to 5 minutes.****
3. Defibrillate @ 360 Joules, or Biphasic Equivalent
4. Resume CPR

Rhythm Change? → YES → Check Pulse

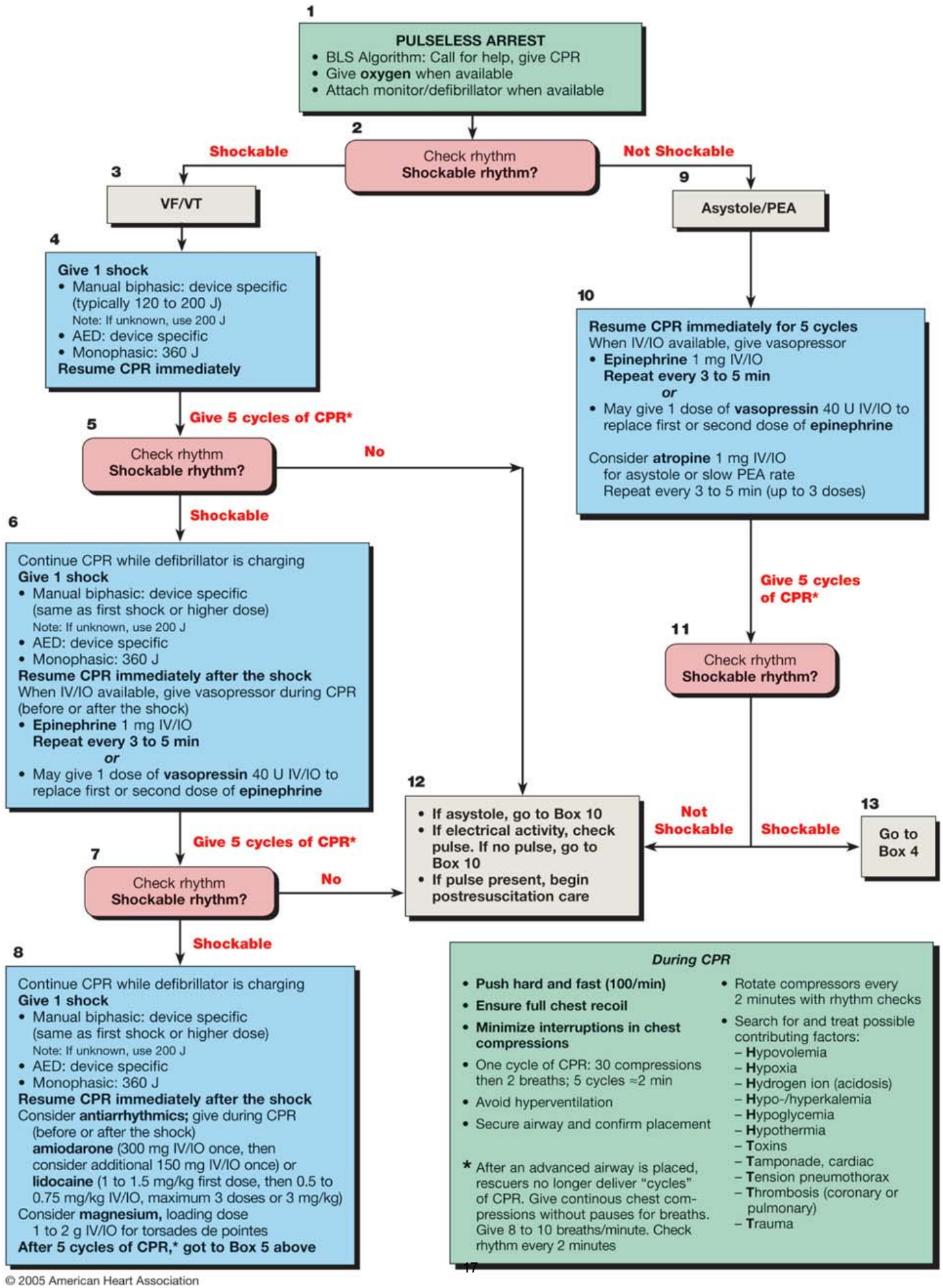
NO → Continue to Treat, Monitor & Transport

Refer to Appropriate Algorithm

***
- If IV or IO access unavailable administer **Lidocaine** 2mg/kg, ET.
- If V-Tach not suppressed repeat **Lidocaine** 2mg/kg, ET, every 3-5 minutes to a max of 6mg/kg, ET
- Once an antiarrhythmic is administered DO NOT administer a different antiarrhythmic.
- If IV or IO access is obtained after ET **Lidocaine** was administered, administer **Lidocaine** 1mg/kg, IV, may repeat every 3-5 minutes to a max of 3mg/kg, IV (Should not administer more than 3 total doses whether IV/IO or ET)
- The Administration of **Lidocaine** during IO placement for pain control **ONLY** does not contraindicate the administration of **Amiodarone** if indicated

** Ideally chest compressions should be interrupted only for rhythm checks and actual defibrillations. The 2005 guidelines state that when CPR is indicated the provider should perform 5 cycles (2 Minutes) of chest compressions. Continue CPR while drugs are prepared/administered and the defibrillator is charging. Providers must organize care to ensure that chest compressions, initial and subsequent defibrillations are not delayed in order to administer drugs, place advanced airways or obtain vascular access.

# ACLS Pulseless Arrest



# ASYSTOLE - ADULT

EMT-Paramedic

1. ABCs
2. CPR (2005 Guidelines)*
3. Ventilate with **Oxygen** (Insert OPA/NPA)
4. ResQPOD
5. Attach Defibrillator**
6. IV, **NS*****
7. Intubate Patient
8. Resume CPR
9. **Epinephrine (1:10,000)**, 1mg, IV, Every 3-5 Minutes

Rhythm Change? → YES → Refer to Appropriate Algorithm

NO

1. Resume CPR.
2. **Atropine**, 1mg, IV, every 3-5 minutes, to a max of 3mg

Rhythm Change? → YES → Refer to Appropriate Algorithm

NO

Resume CPR

Treat Possible Contributing Factors****

Continue to Treat, Monitor & Transport

****
Consider Whether One of the Following may be Involved and Treat Appropriately:
- •Hypovolemia (Infuse Volume)
- •Hypoxia (Ventilate)
- •Hypo/Hyperkalemia
- •Hydrogen Ion (Acidosis)
- •Hypoglycemia (D50)
- •Hypothermia
- •Toxins/OD
- •Tamponade (Cardiac)
- •Tension Pneumothorax (Decompress Chest)
- •Thrombosis (Pulmonary, Coronary)
- •Trauma

*** IV Fluid Should be Infused at a Wide Open Rate to a Max of 3000cc

**Asystole should be confirmed in 2 leads. If rhythm is unclear and possibly Ventricular Fibrillation, go to Ventricular Fibrillation Algorithm.

* Ideally chest compressions should be interrupted only for rhythm check. The 2005 guidelines state that when CPR is indicated the provider should perform 5 cycles (2 minutes) of chest compressions. Continue CPR while drugs are prepared/administered. Providers must organize care to minimize interruption in chest compressions for rhythm checks, advance airway insertion, or vascular access.

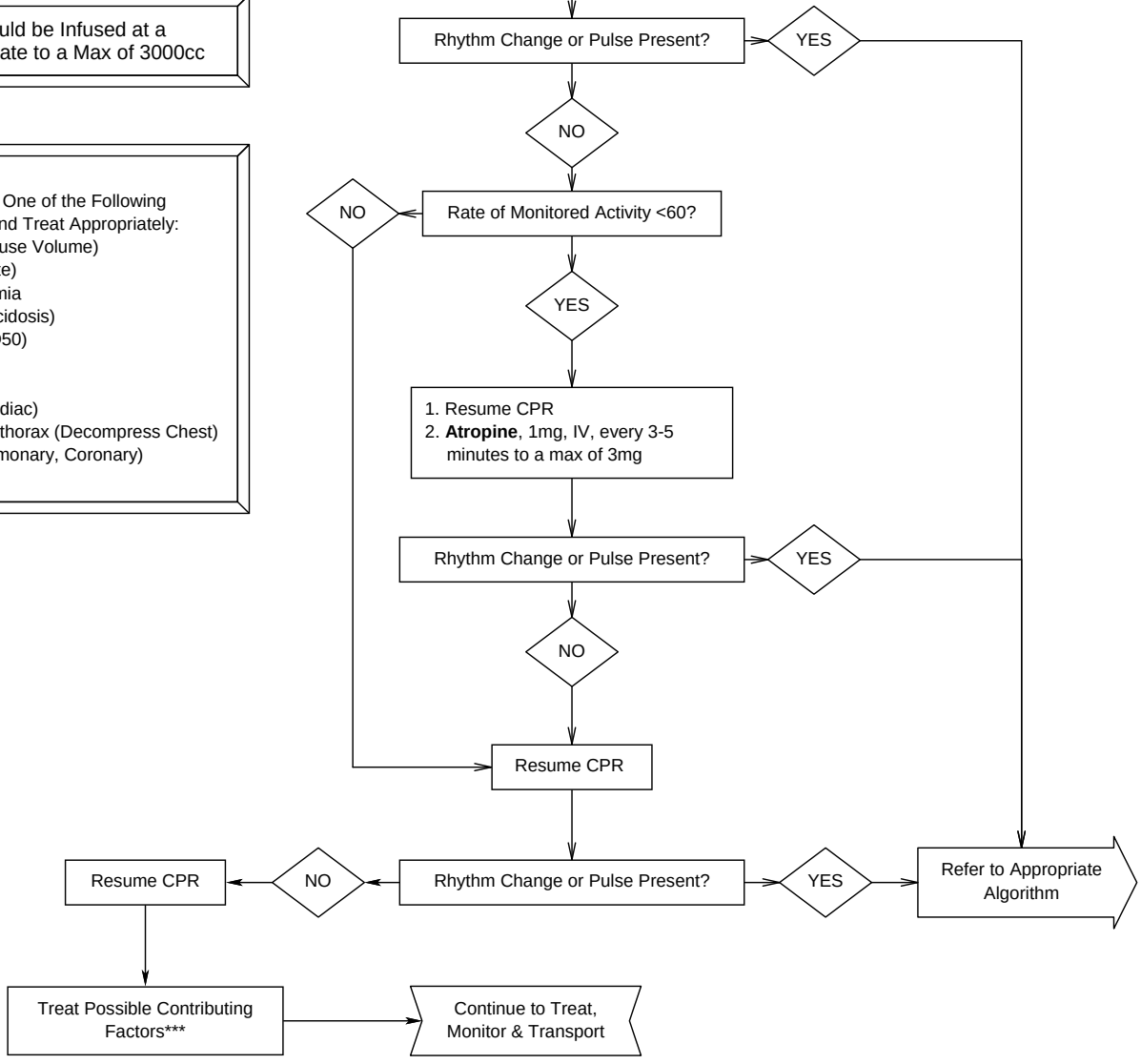
# PULSELESS ELECTRICAL ACTIVITY - ADULT

EMT-Paramedic

1. ABCs
2. CPR (2005 Guidelines)*
3. Ventilate with **Oxygen** (Insert OPA/NPA)
4. ResQPOD
5. Attach Defibrillator
6. IV, **NS****
7. Intubate Patient
8. Resume CPR
9. **Epinephrine (1:10,000)**, 1.0mg, IV, Every 3-5 Minutes

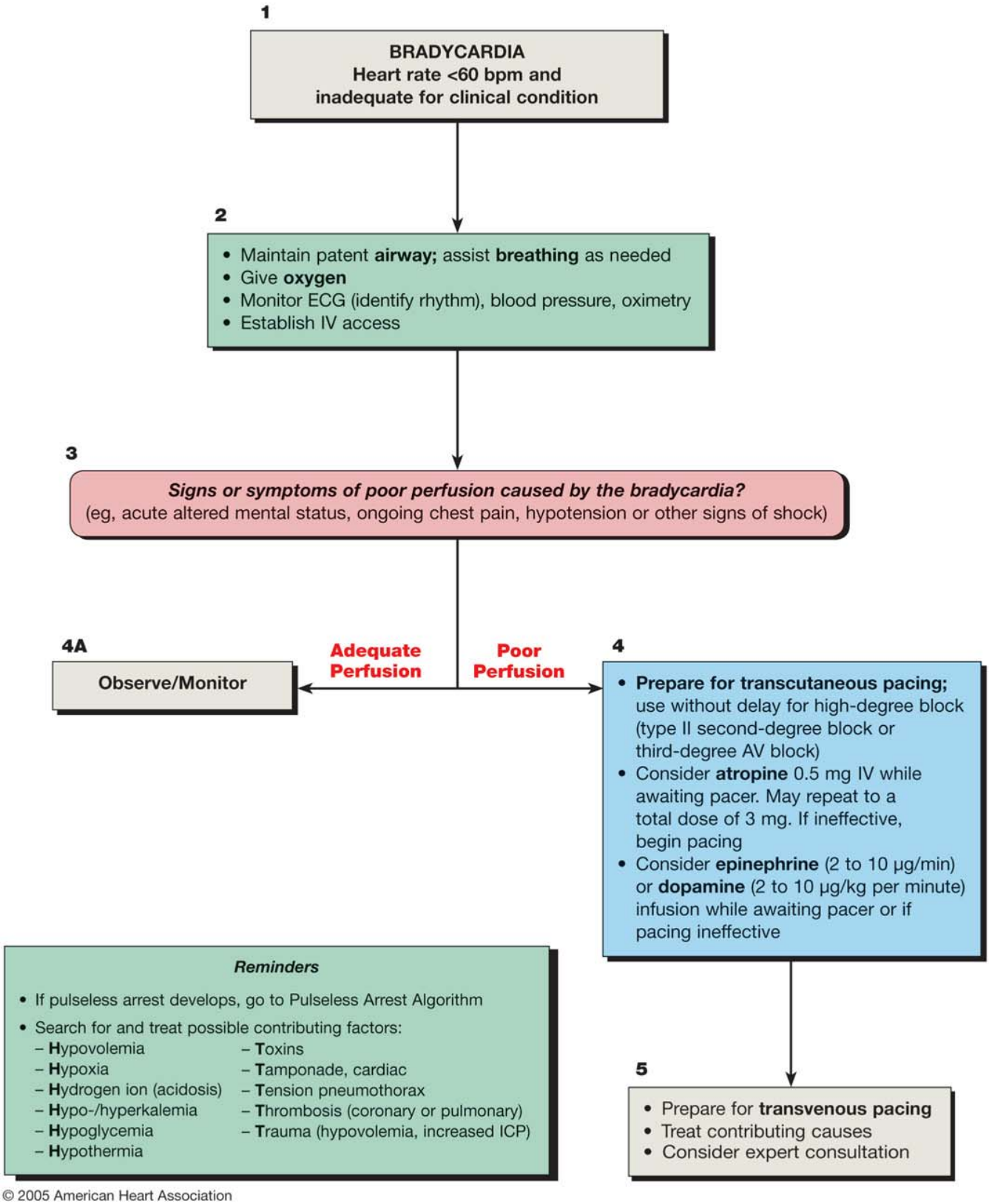
****** IV Fluid Should be Infused at a Wide Open Rate to a Max of 3000cc

***
Consider Whether One of the Following may be Involved and Treat Appropriately:
- •Hypovolemia (Infuse Volume)
- •Hypoxia (Ventilate)
- •Hypo/Hyperkalemia
- •Hydrogen Ion (Acidosis)
- •Hypoglycemia (D50)
- •Hypothermia
- •Toxins/OD
- •Tamponade (Cardiac)
- •Tension Pneumothorax (Decompress Chest)
- •Thrombosis (Pulmonary, Coronary)
- •Trauma




* Ideally chest compressions should be interrupted only for rhythm check. The 2005 guidelines state that when CPR is indicated the provider should perform 5 cycles (2 minutes) of chest compressions. Continue CPR while drugs are prepared/administered. Providers must organize care to minimize interruption in chest compressions for rhythm checks, advance airway insertion, or vascular access.

## Bradycardia Algorithm



# BRADYARRHYTHMIA - ADULT

EMT-Paramedic

1. **Oxygen**
2. IV, **NS**, TKO
3. EKG

Patient has any of the Following:
- •Systolic BP <90mmHg
- •Signs/Symptoms of Hypoperfusion
- •Chest Pain
- •Dyspnea
- •Decreased LOC

YES → 2° or 3° AV Block ? → YES → Attach External Pacemaker

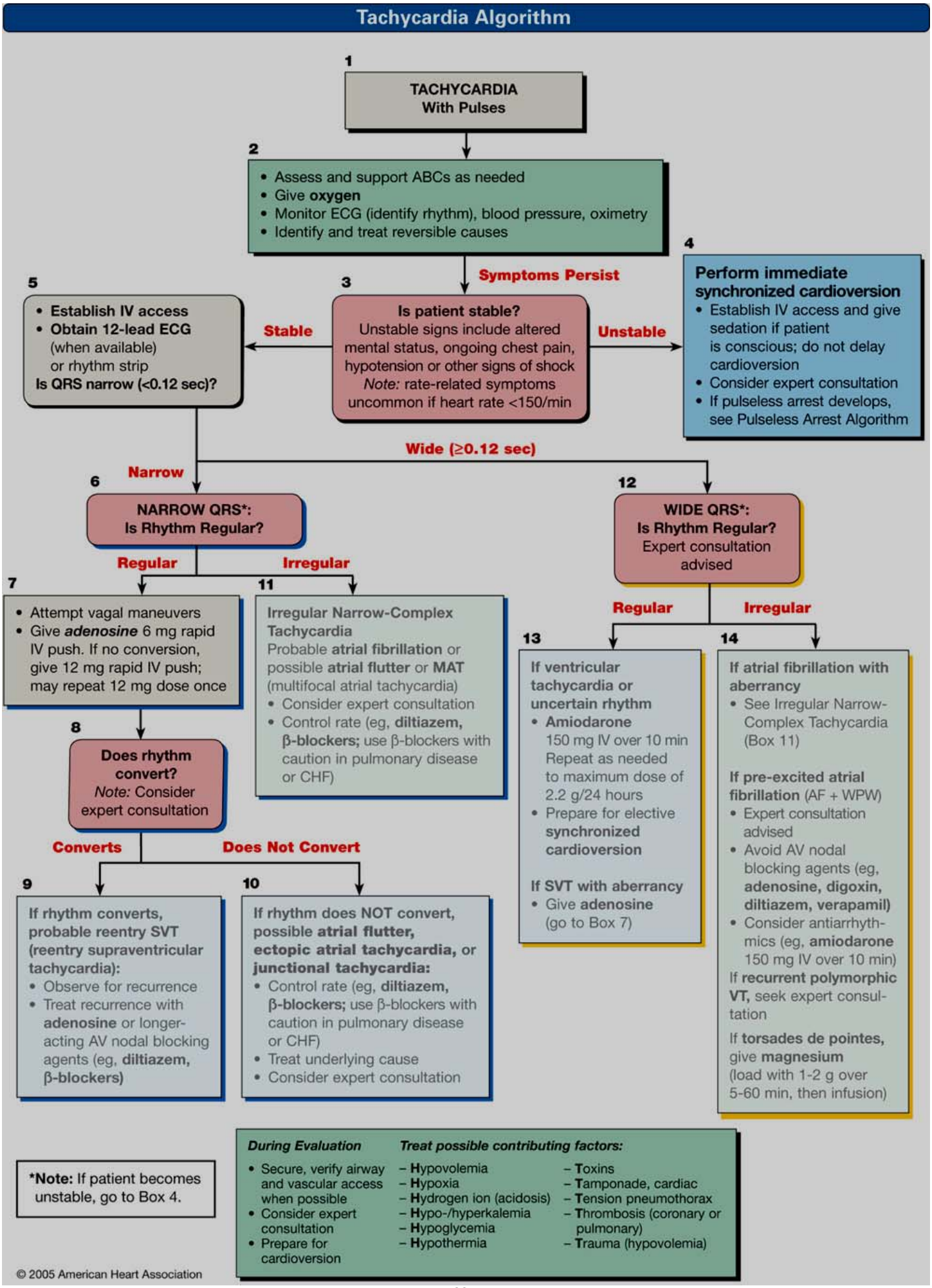
NO → Continue to Treat, Monitor & Transport

NO → 1. **Atropine** 0.5mg, IVP
2.Fluid Challenge of **NS,** 500-1000cc
If Pulmonary Edema not present

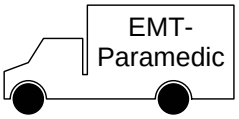
Pulse >60 or Signs/Symptoms Resolve?
- NO → Repeat **Atropine**, 0.5mg, IVP Every 3-5 Minutes, to a max of 3mg → Pulse >60 or Signs & Symptoms Resolve? → YES → Continue to Treat, Monitor & Transport
- NO → 1. If BP ≥ 90 consider **Versed,** 5mg, IV, (2.5mg if >60 years old) May repeat once.
2. Attempt External Pacing. (P-19)
- YES → Continue to Treat, Monitor & Transport

Pacemaker Capture?
- NO → Systolic BP <90mmHg?
  - YES → **Dopamine**, 5mcg/kg/min, IV, Increased by 5mcg/kg/min Every 2 min Until:
    - •Heart Rate 60-100, or
    - •BP >90 Systolic, or
    - •Signs/Symptoms Resolve, or
    - •Infusion at 20mcg/kg/min
    → Continue to Treat, Monitor & Transport
  - NO → 1. Infuse **NS** as Needed to Maintain Systolic BP 90-110mmHg
2. Reassess Lung Sounds & Adequacy of Ventilations
    → Continue to Treat, Monitor & Transport
- YES → Continue to Treat, Monitor & Transport

# Tachycardia Algorithm



# SUPRAVENTRICULAR TACHYCARDIA (>150)




1. **Oxygen**
2. IV, **NS**, TKO

Patient Conscious?

NO

1. Synchronized Cardiovert @ 100 Joules
2. Synchronized Cardiovert @ 200 Joules*
3. Synchronized Cardiovert @ 300 Joules*
4. Synchronized Cardiovert @ 360 Joules*

*Repeated Cardioversions Are Done Only if There is NO Rhythm Change.

Rhythm Change? → YES → Refer to Appropriate Algorithm

NO

YES

Valsalva Maneuver

Rhythm Change? → NO → **Adenosine**, 12mg, IV

YES

Refer to Appropriate Algorithm

Rhythm Change? → YES → Refer to Appropriate Algorithm

NO

**Adenosine**, 12mg, IV

Rhythm Change? → YES → Refer to Appropriate Algorithm

NO

Altered Mental Status, Chest Pain, Hypotension, or Other Signs of Shock

NO → Continue to Treat, Monitor & Transport

YES → If Systolic BP >90mmHg and patient is conscious give **Versed,** 5mg, IVP (2.5mg if > 60 years old)

1. Synchronized Cardiovert @ 100 Joules
2. Synchronized Cardiovert @ 200 Joules*
3. Synchronized Cardiovert @ 300 Joules*
4. Synchronized Cardiovert @ 360 Joules*

Rhythm Change? → NO → ****Amiodarone,** 150mg IV Over 10 minutes. May Repeat Once if Needed. (may mix into 100cc of **D5W**)

YES → Refer to Appropriate Algorithm

Rhythm Change? → NO → Continue to Treat, Monitor & Transport

Rhythm Change? → YES → Refer to Appropriate Algorithm

**PEDIATRIC DOSES**

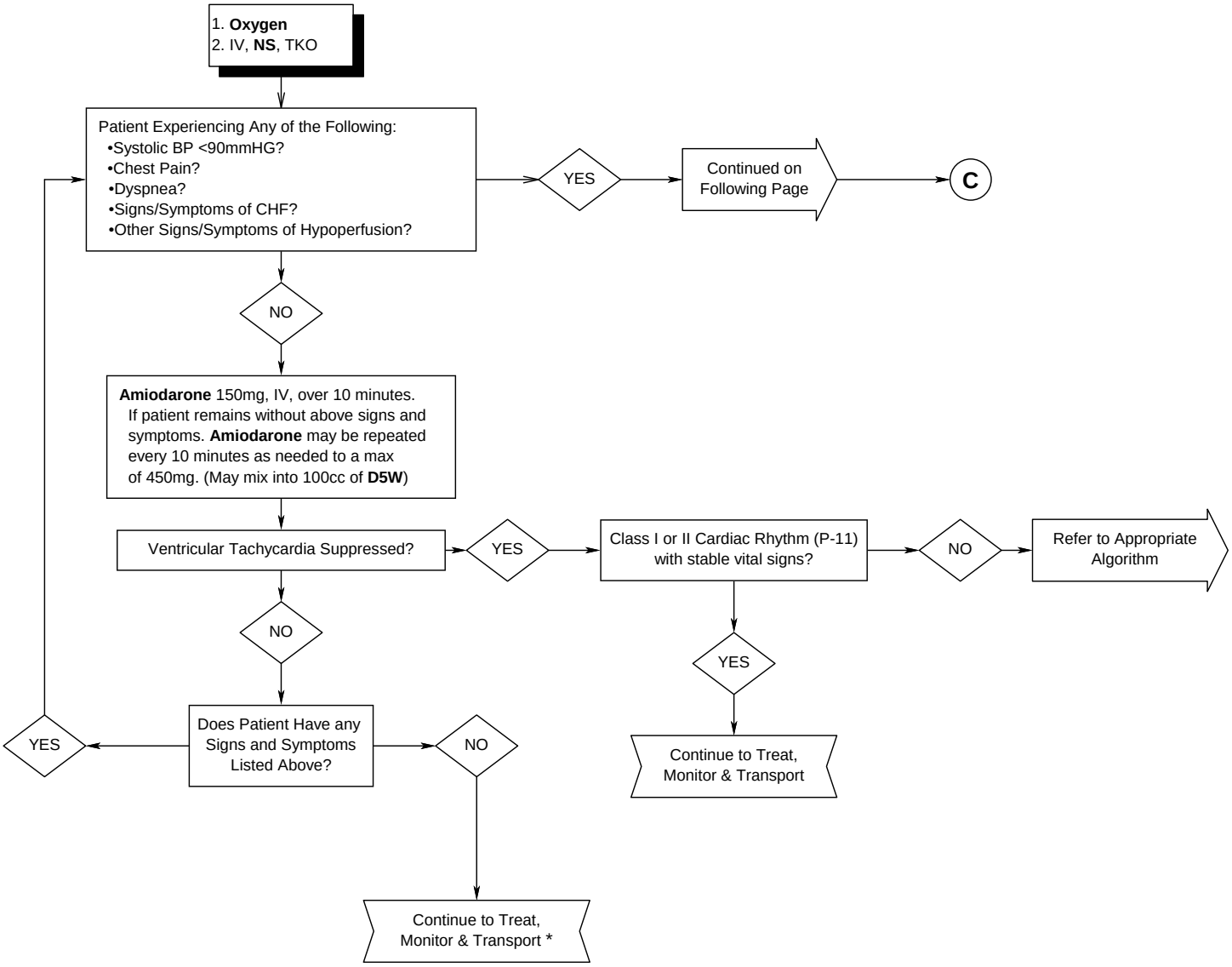
- Sync. Cardiovert @ 1Joule/kg to a max of 100 J
  Sync. Cardiovert @ 2Joules/kg to a max of 360 J*
- **Adenosine**, 0.1mg/kg to a max of 12mg
- **Versed,** 0.1mg/kg, IV, to a max of 2.5mg
- **Amiodarone** 5mg/kg, IV, over 20 minutes, to a max single dose of 150mg. May be repeated X 2 (Do not mix into 100cc of **D5W**)

PEDIATRIC SVT RATES
In Infants Heart rate > 220
In Children Heart Rate > 180

** The Administration of **Lidocaine** during IO placement for pain control **ONLY** does not contraindicate the administration of **Amiodarone** if indicated

# VENTRICULAR TACHYCARDIA WITH A PULSE

EMT-Paramedic



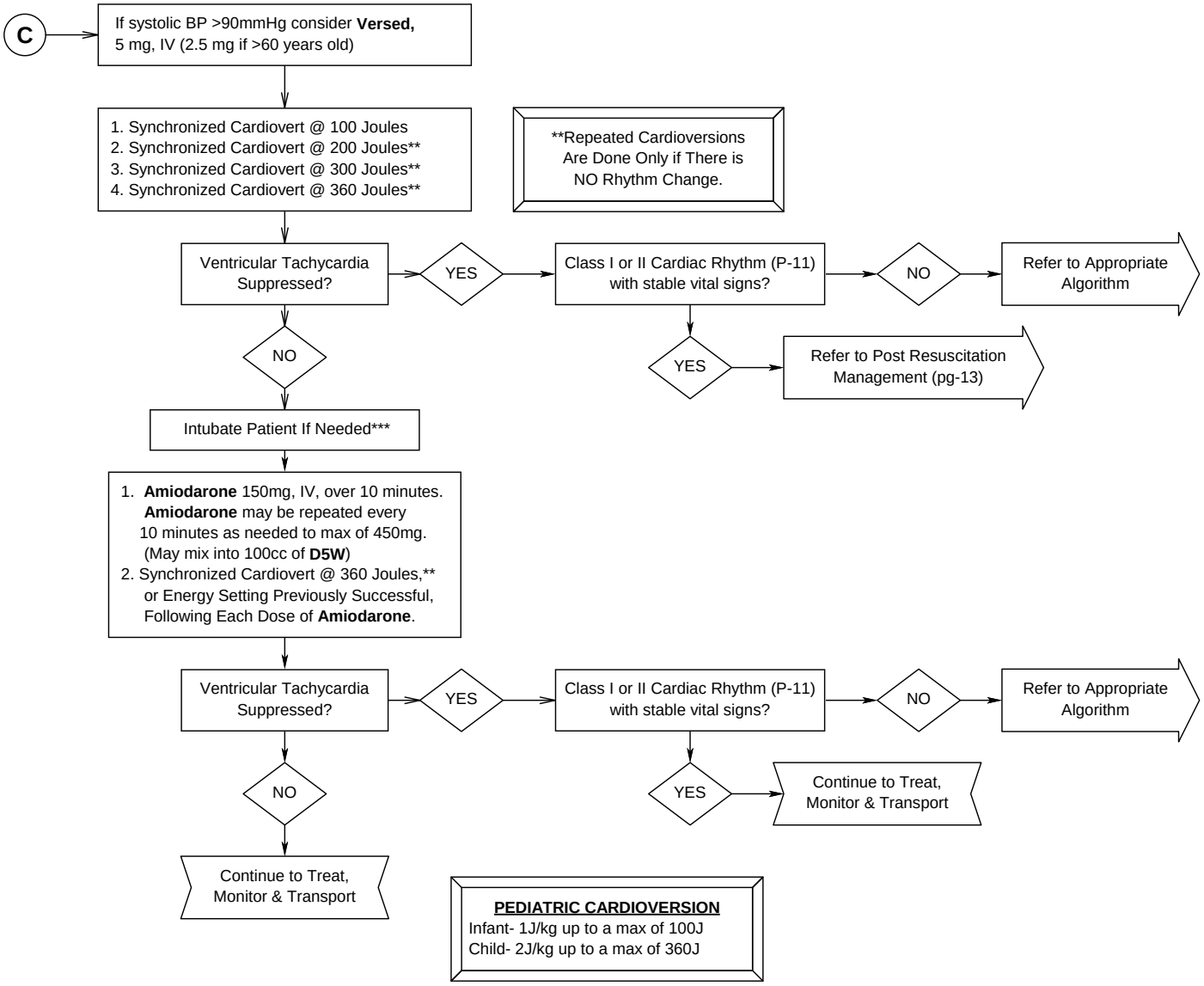

* If at any time the patient starts to experience any of the signs and symptoms noted above, go directly to Cardioversion.( Pg 20)

**PEDIATRIC DOSE**

•**Amiodarone** 5mg/kg, IV, over 20 minutes, to a max single dose of 150mg. May be repeated X 2 (Do not mix into 100cc of **D5W**)

# VENTRICULAR TACHYCARDIA WITH A PULSE (CONTINUED)

EMT-Paramedic

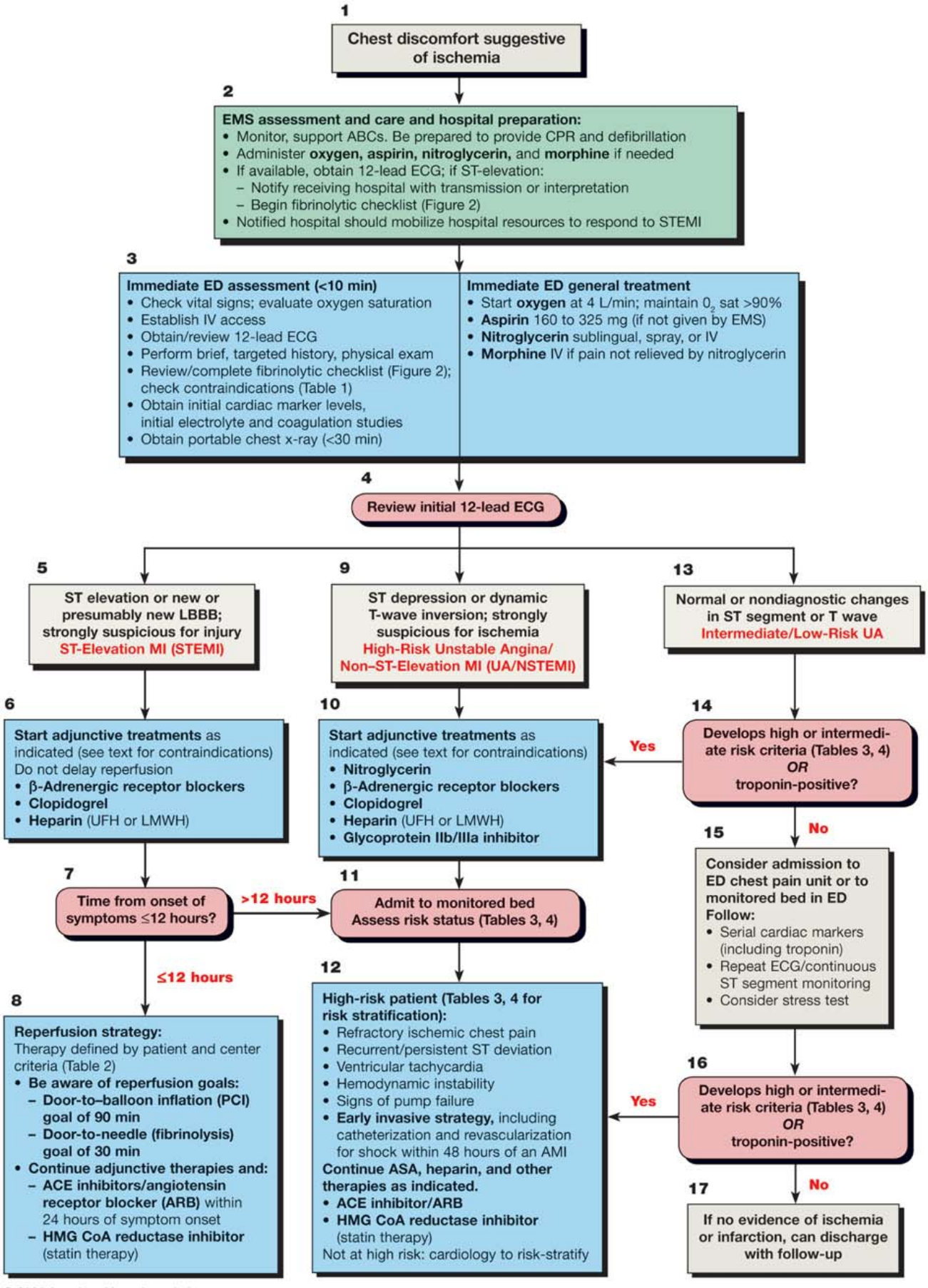



**PEDIATRIC CARDIOVERSION**
Infant- 1J/kg up to a max of 100J
Child- 2J/kg up to a max of 360J

***
- If IV or IO access unavailable administer **Lidocaine** 2mg/kg, ET.
- If V-Tach not suppressed repeat **Lidocaine** 2mg/kg, ET, every 3-5 minutes to a max of 6mg/kg, ET
- Once an antiarrhythmic is administered DO NOT administer a different antiarrhythmic.
- If IV or IO access is obtained after ET **Lidocaine** was administered, administer **Lidocaine** 1mg/kg, IV, may repeat every 3-5 minutes to a max of 3mg/kg, IV (Should not administer more than 3 total doses whether IV/IO or ET)
- The Administration of **Lidocaine** during IO placement for pain control **ONLY** does not contraindicate the administration of **Amiodarone** if indicated

**PEDIATRIC DOSE**
- **Amiodarone** 5mg/kg, IV, over 20 minutes, to a max single dose of 150mg. May be repeated X 2 (Do not mix into 100cc of **D5W**)
- **Versed,** 0.1mg/kg, IV, to a max of 2.5mg
- **Lidocaine** 2mg/kg, ET, every 3-5 minutes, to max of 6mg/kg.
- If IV or IO access is obtained after ET **Lidocaine** was administered, administer **Lidocaine** 1mg/kg, IV, may repeat every 3-5 minutes to a max of 3mg/kg, IV (Should not administer more than 3 total doses whether IV/IO or ET)
- Once an antiarrhythmic is administered DO NOT administer a different antiarrhythmic.

# Acute Coronary Syndrome



# CARDIAC CHEST PAIN or SUSPECTED MYOCARDIAL INFARCTION*

EMT-Paramedic

1. **Oxygen**
2. IV, **NS**, TKO
3. Blood draw for labs (P-16)
4. **Aspirin**, 325mg, PO (chew and swallow)
5. Monitor EKG (obtain 12 lead if available, Consider serial EKGs if appropriate)
6. Transmit suspect EKGs to the receiving ER (if possible)

**If chest pain continues after the suppression of underlying arrhythmias, or after correcting cardiogenic shock return to this algorithm.

*** Signs of a RVI
1. JVD with clear lung sounds
2. Hypotension
3. ST elevation in leads II, III, aVF
4. If appropriately trained and time permits obtain a Right sided EKG. ST elevation in V4R may further confirm an RVI.

Class I or II Cardiac Rhythm? (P-11)

YES

NO → Refer to Appropriate Algorithm**

12 lead EKG Obtained?

YES → ST elevation in two contiguous leads?

YES → Possible right ventricular infarct (RVI)?***

YES → 1. 2nd large bore IV
2. Infuse NS at a WO rate to maintain a systolic BP of >90mmHG.

NO

NO

NO

Systolic BP >90mmHg with Adequate Perfusion?

1. Reference the Cardiac Triage/Transport Scheme (P-38)
2. Immediate rapid transport
3. Notify Emergency Department ASAP

NO → Refer to Cardiogenic Shock Algorithm (Page 12)**

YES → **Nitroglycerin**, 0.4mg, Sublingual or **Nitrospray**, 1 Spray, Sublingual every 5 minutes until (rule out the use of sexual enhancement drugs):
- Symptoms relieved
- Total of 3 given
- Systolic BP < 90mmHg

If not previously done:
1. Reference the Cardiac Triage/Transport Scheme (P-38)
2. Initiate transport

MI Signs and Symptoms* Relieved?

YES

NO → Systolic BP >90mmHg?

YES → 1. **Morphine Sulfate**,2-6mg, IV (Repeat as needed every 10 Minutes until signs and symptoms relieved or Systolic BP <90mmHg)
2. Continue **Nitroglycerin** every 5 minutes until signs and symptoms relieved or Systolic BP <90mmHg

NO → 250cc Fluid Bolus

Continue to Treat, Monitor & Transport

*** Atypical MI Signs and Symptoms**

Atypical Pain:
1. "Sharp" chest pain
2. Intermittent chest pain
3. Pain in ABD, jaw, teeth, neck, shoulder, or arm

Anginal Equivalents consider in higher risk patients
1. Resp. Distress/Dyspnea
2. Weakness/Fatigue without history of GI bleed or recent fever
3. Palpitations
4. Near Syncope/Syncope
5. Nausea/Vomiting
6. DKA

Female, Elderly, or Diabetic?

YES → **Consider** patient a candidate for the Cardiac Chest Pain Protocol see ACS P-10

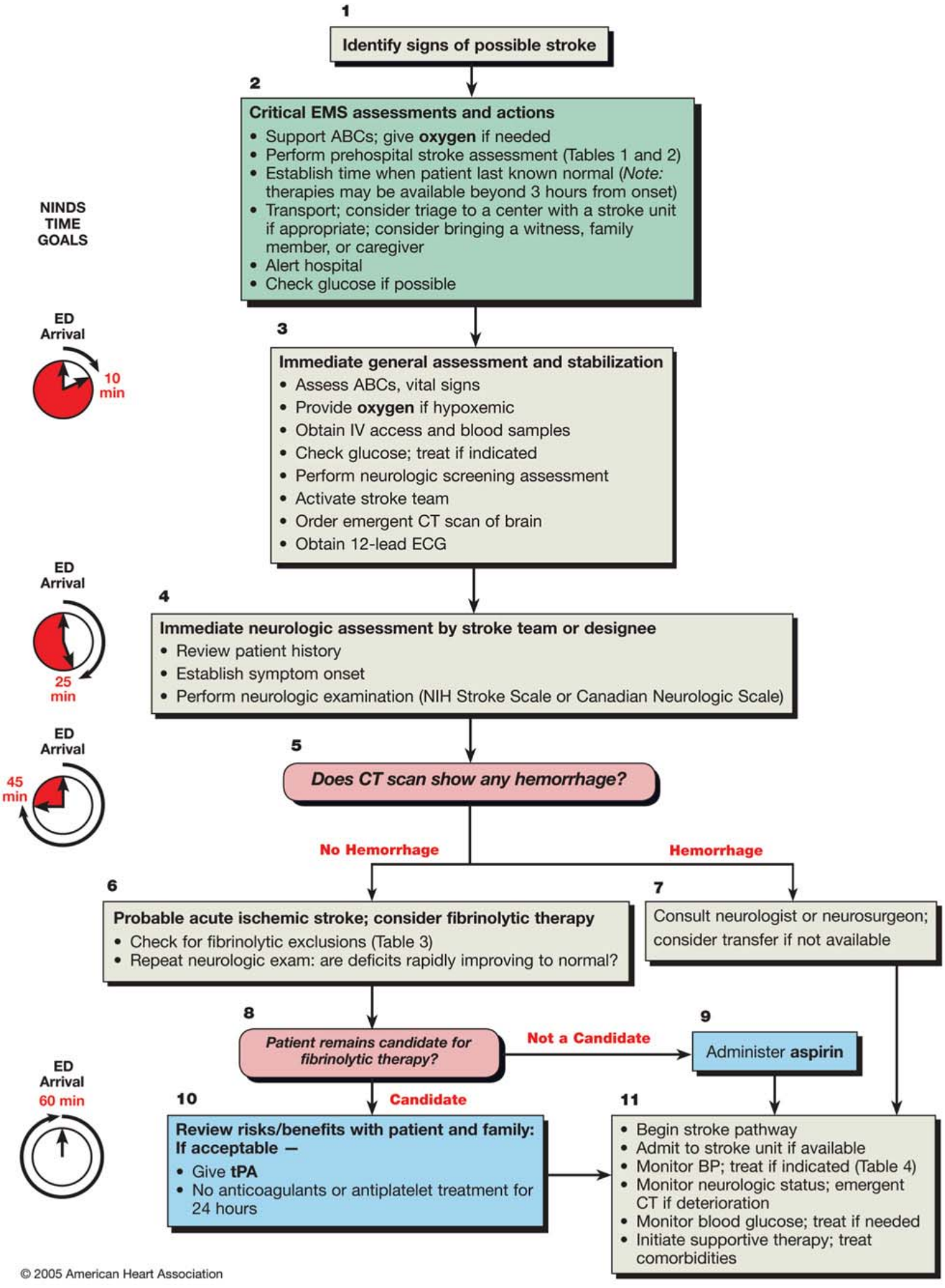
NO → YES → Risk factors:
1. CAD
2. HTN
3. Hyperlipidema
4. Obesity
5. Stress
6. Sedentary life style
7. Smoker

For interfacility transfers, if the patient has a Nitroglycerin drip in place and symptoms develop or become worse, you may administer sublingual Nitro in addition to the drip or increase the Nitro drip in increments of 5mcg/min until:
1. Symptoms relieved
2. Systolic BP <90mmHg
3. Max of 40mcg/min is reached



Consider **Zofran**, 4mg, IVP, in a patient with profound nausea and/or vomiting.

## Suspected Stroke Algorithm



# OLTON EMS TRAINING PROGRAM

# MEGACODE

| | | | |
|---|---|---|---|
| CANDIDATE'S NAME: | | | DATE: |
| ___ EMT-PARAMEDIC | | | LOCATION: |
| ___ INITIAL | ___ RETEST | ___ EQUIVALENCY | ___ RENEWAL |
| SCENARIO #: | START TIME: | | END TIME: |

## IDENTIFIES LETHAL ARRHYTHMIAS

0 2 *1. Identifies Ventricular Fibrillation

0 2 *2. Identifies Normal Sinus Rhythm

0 2 *3. Identifies one other arrhythmia (Specify:_____)

## UTILIZES EQUIPMENT AND MEDICATIONS FOR APPROPRIATE TREATMENT OF PATIENT

DEFIBRILLATOR

0 2 *4. Recognizes need for defibrillation

0 2 *5. Uses defibrillator correctly

0 2 *6. Uses correct energy level

0 2 *7. Performs defibrillation safely

EPINEPHRINE

0 2 *8. Recognizes need for Epinephrine

0 2 *9. Administers at appropriate time

0 2 *10. Administers correct dosage

ANTI-ARRHYTHMIC

0 2 *11. Recognizes need for anti-arrhythmic

0 2 *12. Administers at appropriate time

0 2 *13. Administers correct dosage

OXYGEN

0 2 *14. Recognizes need for Oxygen

0 2 *15. Administers at appropriate time

0 2 *16. Administers correct dosage

OTHER (Optional, must specify:_____)

0 2 *17. Recognizes need for other procedures and/or medications

0 2 *18. Performs procedures and/or administers medications at appropriate time

0 2 *19. Performs procedures properly and/or administers correct dosage of medications

## FUNCTIONS AS TEAM LEADER

ASSESSMENT OF THE PATIENT

0 2 *20. Does initial evaluation to determine if CPR is necessary

0 2 21. Checks adequacy of artificial ventilation (rise and fall of chest)

0 2 *22. Assures correct placement of ET tube or other advanced airway (bilateral breath sounds)

0 2 23. Checks for adequate compressions (pulse generated with compressions, correct hand position, compression/relaxation technique) each time CPR is resumed

0 2 *24. Checks pulse after change in rhythm

0 2 *25. Checks for spontaneous breathing following return of spontaneous pulse

SUPERVISION OF TEAM MEMBERS

0 2 26. Checks for maintenance of correct CPR (limits interruptions of chest compressions)

0 2 27. Proper use of adjuncts (depends on scenario)

PROBLEM SOLVING (Solve at least one problem from the following list:

A. Disconnected oxygen line to bag-valve-mask;
B. Endotracheal tube in right mainstem bronchus;
C. Synchronizer on during defibrillation attempt;
D. IV line delayed or unobtainable;
E. Loose electrode.

0 2 *28. Specify problem:____ (Indicate by letter)

0 2 *29. Specify problem:____ (Indicate by letter)(OPTIONAL)

**Record patient care activities as they occur by time. <u>Identify errors</u> in arrhythmia interpretation or patient care by placing a "*" in the margin at the point where the error was made.**

| Actual Rhythm | Student Interp. | Treatment Given | Actual Rhythm | Student Interp. | Treatment Given |
|---|---|---|---|---|---|
| | | 00 Min. | | | 06 Min. |
| | | 01 Min. | | | 07 Min. |
| | | 02 Min. | | | 08 Min. |
| | | 03 Min. | | | 09 Min. |
| | | 04 Min. | | | 10 Min. |
| | | 05 Min. | | | 11 Min. |

| | |
|---|---|
| Examiner: | Absolutes satisfied: ____ Yes ____ No<br>____ Pass ____ Fail |