

Adult Bradycardia with a Pulse

Assessment and Treatment



**STEP
#1**

ASSESS APPROPRIATENESS FOR CLINICAL CONDITION

Heart rate typically <50/min if bradyarrhythmia.

**STEP
#2**

IDENTIFY AND TREAT THE 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

**STEP
#3**

IS PERSISTENT BRADYARRHYTHMIA CAUSING...

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

YES

ATROPINE (0.5 mg IV)

If Atropine ineffective:

- **TRANSCUTANEOUS PACING**
and/or
- **DOPAMINE INFUSION**
and/or
- **EPINEPHRINE INFUSION**

CONSIDER:

- Expert consultation
- Transvenous pacing

NO

**MONITOR
AND
OBSERVE**

Doses and Details

ATROPINE IV DOSE

First Dose

- 0.5 mg bolus
- Repeat every 3-5 min.
- Maximum: 3 mg.

DOPAMINE IV INFUSION

Usual Infusion Rate

- 20 mcg/kg/min
- Titrate to pt. response;
taper slowly

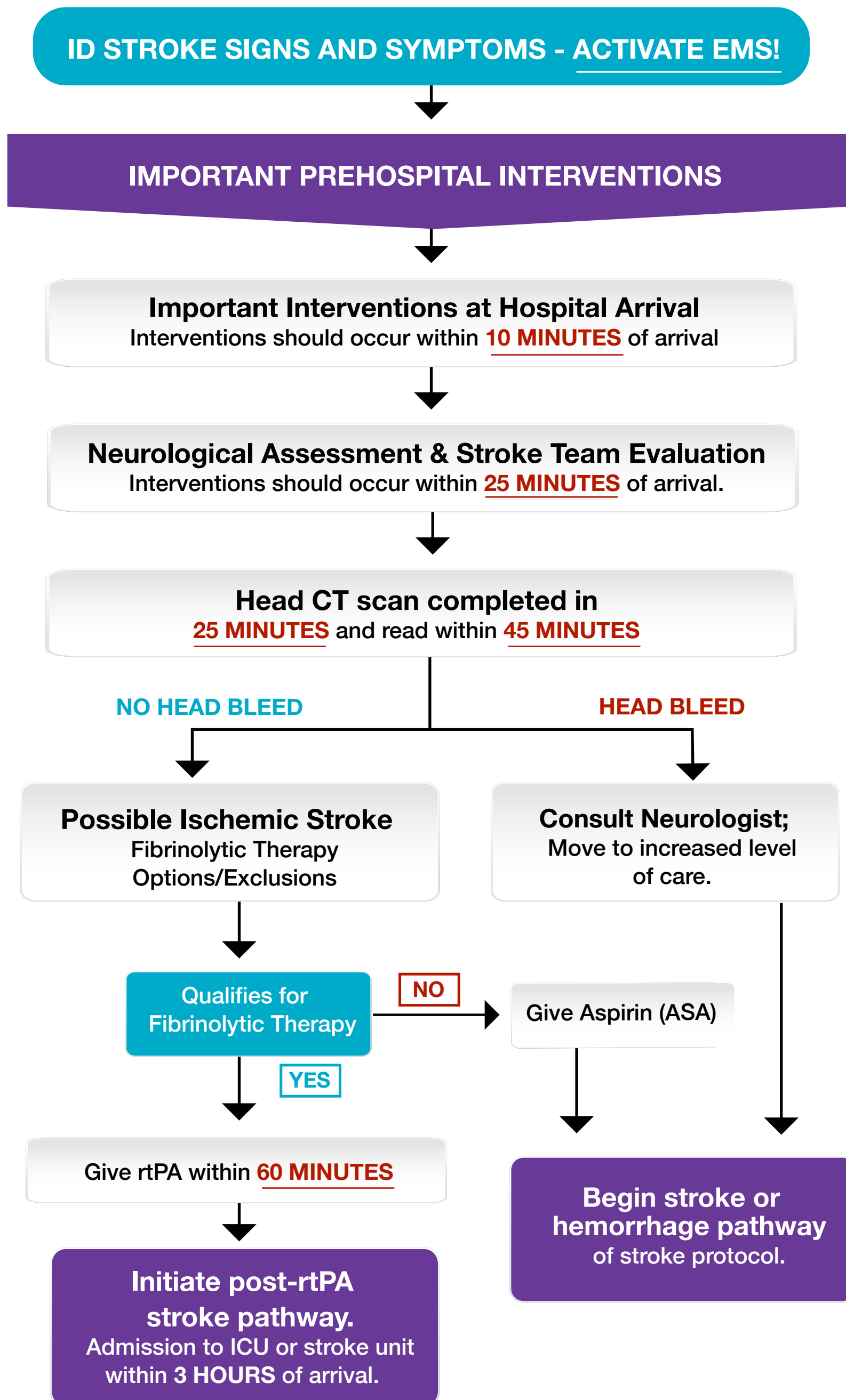
EPINEPHRINE IV INFUSION

Usual Infusion Rate

- 2-10 mcg/min infusion
- Titrate to pt. response

Suspected Stroke in Adult

Assessment and Treatment

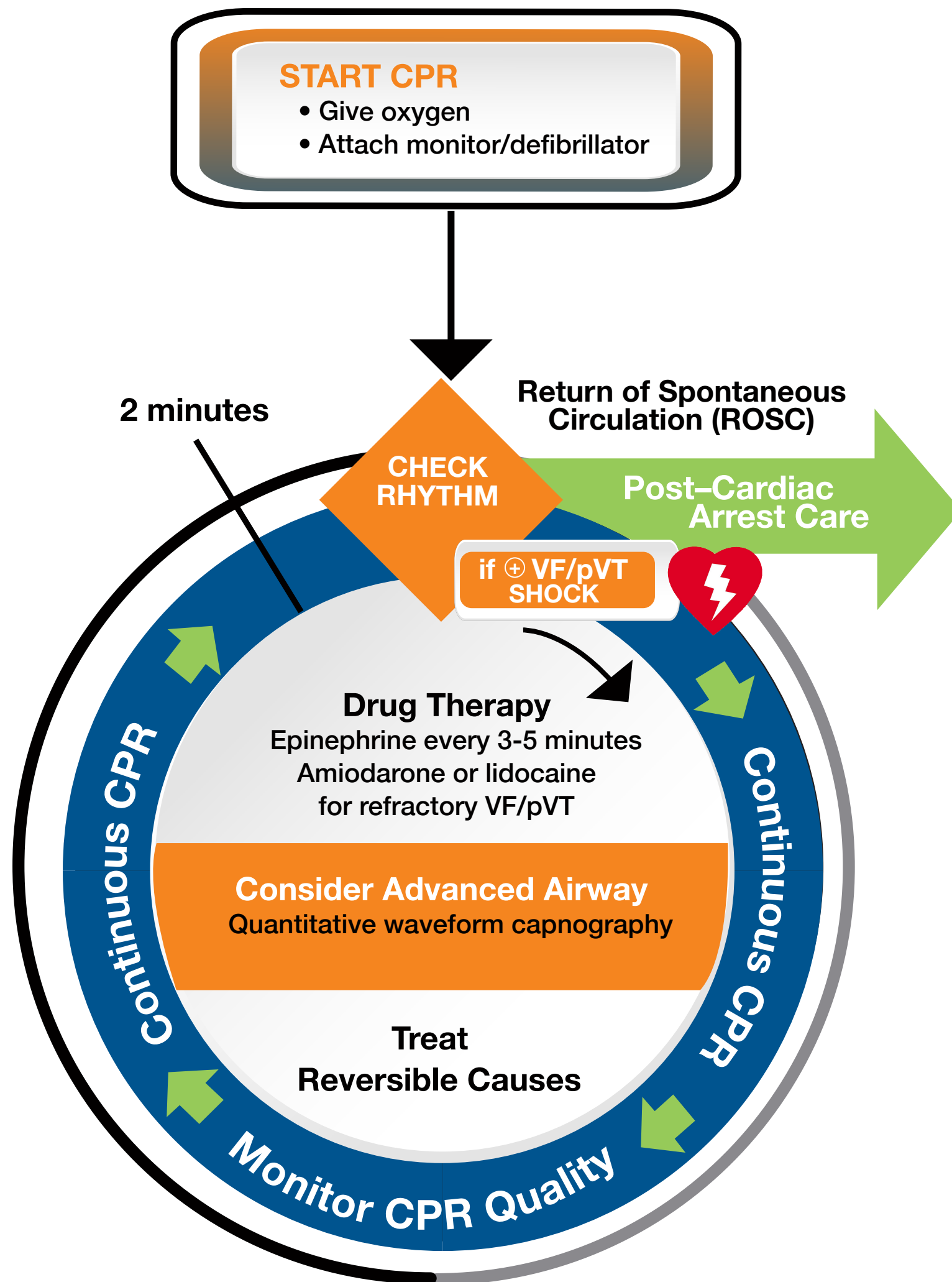


Adult Cardiac Arrest Circular Algorithm

Assessment and Treatment



Circular Algorithm



CPR

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 PETCO₂ 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.
- 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):

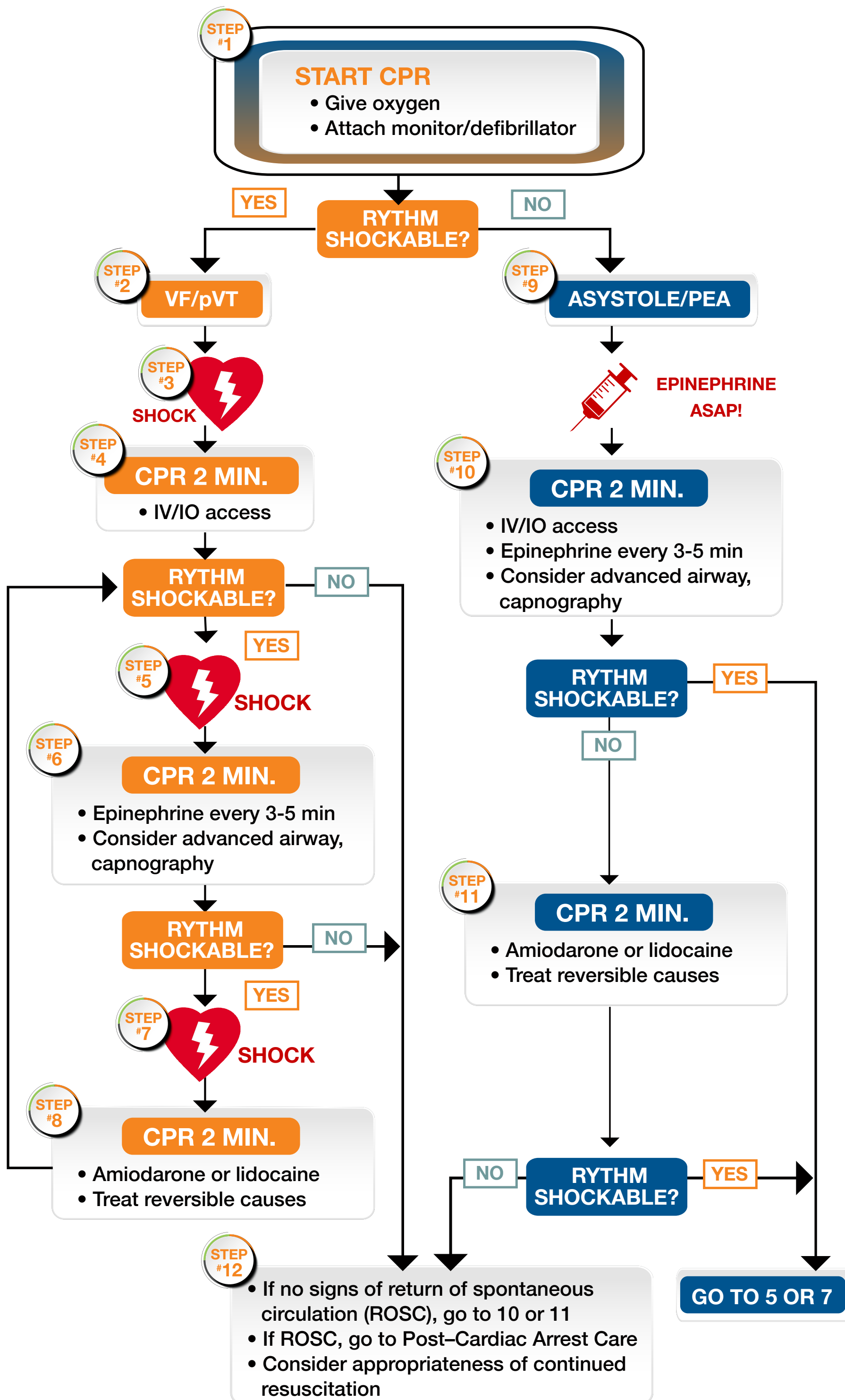
- Pulse and blood pressure
- Abrupt sustained increase in PETCO₂ (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes:

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

Adult Cardiac Arrest Vertical Algorithm

Assessment and Treatment



CPR

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 PETCO₂ is low or decreasing, reassess CPR quality.

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Post-Cardiac Arrest Care

Assessment and Treatment



POST-ROSC

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 FIO₂ for SpO₂ 92%-98%; start at 10 breaths/min; titrate to PaCO₂ 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
- Manage hemodynamic parameters:
Administer crystalloid and/or vasopressor or inotrope for goal systolic blood pressure >90

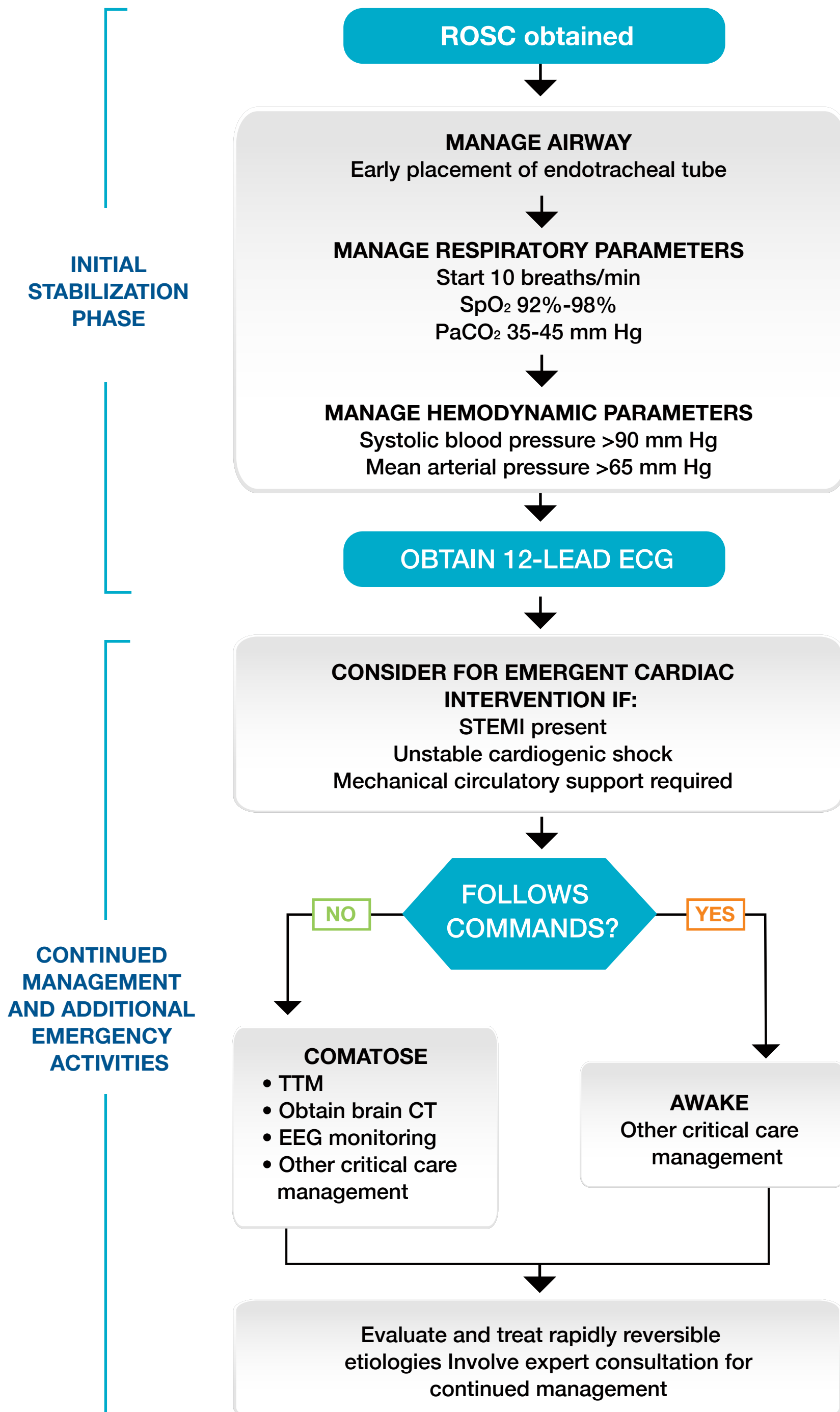
Continued Management and Additional Emergent Activities:

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

- 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/hyperkalemia Hypothermia
- Tension pneumothorax Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary



Adult Tachycardia with a Pulse

Assessment and Treatment

ASSESS APPROPRIATENESS FOR CLINICAL CONDITION.
Heart rate typically $\geq 150/\text{min}$ 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:

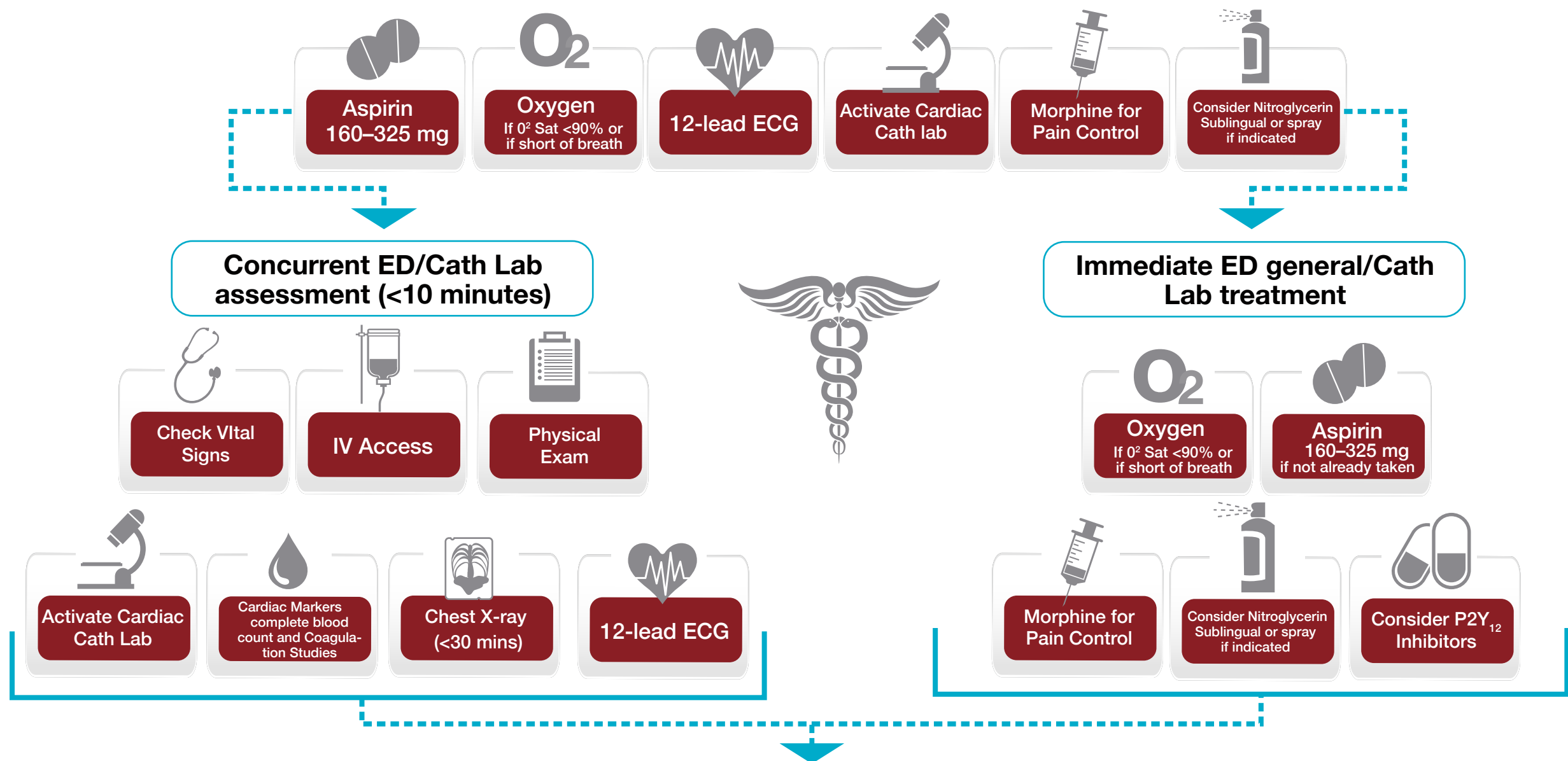
100 mg (1.5 mg/kg) over 5 minutes. Avoid if prolonged QT.

NOTES:

Acute Coronary Syndromes Algorithm

Syndromes Suggestive of Ischemia or Infarction

EMS Assessment, Care and Hospital Preparation



ECG Interpretation**

ST-ELEVATION MI (STEMI)

Start adjunctive therapies as indicated
Do not delay reperfusion

Time from onset of symptoms
≤12 hours?

>12 hours

<12 hours

Reperfusion goals:
First medical contact-to-balloon inflation (PCI) goal of 90 minutes.
Door-to-needle (fibrinolysis) goal of 30 minutes.

High-risk unstable angina/non-ST-elevation MI (UA/NSTEMI)

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 treatments as indicated

- Nitroglycerin
- Heparin (UFH or LMWH)
- Angiotensin-converting enzyme inhibitors
- HMG-CoA reductase inhibitors
- Consider: PO β-blockers
- Consider: P2Y12 inhibitors
- Consider: Glycoprotein IIb/IIIa inhibitor

Admit to monitored bed. Assess risk status.
Continue ASA, heparin, and other therapies as indicated.

LOW-/INTERMEDIATE-RISK ACS

Consider admission to ED chest pain unit or to appropriate bed and follow:

- Serial cardiac markers (including troponin)
- Repeat ECG/continuous ST-segment monitoring
- Consider noninvasive diagnostic test

Develops 1 or more:

- Clinical high-risk features
- Dynamic ECG changes consistent with ischemia
- Troponin elevated

Abnormal diagnostic noninvasive imaging or physiologic testing?

If no evidence of ischemia or infarction by testing, can discharge with follow-up