RWJBarnabas HEALTH | Mobile Health

ACLS Traditional Course

Dear ACLS Course Student:

Welcome to the Advanced Cardiovascular Life Support (ACLS) Provider Course.

Please plan for traffic and prepare to arrive on time. *Late students will not be allowed entry to the classroom.* Students are expected to attend and participate in the entire course.

Find Your Classroom

Please visit the website for help finding your classroom https://www.rwjbh.org/treatment-care/training-center/find-your-classroom/

What We Sent You

We have enclosed directions for completing the pre-course assessment. Please be advised this assessment must be completed prior to attending the first day of class. Use the following steps to access the Pre-Course assessment.

1. Visit **elearning.heart.org/courses**.
2. Find the course name **ACLS Precourse Self-Assessment**
3. Once you find your course, select Launch Course to begin.

Note: If you haven't already logged in, the system will ask you to do so. If you haven't visited the site before, you'll be prompted to set up an account.

How to Get Ready

The ACLS Course will teach you the lifesaving skills required to be both a team member and a Team Leader in either an in-hospital or out-of-hospital setting. Because the ACLS Course covers extensive material in a short time, you will need to prepare for the course beforehand.

Precourse Requirements

You should **prepare for class** by doing the following:

1. Review and understand the information in your *ACLS Provider Manual*.
2. Review, understand, and **pass the mandatory precourse self-assessment**. Print your certificate and bring it with you to class.
3. Ensure that your BLS skills and knowledge are current for the resuscitation scenarios. At the beginning of the ACLS Course, you will be tested on adult high-quality BLS skills, using a feedback manikin. You must know these skills in advance because the ACLS Course will not teach you how to do CPR or use an AED.

What to Bring and What to Wear

An ACLS Provider Manual will be available for you to use during class; you will need it during each lesson.

Please wear loose, comfortable clothing to class. You will be practicing skills that require working on your hands and knees, bending, standing, and lifting. If you have any physical condition that might prevent you from engaging in these activities, please tell an instructor. The instructor may be able to adjust the equipment if you have back, knee, or hip problems.

We look forward to welcoming you. If you have any questions about the course, please contact us at CPRTraining@rwjbh.org.

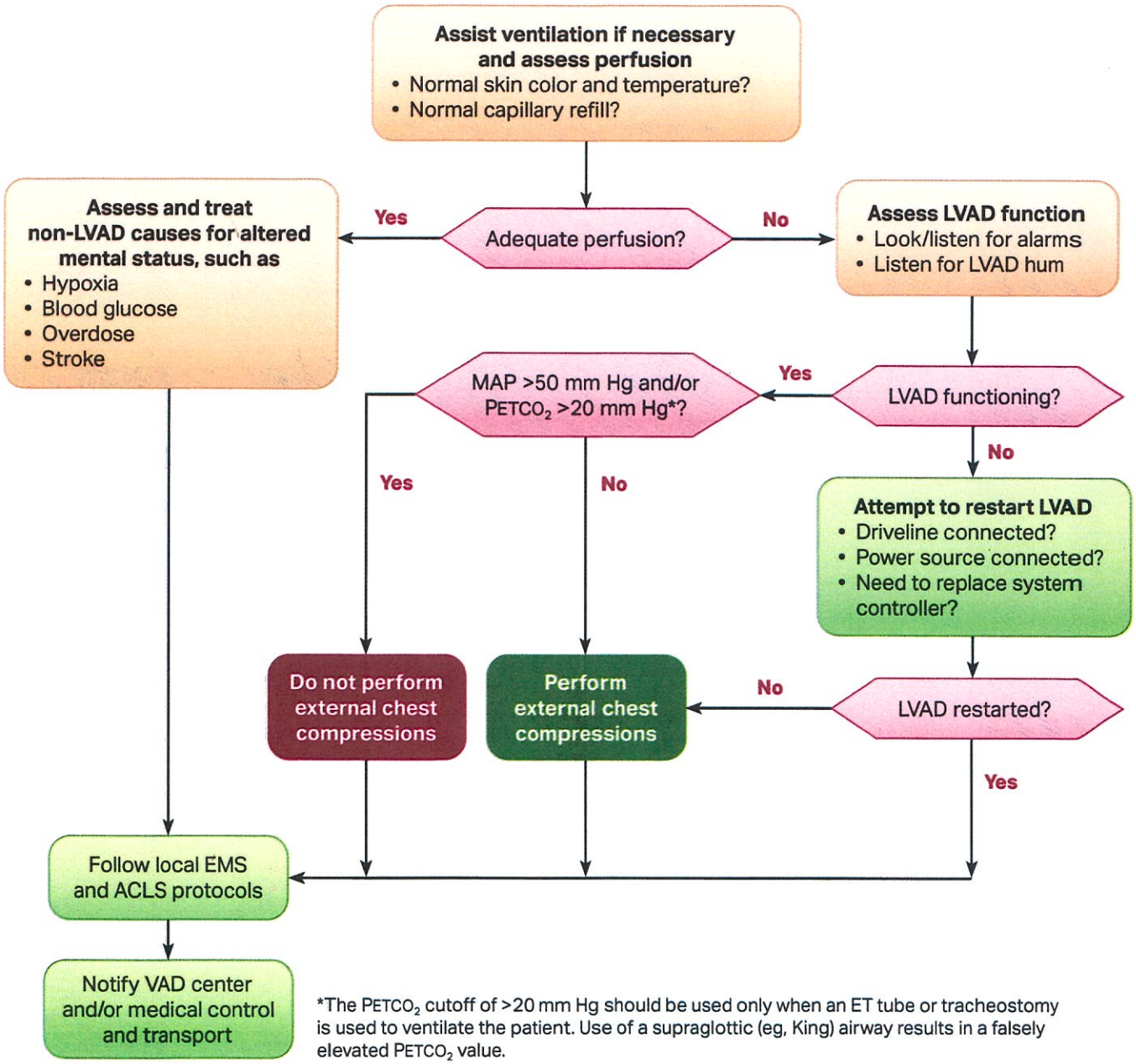
Sincerely,

RWJBarnabas Health Training Center

Adult Ventricular Assist Device Algorithm

American Heart Association.

Advanced Cardiovascular Life Support



*The $PETCO_2$ cutoff of >20 mm Hg should be used only when an ET tube or tracheostomy is used to ventilate the patient. Use of a supraglottic (eg, King) airway results in a falsely elevated $PETCO_2$ value.

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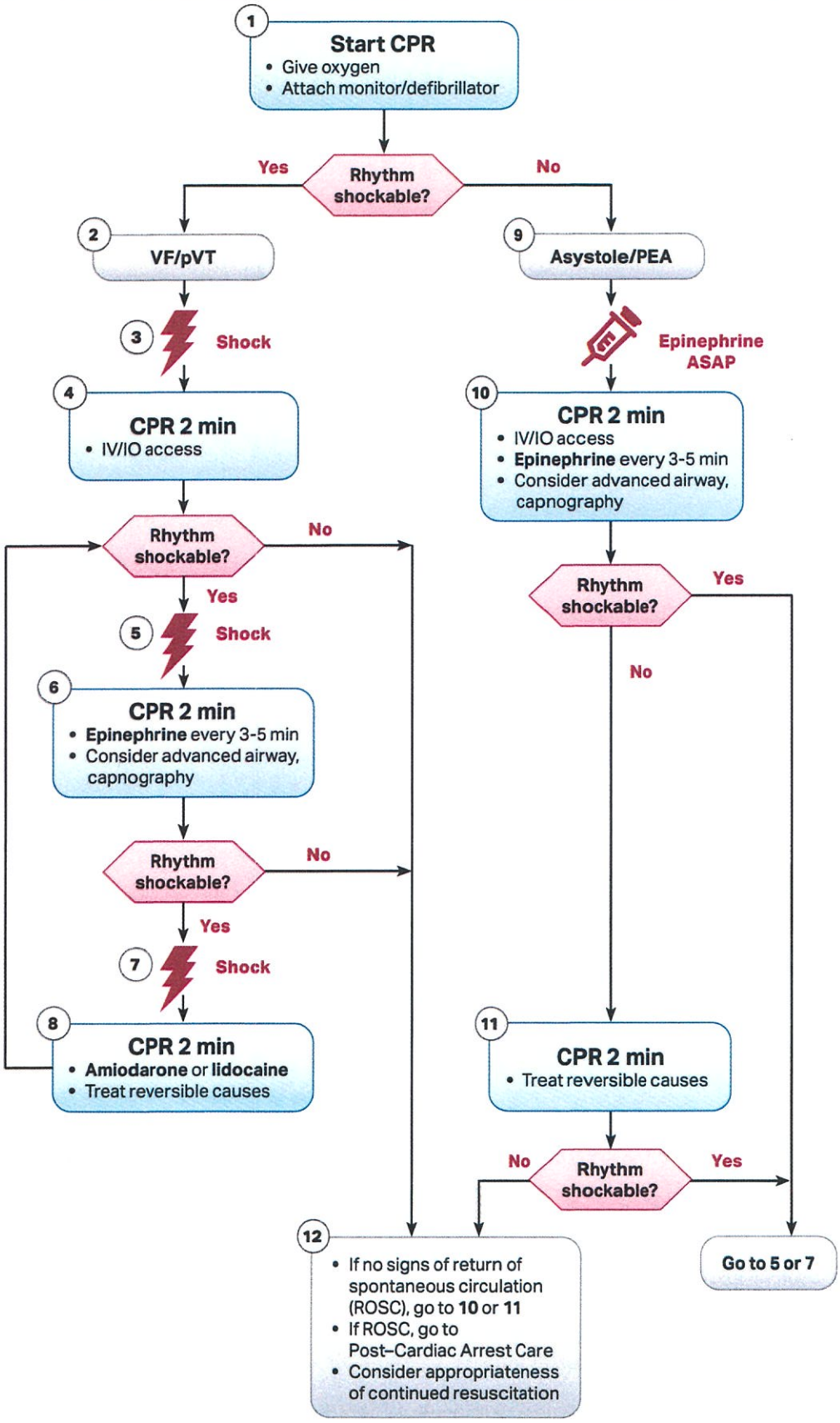
Adult Cardiac Arrest Algorithm

American Heart Association.

Advanced Cardiovascular 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.
- Change compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
  - If $PETCO_2$ 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 $PETCO_2$ (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

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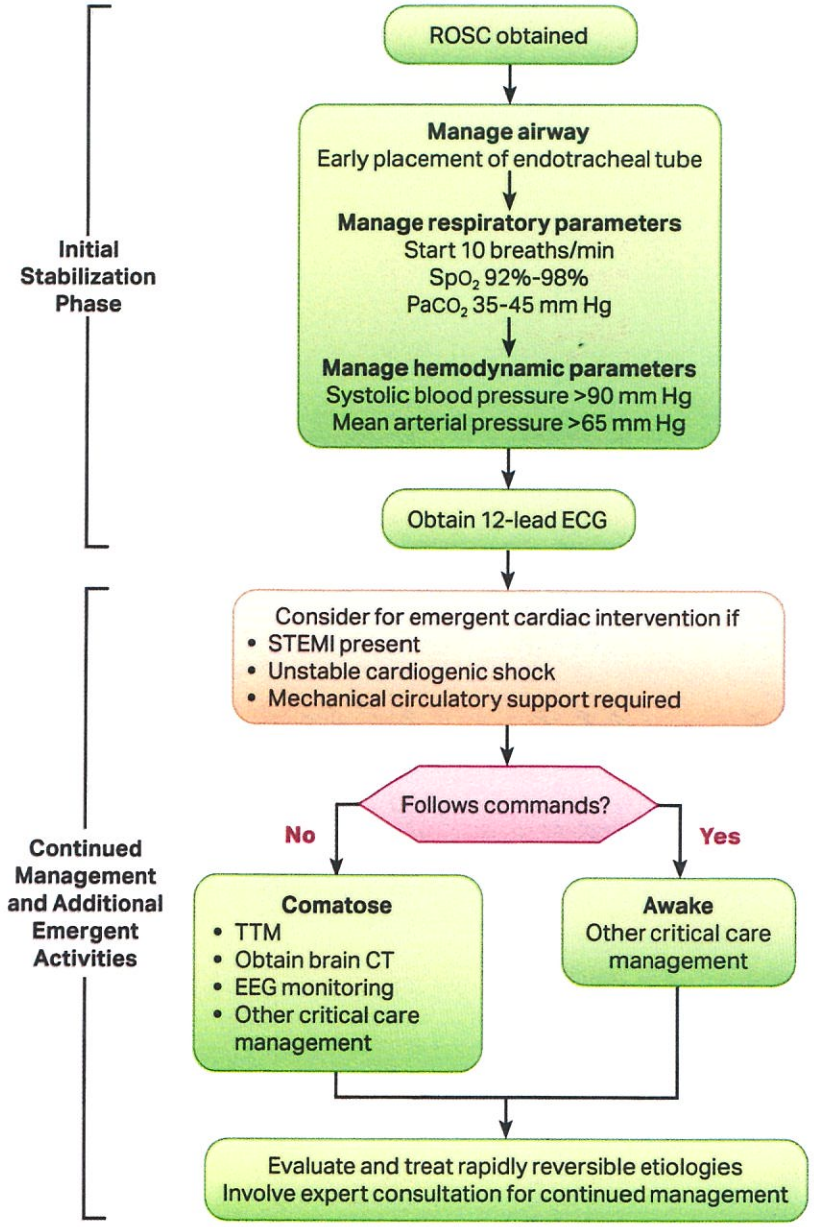
Adult Post–Cardiac Arrest Care Algorithm

American Heart Association.

Advanced Cardiovascular Life Support



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

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Adult Tachycardia With a Pulse Algorithm

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Assess appropriateness for clinical condition.
Heart rate typically ≥150/min if tachyarrhythmia.

↓

Identify and treat underlying cause
- Maintain patent airway; assist breathing as necessary
- Oxygen (if hypoxemic)
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
- IV access
- 12-lead ECG, if available

↓

Persistent tachyarrhythmia causing:
- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

Yes → **Synchronized cardioversion**
- Consider sedation
- If regular narrow complex, consider adenosine

No ↓

Wide QRS? ≥0.12 second

Yes → **Consider**
- Adenosine only if regular and monomorphic
- Antiarrhythmic infusion
- Expert consultation

No ↓

- Vagal maneuvers (if regular)
- Adenosine (if regular)
- β-Blocker or calcium channel blocker
- Consider expert consultation

If refractory, consider
- Underlying cause
- Need to increase energy level for next cardioversion
- Addition of anti-arrhythmic drug
- Expert consultation

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.

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Adult Bradycardia Algorithm

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Assess appropriateness for clinical condition.
Heart rate typically <50/min if bradyarrhythmia.

↓

Identify and treat underlying cause

- Maintain patent airway; assist breathing as necessary
- Oxygen (if hypoxemic)
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
- IV access
- 12-Lead ECG if available; don't delay therapy
- Consider possible hypoxic and toxicologic causes

↓

Persistent bradyarrhythmia causing:

- Hypotension?
- Acutely altered mental status?
- Signs of shock?
- Ischemic chest discomfort?
- Acute heart failure?

No → **Monitor and observe**

Yes ↓

Atropine

If atropine ineffective:

- Transcutaneous pacing
  and/or
- **Dopamine** infusion
  or
- **Epinephrine** infusion

↓

Consider:

- Expert consultation
- Transvenous pacing

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)

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Acute Coronary Syndromes Algorithm

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Advanced Cardiovascular Life Support

Symptoms suggestive of ischemia or infarction

EMS assessment and care and hospital preparation

- Assess ABCs. Be prepared to provide CPR and defibrillation
- Administer aspirin and consider oxygen, nitroglycerin, and morphine if needed
- Obtain 12-lead ECG; if ST elevation:
  - Notify receiving hospital with transmission or interpretation; note time of onset and first medical contact
- Provide prehospital notification; on arrival, transport to ED/cath lab per protocol
- Notified hospital should mobilize resources to respond to STEMI
- If considering prehospital fibrinolysis, use fibrinolytic checklist

Concurrent ED/cath lab assessment (<10 minutes)

- Activate STEMI team upon EMS notification
- Assess ABCs; give oxygen if needed
- Establish IV access
- Perform brief, targeted history, physical exam
- Review/complete fibrinolytic checklist; check contraindications
- Obtain initial cardiac marker levels, complete blood counts, and coagulation studies
- Obtain portable chest x-ray (<30 minutes); do not delay transport to the cath lab

Immediate ED/cath lab general treatment

- If O_2 sat <90%, start **oxygen** at 4 L/min, titrate
- **Aspirin** 162 to 325 mg (if not given by EMS)
- **Nitroglycerin** sublingual or translingual
- **Morphine** IV if discomfort not relieved by nitroglycerin
- Consider administration of **$P2Y_{12}$ inhibitors**

ECG interpretation

ST elevation or new or presumably new LBBB; strongly suspicious for injury
ST-elevation MI (STEMI)

- **Start adjunctive therapies** as indicated
- **Do not delay reperfusion**

Time from onset of symptoms ≤12 hours?

>12 hours →

Troponin elevated or high-risk patient
Consider early invasive strategy if:

- Refractory ischemic chest discomfort
- Recurrent/persistent ST deviation
- Ventricular tachycardia
- Hemodynamic instability
- Signs of heart failure

Start adjunctive therapies
(eg, nitroglycerin, heparin) as indicated

See AHA/ACC NSTE-ACS Guidelines

≤12 hours ↓

Reperfusion goals:
Therapy defined by patient and center criteria

- **FMC–to–balloon inflation (PCI) goal of ≤90 minutes**
- **Door-to-needle (fibrinolysis) goal of 30 minutes**

Non–ST-elevation ACS (NSTE-ACS)
Determine risk using validated score (ie, TIMI or GRACE)

ST depression or dynamic T-wave inversion, transient ST elevation; strongly suspicious for ischemia and/or high-risk score
High-risk NSTE-ACS

Normal ECG or nondiagnostic changes in ST segment or T wave; low-risk score
Low-/intermediate-risk NSTE-ACS

Consider admission to ED chest pain unit or to appropriate bed for further monitoring and possible intervention

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Adult Suspected Stroke Algorithm

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Identify signs and symptoms of possible stroke
Activate emergency response

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Critical EMS assessments and actions

- Assess ABCs; give oxygen if needed
- Initiate stroke protocol
- Perform physical exam
- Perform validated prehospital stroke screen and stroke severity tool
- Establish time of symptom onset (last known normal)
- Triage to most appropriate stroke center
- Check glucose; treat if indicated
- Provide prehospital notification; on arrival, transport to brain imaging suite

Note: Refer to the expanded EMS stroke algorithm.

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ED or brain imaging suite*
Immediate general and neurologic assessment by hospital or stroke team

- Activate stroke team upon EMS notification
- Prepare for emergent CT scan or MRI of brain upon arrival
- Stroke team meets EMS on arrival
- Assess ABCs; give oxygen if needed
- Obtain IV access and perform laboratory assessments
- Check glucose; treat if indicated
- Review patient history, medications, and procedures
- Establish time of symptom onset or last known normal
- Perform physical exam and neurologic examination, including NIH Stroke Scale or Canadian Neurological Scale

*Best practice is to bypass the ED and go straight to the brain imaging suite.

↓

Does brain imaging show hemorrhage?

- Yes → **Initiate intracranial hemorrhage protocol**
- No ↓

Consider alteplase

↓

Alteplase candidate?

- Yes → **Administer alteplase** → **Consider EVT**
- No ↓

Consider EVT

- Perform CTA
- Perform CTP as indicated

↓

EVT candidate?

- Yes → **Rapidly transport to cath lab or transfer to EVT-capable center** → **Admit to neurological ICU**
- No → **Admit to stroke unit or neurological ICU, or transfer to higher level of care**

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Cardiac Arrest in Pregnancy In-Hospital ACLS Algorithm

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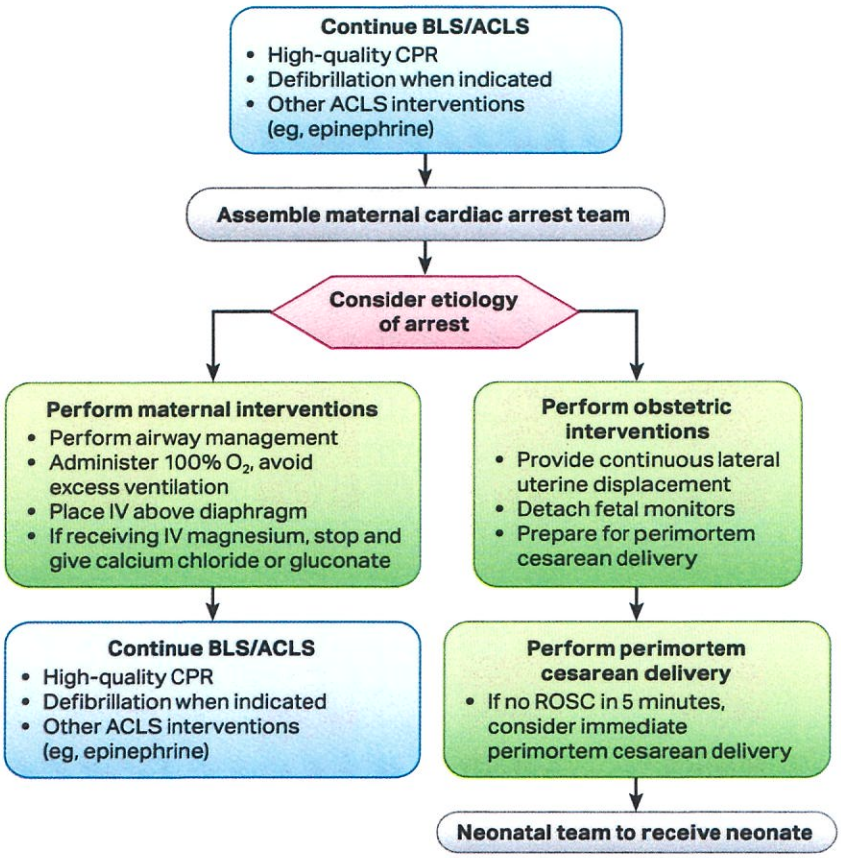

Maternal Cardiac Arrest

- 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

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