ACLS Algorithms

ACLS SUMMARIZED ALGORITHMS

Initiate **High Quality CPR** immediately if indicated while instructing team member to obtain monitor/defibrillator

CPR **100-120 per minute**, depth **2-2.4 inches** (**Updated 3/2021)**

V Fib/Pulseless VT

- Start CPR, give O2, attach monitor/defibrillator
- First shock @ 120J biphasic
- Resume CPR immediately after shock (5 cycles or 2 minutes)
- Rhythm/Pulse check (<10 seconds)
- Second shock @ 150J biphasic
- Resume CPR immediately after shock (5 cycles of CPR or 2 minutes)
- **Epinephrine 1 mg (IV/IO) every 4 minutes** given after 2nd shock
- Consider advanced airway, waveform capnography, once ETT in place,
  1 breath every 6 seconds equals 10 breaths per minute with continuous chest compressions
- Rhythm/Pulse check (<10 seconds)
- Third shock @ 200J biphasic
- Resume CPR immediately after shock (5 cycles of CPR or 2 minutes)
- Consider anti-arrhythmic RX - give during CPR, before or after shock
  - **Amiodarone 300 mg** once, then consider additional **150 mg** or
  - **Lidocaine 1-1.5 mg/kg first dose, 0.5-.75 mg/kg second dose**
- Consider advanced airway if bag mask ineffective
- Ventilation rate 1 breath every 6 seconds. Maintain >**92-98% O2 sat**

Tachycardia (With Pulse-Heart Rate >150)

- IV/O2/Monitor/VS/12 lead ECG are all helpful
- Identify and treat reversible causes, consider expert consultation
- Determine if ***Stable or Unstable***
  - ***Unstable*** with hypotension, altered mental status, signs of shock, chest pain, acute heart failure
    - Sedate and Sync Cardiovert **(Refer to device-specific recommendation)**
    - Synchronized Cardioversion: 75J, 120J, 150J
- ***Stable*** – IV, support, 12 lead ECG, and seek expert consultation
- Determine if rhythm is ***Narrow or Wide, Regular or Irregular***
  - ***Narrow/Regular*** (possible SVT)
    - Vagal maneuvers
    - **Adenosine** (**6 mg**-fast-NS flush), May repeat @ **12 mg x2**
  - Rate control with diltiazem
  - ***Wide/Regular*** (probably VT)
    - Consider **Adenosine 6 mg** rapid IVP; follow with NS flush
    - **Amiodarone 150 mg/100 ml** over 10 minutes, repeat as needed, follow by maintenance of 1mg/min for 6 hours
    - **Procainamide 20-50 mg/min** until arrhythmia suppressed, hypotension ensues, QRS duration increases >50%, or max dose 17 mg/kg
    - Consider expert consultation

Bradycardia (Heart rate <50/min)

- Maintain patent airway, assist breathing as necessary,
- IV /IO access, Monitor/VS,12 lead ECG are all helpful

If perfusion adequate, ***continue to monitor and observe*** for signs & symptoms of poor perfusion (hypotension, altered mental status, signs shock, chest pain, acute heart failure)

- Consider **Atropine 1mg** while awaiting pacer
  (May repeat every 3-5 minutes for a max of 3 mg)
  - If ineffective, begin pacing
- Prepare for TCP – use without delay for high grade AVB – 2nd degree type 2 to 3rd degree
  - Consider infusions of **epinephrine 2 - 10 mcg/min** or **Dopamine 5-20 mcg/kg/min** while awaiting pacer or if pacer is ineffective

Asystole/PEA

- Start CPR, give O2, attach monitor/defibrillator
- "Non-shockable" rhythm
- Verify in 2 leads, check for loose lead and increase gain/size
- CPR (5 cycles or 2 minutes)
- When IV/IO available – **early epinephrine 1 mg every 4 minutes** (administer ASAP)
- CPR (5 cycles of CPR or 2 minutes)
- Consider advanced airway if bag mask ineffective
- Ventilation rate **1 breath every 6 seconds**. Maintain >**92-98% O2 saturation**
- Consider treatable causes and treatment

Hypovolemia – volume infusion	Toxins-intubation, antidotes
Hypoxia-oxygenation, airway	Tamponade, cardiac- peri cardiocentesis
Hydrogen ion (Acidosis)- Na Bicarb	Tension pneumothorax- needle decompression
Hypokalemia-K replacement, Mg	Thrombosis (coronary) – fibrinolytic, PCI
Hyperkalemia- Ca Chloride, Na Bicarb	Thrombosis(pulmonary)- fibrinolytic, embolectomy
Hypothermia- TTM-32-36 C	

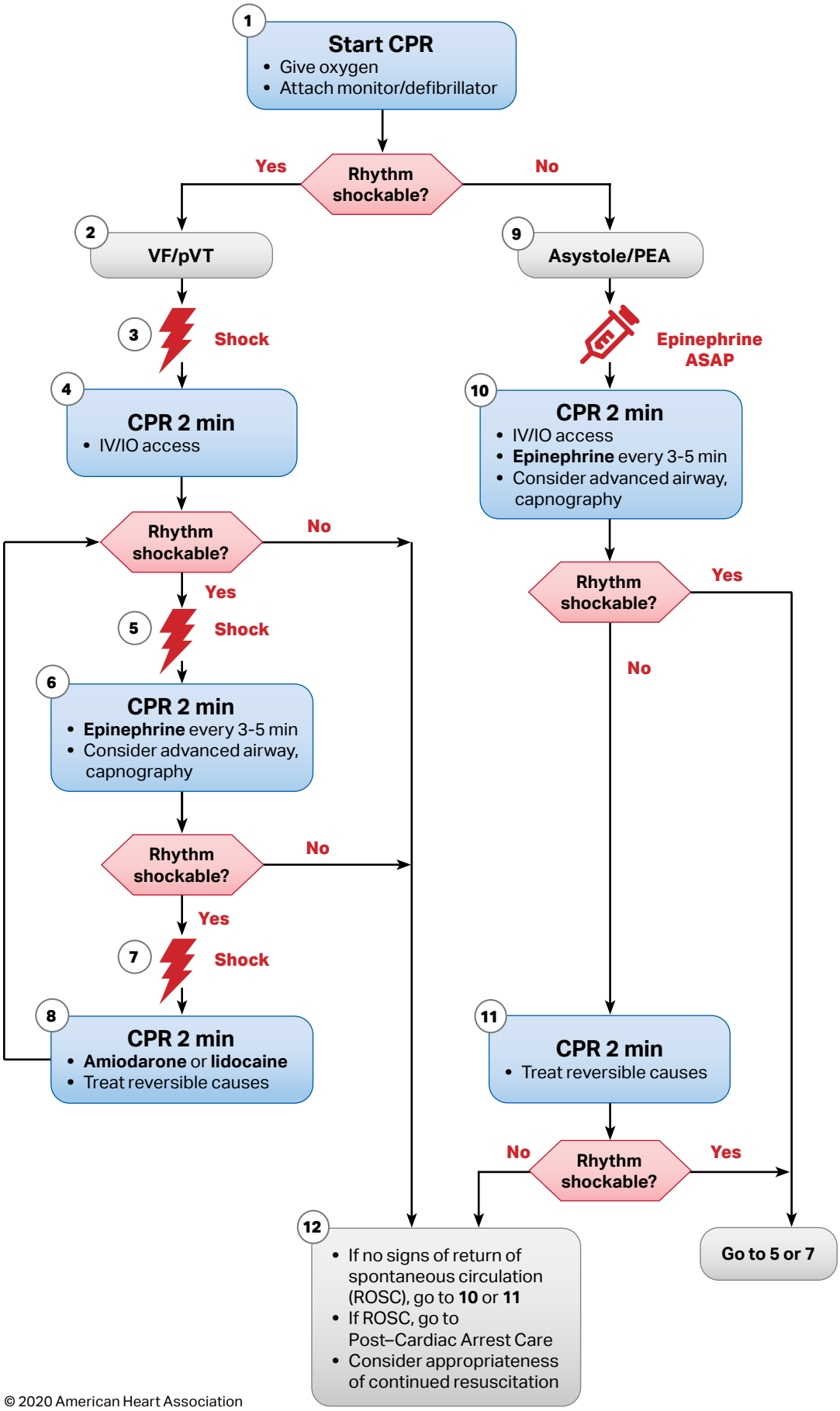
Maternal Cardiac Arrest

- Place in the left-lateral position to relieve aortacaval pressure
- Place IV above diaphragm, If receiving IV magnesium, stop and give calcium chloride or gluconate
- Provide continuous lateral uterine displacement
- Detach fetal monitors
  - If no ROSC in 5 minutes, consider perimortem cesarean delivery

Post-Cardiac Arrest Care

- Identifies ROSC, ensures B/P (>90mm Hg), Obtain 12 lead ECG, and orders lab tests
- O2 sat is monitored (92%-98%)
- Verbalizes need for ETT and waveform capnography PaCo2 (35-45mm Hg)
- If awake, transfer patient to critical care or emergency cardiac intervention for patients with STEMI present
- If comatose, considers **TTM** (**32-36 degrees C**) for at least 24 hours

Adult Cardiac Arrest Algorithm



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.
- Change compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio, or 1 breath every 6 seconds.
- Quantitative waveform capnography
  - If P_{ETCO_2} is low or decreasing, reassess 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.
  or
  Lidocaine IV/IO dose: First dose: 1-1.5 mg/kg. Second dose: 0.5-0.75 mg/kg.

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

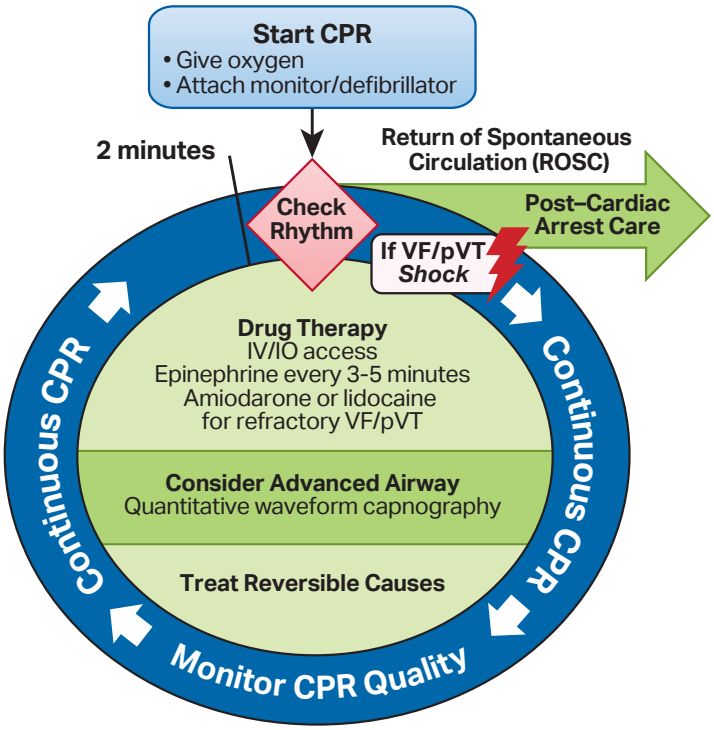
Return of Spontaneous Circulation (ROSC)

- 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 Cardiac Arrest Circular Algorithm



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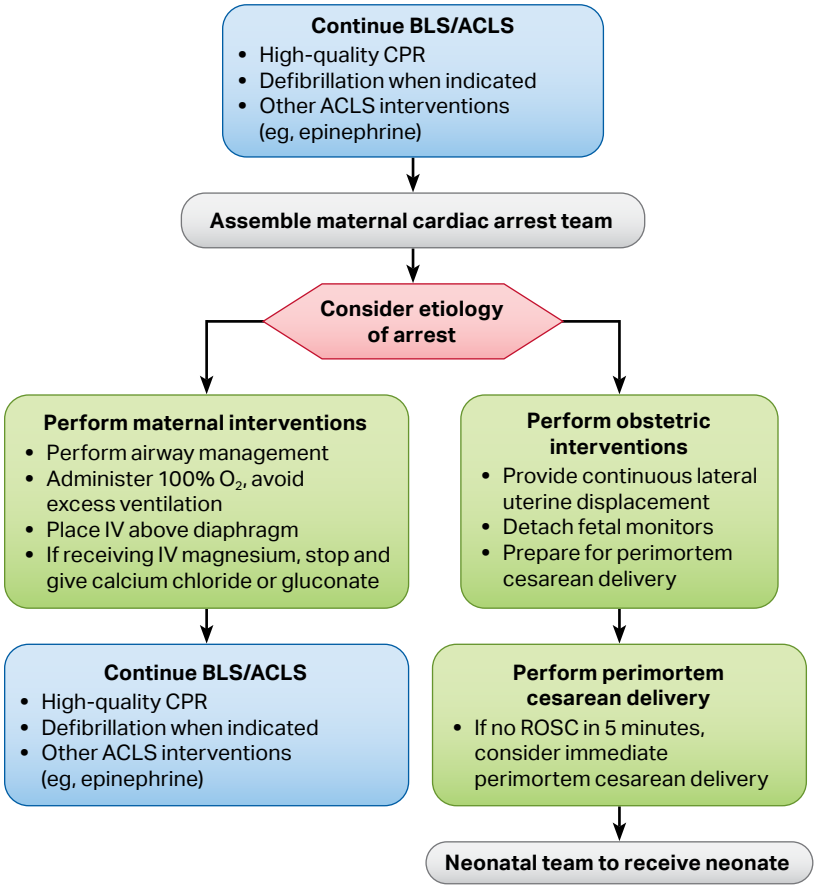
Cardiac Arrest in Pregnancy In-Hospital ACLS Algorithm



Maternal Cardiac Arrest

- Team planning should be done in collaboration with the obstetric, neonatal, emergency, anesthesiology, intensive care, and cardiac arrest services.
- Priorities for pregnant women in cardiac arrest should include provision of high-quality CPR and relief of aortocaval compression with lateral uterine displacement.
- The goal of perimortem cesarean delivery is to improve maternal and fetal outcomes.
- Ideally, perform perimortem cesarean delivery in 5 minutes, depending on provider resources and skill sets.

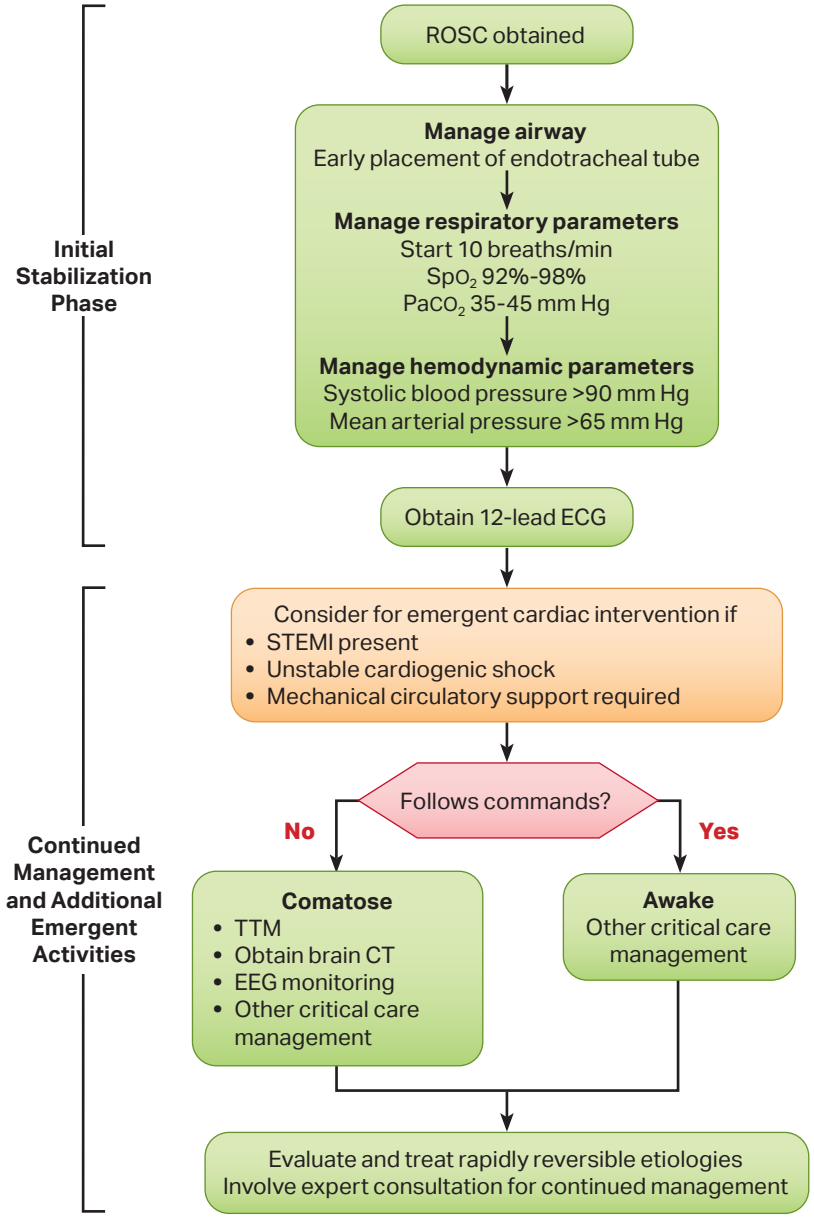
Advanced Airway

- In pregnancy, a difficult airway is common. Use the most experienced provider.
- Provide endotracheal intubation or supraglottic advanced airway.
- Perform waveform capnography or capnometry to confirm and monitor ET tube placement.
- Once advanced airway is in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions.

Potential Etiology of Maternal Cardiac Arrest

A Anesthetic complications
B Bleeding
C Cardiovascular
D Drugs
E Embolic
F Fever
G General nonobstetric causes of cardiac arrest (H's and T's)
H Hypertension

ACLS Healthcare Provider
Post–Cardiac Arrest Care Algorithm



Initial Stabilization Phase

Resuscitation is ongoing during the post-ROSC phase, and many of these activities can occur concurrently. However, if prioritization is necessary, follow these steps:

- Airway management: Waveform capnography or capnometry to confirm and monitor endotracheal tube placement
- Manage respiratory parameters: Titrate FIO_2 for SpO_2 92%-98%; start at 10 breaths/min; titrate to $PaCO_2$ of 35-45 mm Hg
- Manage hemodynamic parameters: Administer crystalloid and/or vasopressor or inotrope for goal systolic blood pressure >90 mm Hg or mean arterial pressure >65 mm Hg

Continued Management and Additional Emergent Activities

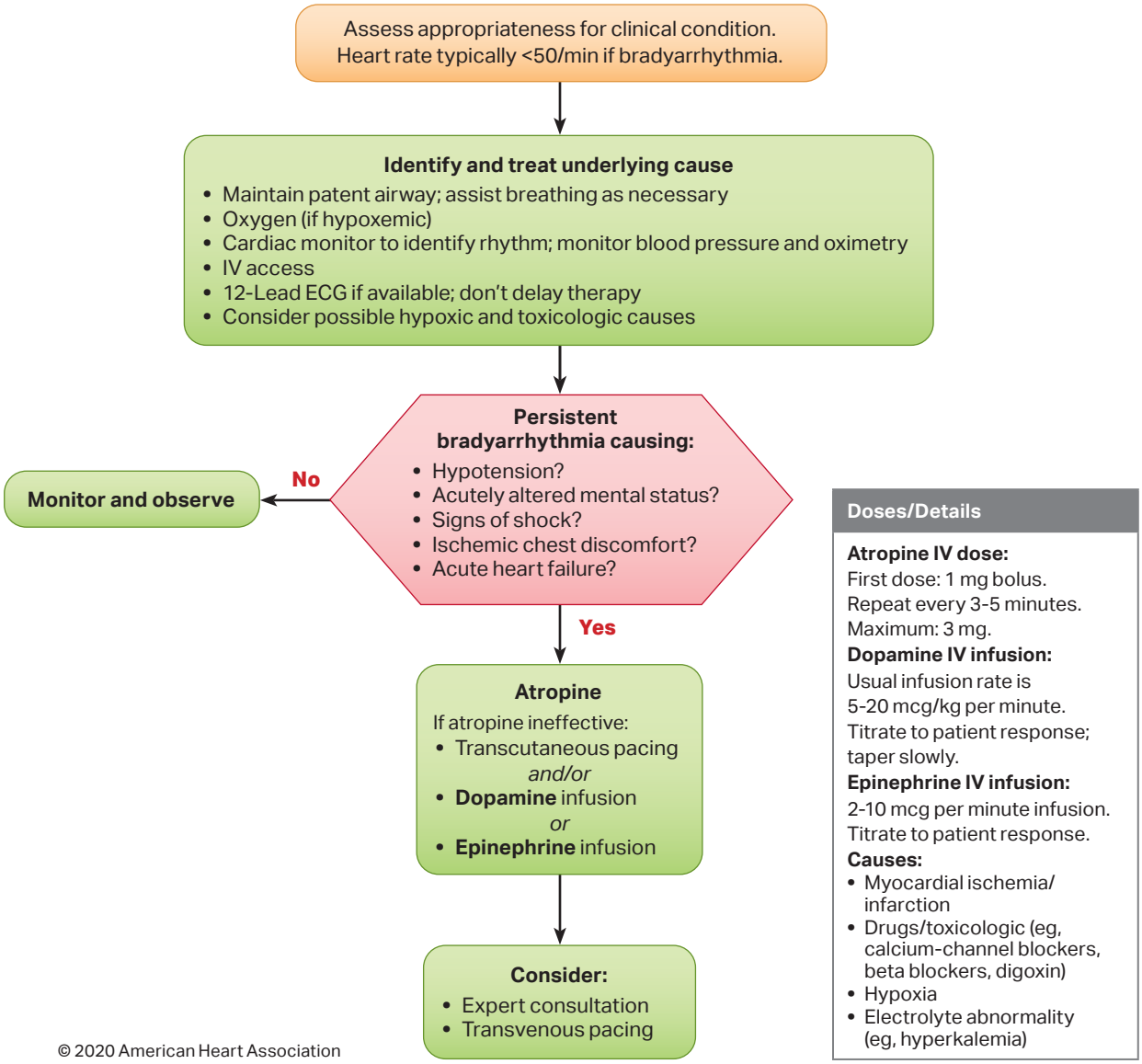
These evaluations should be done concurrently so that decisions on targeted temperature management (TTM) receive high priority as cardiac interventions.

- Emergent cardiac intervention: Early evaluation of 12-lead electrocardiogram (ECG); consider hemodynamics for decision on cardiac intervention
- TTM: If patient is not following commands, start TTM as soon as possible; begin at 32-36°C for 24 hours by using a cooling device with feedback loop
- Other critical care management
  - Continuously monitor core temperature (esophageal, rectal, bladder)
  - Maintain normoxia, normocapnia, euglycemia
  - Provide continuous or intermittent electroencephalogram (EEG) monitoring
  - Provide lung-protective ventilation

H's and T's

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypokalemia/**h**yperkalemia
Hypothermia
Tension pneumothorax
Tamponade, cardiac
Toxins
Thrombosis, pulmonary
Thrombosis, coronary

Adult Bradycardia Algorithm



Doses/Details

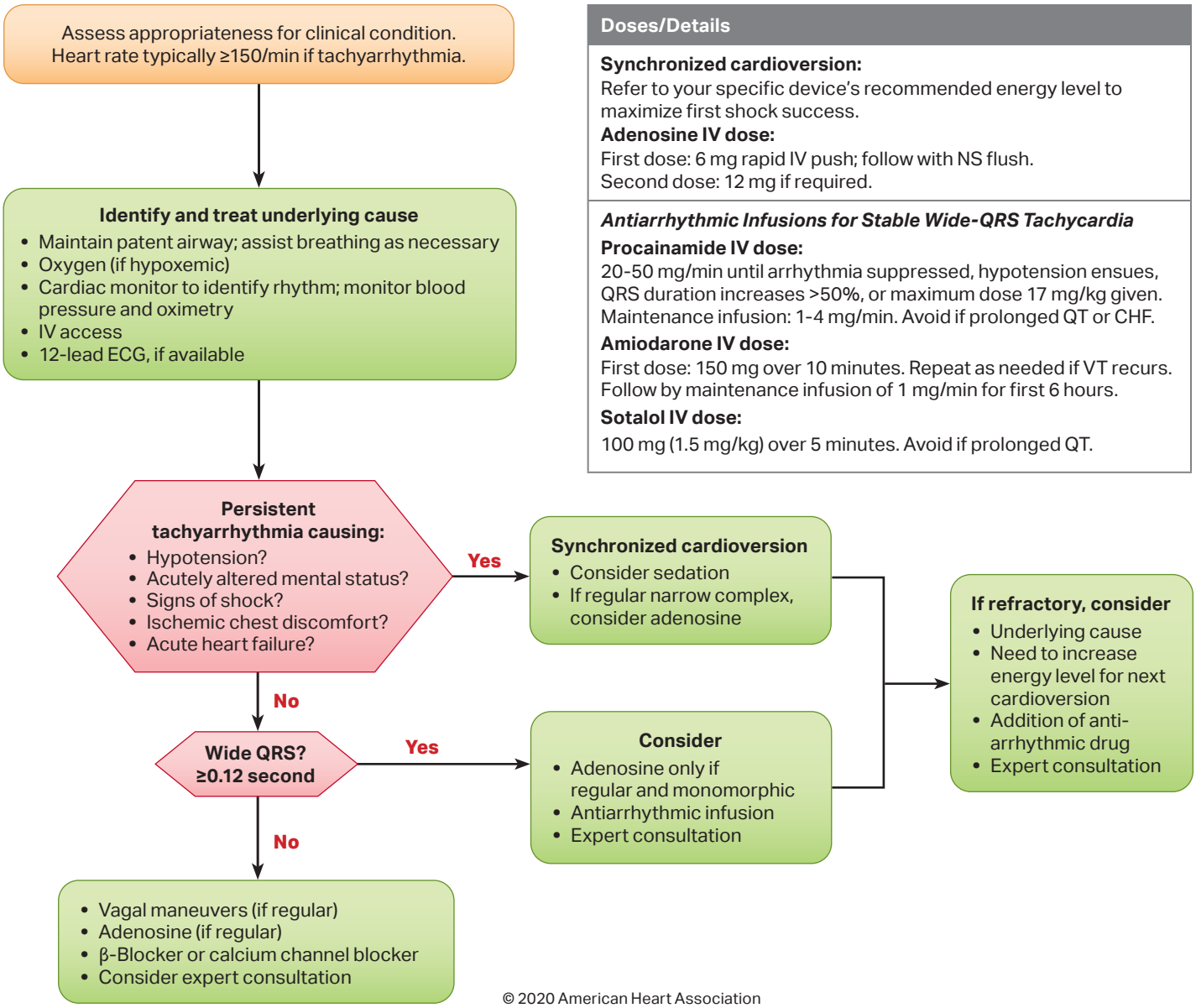
Atropine IV dose:
First dose: 1 mg bolus.
Repeat every 3-5 minutes.
Maximum: 3 mg.

Dopamine IV infusion:
Usual infusion rate is 5-20 mcg/kg per minute.
Titrate to patient response; taper slowly.

Epinephrine IV infusion:
2-10 mcg per minute infusion.
Titrate to patient response.

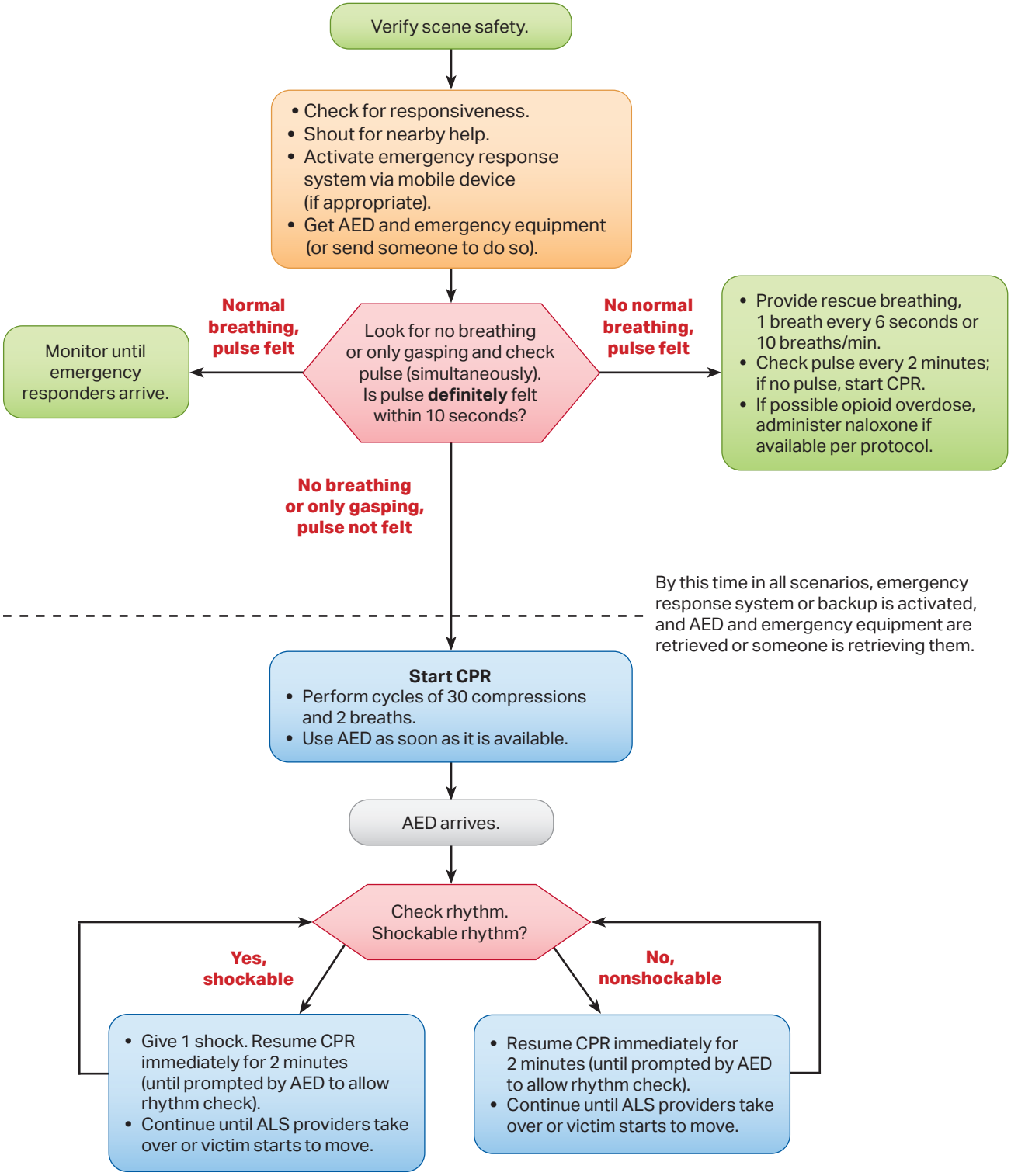
Causes:
- Myocardial ischemia/infarction
- Drugs/toxicologic (eg, calcium-channel blockers, beta blockers, digoxin)
- Hypoxia
- Electrolyte abnormality (eg, hyperkalemia)

Adult Tachycardia With a Pulse Algorithm

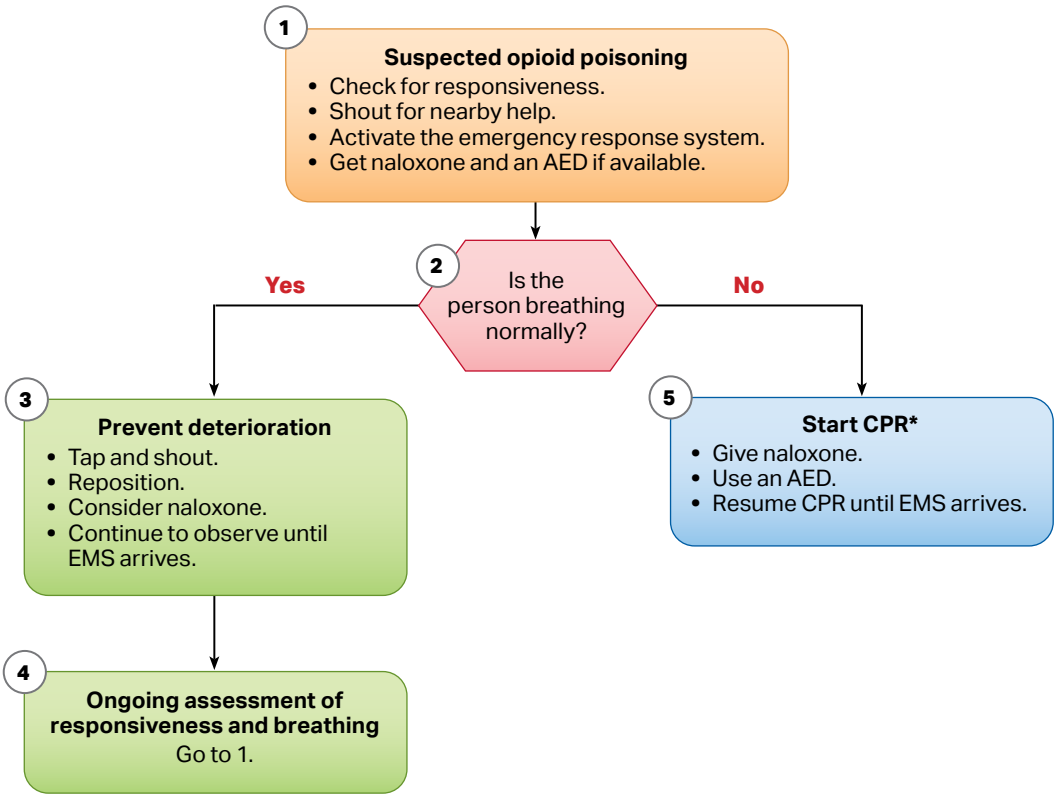


Doses/Details
Synchronized cardioversion: Refer to your specific device's recommended energy level to maximize first shock success. **Adenosine IV dose:** First dose: 6 mg rapid IV push; follow with NS flush. Second dose: 12 mg if required.
Antiarrhythmic Infusions for Stable Wide-QRS Tachycardia **Procainamide 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.

Adult Basic Life Support Algorithm for Healthcare Providers



Opioid-Associated Emergency for Lay Responders Algorithm



*For adult and adolescent victims, responders should perform compressions and rescue breaths for opioid-associated emergencies if they are trained and perform Hands-Only CPR if not trained to perform rescue breaths. For infants and children, CPR should include compressions with rescue breaths.