



2015 GUIDELINE UPDATE
CPR AND ECC: ALGORITHM PACKAGE
Essentials for Health Professionals

Introduction



On October 15th, 2015 the Heart and Stroke Foundation of Canada (HSFC) released the 2015 Guidelines for Cardio Pulmonary Resuscitation (CPR) and Emergency Cardiac Care (ECC).

HSFC works collaboratively with the American Heart Association (AHA) and the European Resuscitation Council (ERC) who each released similar interpretations of these guidelines. Following the last update 5 years ago, experts have reviewed new scientific studies and provided recommendations on how to improve the survival for patients suffering from a sudden cardiac arrest.

These guidelines provide core algorithms to outline key actions and decisions for the immediate care of common cardiovascular emergencies:

- Cardiac arrest
- Post-cardiac arrest
- Hemodynamically unstable bradycardia and tachycardia
- Acute coronary syndromes

The algorithms in this booklet are central to Advanced Cardiac Life Support and Pediatric Advanced Life Support Courses and are provided here for easy reference during the course.

Further information on the algorithms is summarized in the Highlights of the 2015 American Health Association Guidelines Update for CPR and ECC¹. Considerable material included in the major release documents is not included in these core algorithms. For the most comprehensive information and references readers are encouraged to review the 2015 AHA Guidelines Update for CPR and ECC².

1 - http://www.heartandstroke.com/atf/cf/%7B99452d8b-e7f1-4bd6-a57d-b136ce6c95bf%7D/ECC%20HIGHLIGHTS%20OF%202015%20GUIDELINES%20UPDATE%20FOR%20CPR%20ECC_LR.PDF

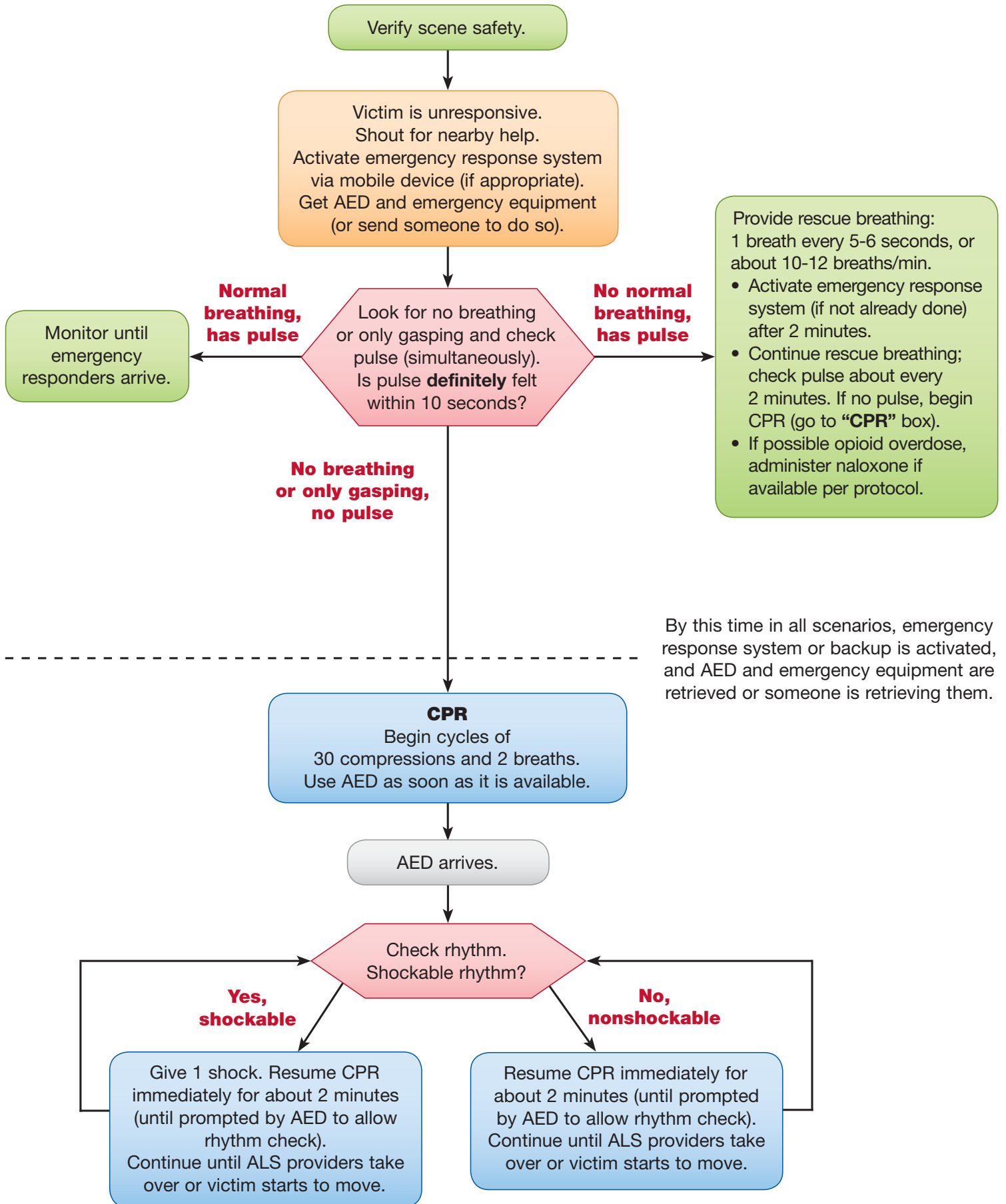
2 - <https://eccguidelines.heart.org/index.php/american-heart-association/0/>

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BLS Healthcare Provider Adult Cardiac Arrest Algorithm—2015 Update



BLS Dos and Don'ts of Adult High-Quality CPR

Rescuers Should	Rescuers Should <i>Not</i>
Perform chest compressions at a rate of 100-120/min	Compress at a rate slower than 100/min or faster than 120/min
Compress to a depth of at least 2 inches (5 cm)	Compress to a depth of less than 2 inches (5 cm) or greater than 2.4 inches (6 cm)
Allow full recoil after each compression	Lean on the chest between compressions
Minimize pauses in compressions	Interrupt compressions for greater than 10 seconds
Ventilate adequately (2 breaths after 30 compressions, each breath delivered over 1 second, each causing chest rise)	Provide excessive ventilation (ie, too many breaths or breaths with excessive force)

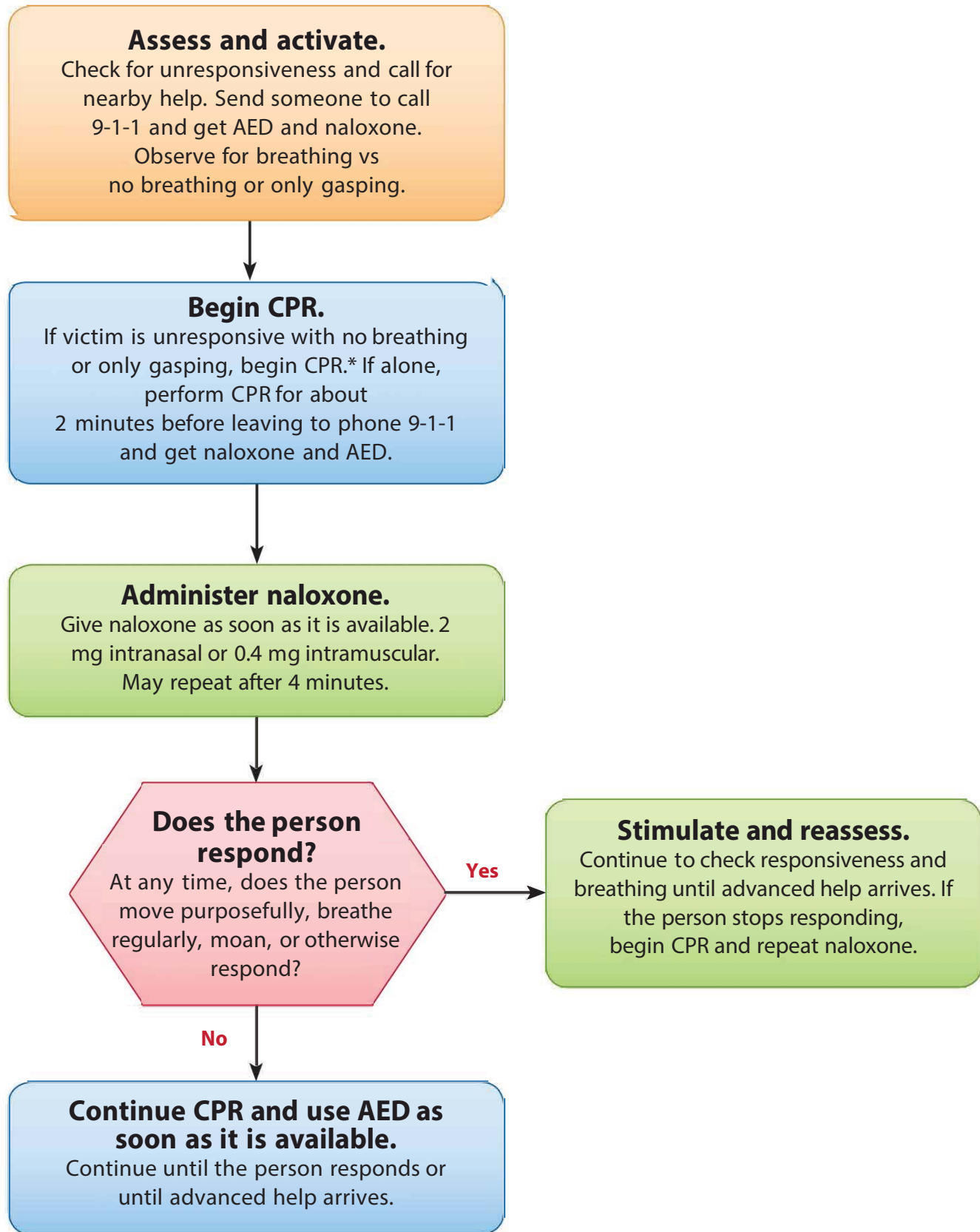
Summary of High-Quality CPR Components for BLS Providers

*Compression depth should be no more than 2.4 inches (6 cm).
 Abbreviations: AED, automated external defibrillator; AP, anteroposterior; CPR, cardiopulmonary resuscitation.

Component	Adults and Adolescents	Children (Age 1 Year to Puberty)	Infants (Age Less Than 1 Year, Excluding Newborns)
Scene safety	Make sure the environment is safe for rescuers and victim		
Recognition of cardiac arrest	Check for responsiveness No breathing or only gasping (ie, no normal breathing) No definite pulse felt within 10 seconds (Breathing and pulse check can be performed simultaneously in less than 10 seconds)		
Activation of emergency response system	If you are alone with no mobile phone, leave the victim to activate the emergency response system and get the AED before beginning CPR Otherwise, send someone and begin CPR immediately; use the AED as soon as it is available	<p style="text-align: center;"><i>Witnessed collapse</i></p> Follow steps for adults and adolescents on the left <p style="text-align: center;"><i>Unwitnessed collapse</i></p> Give 2 minutes of CPR Leave the victim to activate the emergency response system and get the AED Return to the child or infant and resume CPR; use the AED as soon as it is available	

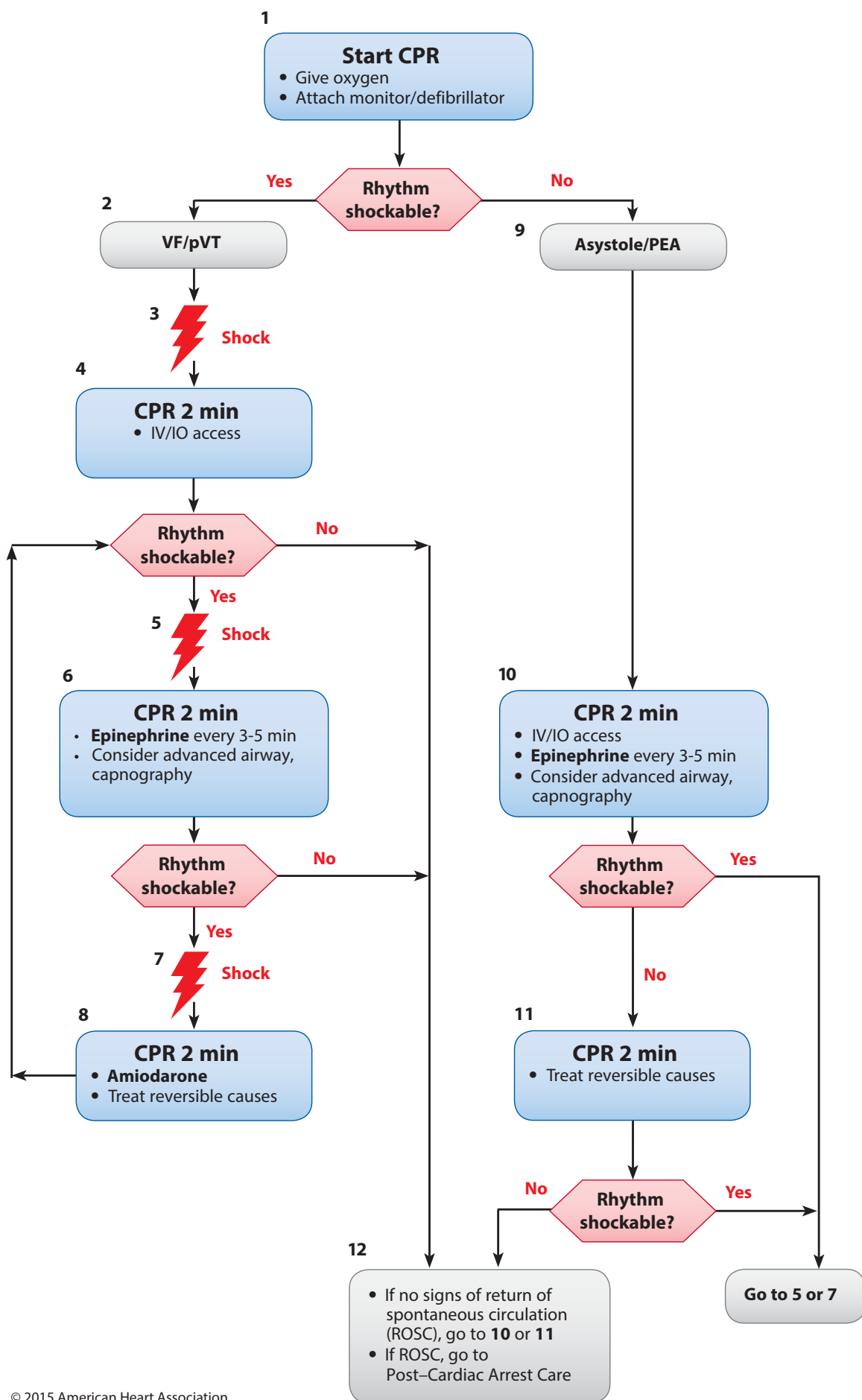
Compression-ventilation ratio without advanced airway	1 or 2 rescuers - 30:2	1 rescuer - 30:2 2 or more rescuers - 15:2	
Compression-ventilation ratio with advanced airway	Continuous compressions at a rate of 100-120/min Give 1 breath every 6 seconds (10 breaths/min)		
Compression rate	100-120/min		
Compression depth	At least 2 inches (5 cm)*	At least one-third AP diameter of chest About 2 inches (5 cm)	At least one-third AP diameter of chest About 1 1/2 inches (4 cm)
Hand placement	2 hands on the lower half of the breastbone (sternum)	2 hands or 1 hand (optional for very small child) on the lower half of the breastbone (sternum)	1 rescuer 2 fingers in the center of the chest, just below the nipple line 2 or more rescuers 2 thumb-encircling hands in the center of the chest, just below the nipple line
Chest recoil	Allow full recoil of chest after each compression; do not lean on the chest after each compression		
Minimizing interruptions	Limit interruptions in chest compressions to less than 10 seconds		

Opioid-Associated Life-Threatening Emergency (Adult) Algorithm — New 2015



*CPR technique based on rescuer's level of training.

Adult Cardiac Arrest Algorithm—2015 Update



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.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
 - If PETCO₂ <10 mm Hg, attempt to improve CPR quality.
 - Intra-arterial pressure
 - If relaxation phase (diastolic) pressure <20 mm Hg, attempt to improve 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.

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

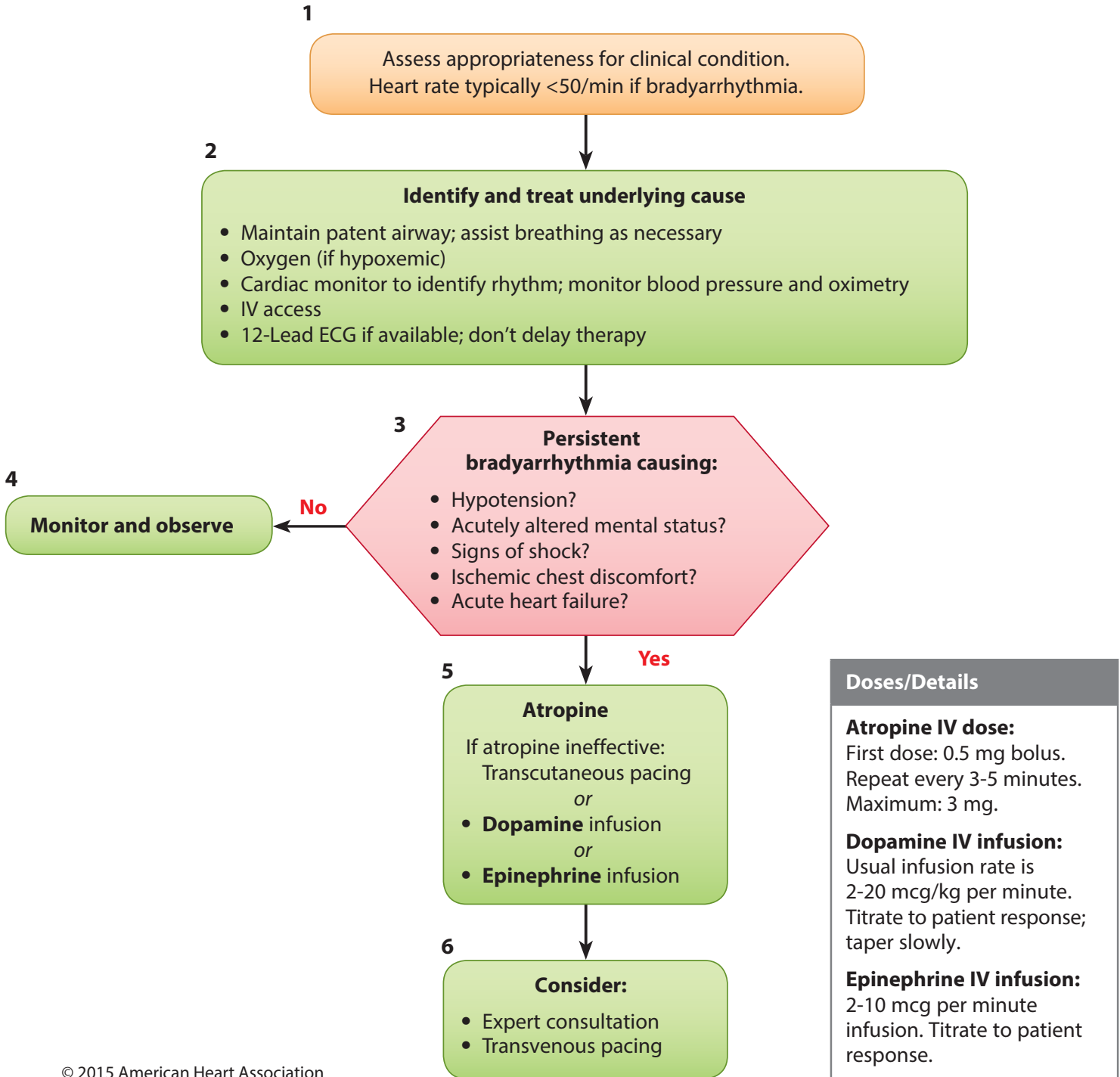
Return of Spontaneous Circulation (ROSC)

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

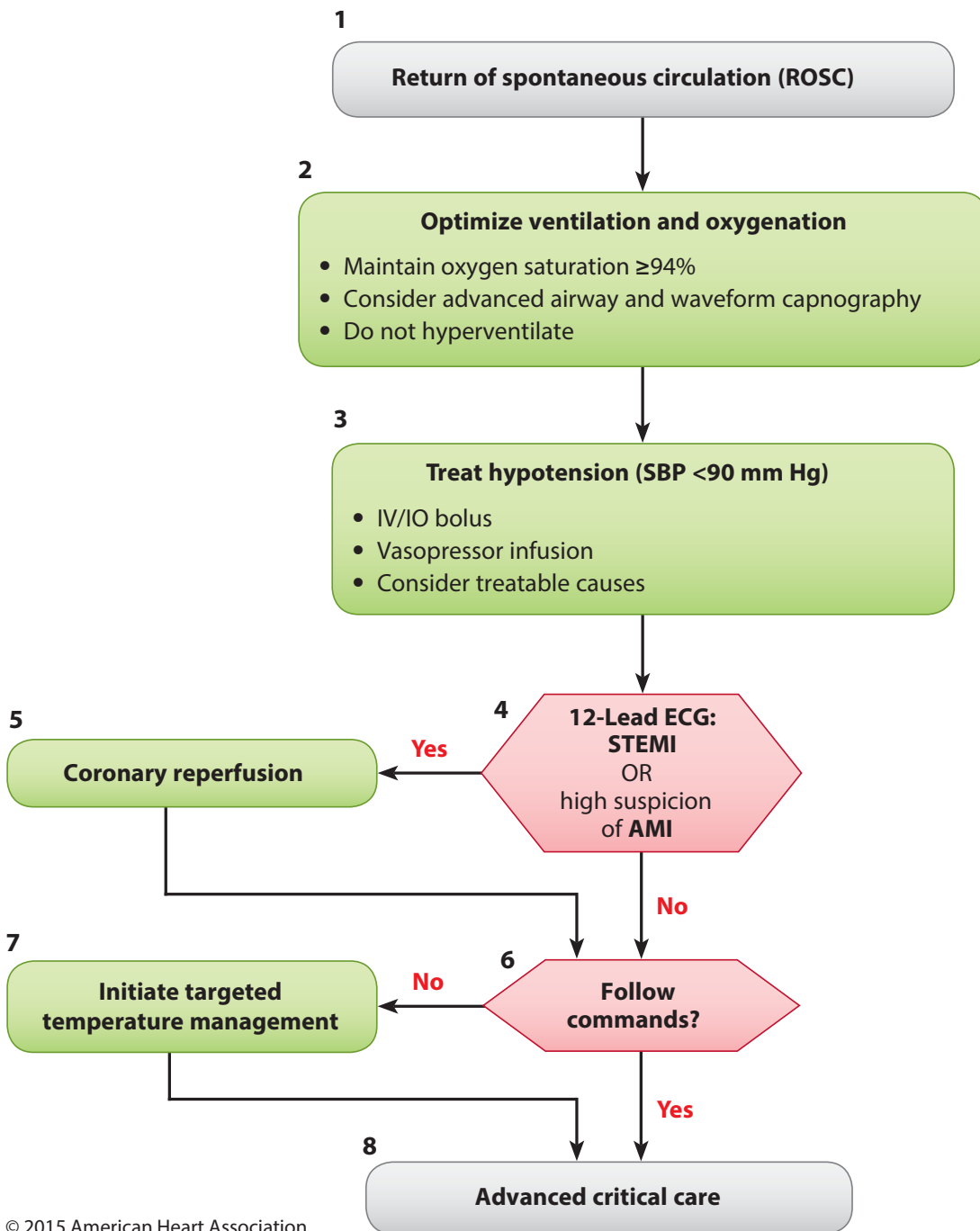
Reversible Causes

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

Adult Bradycardia With a Pulse Algorithm

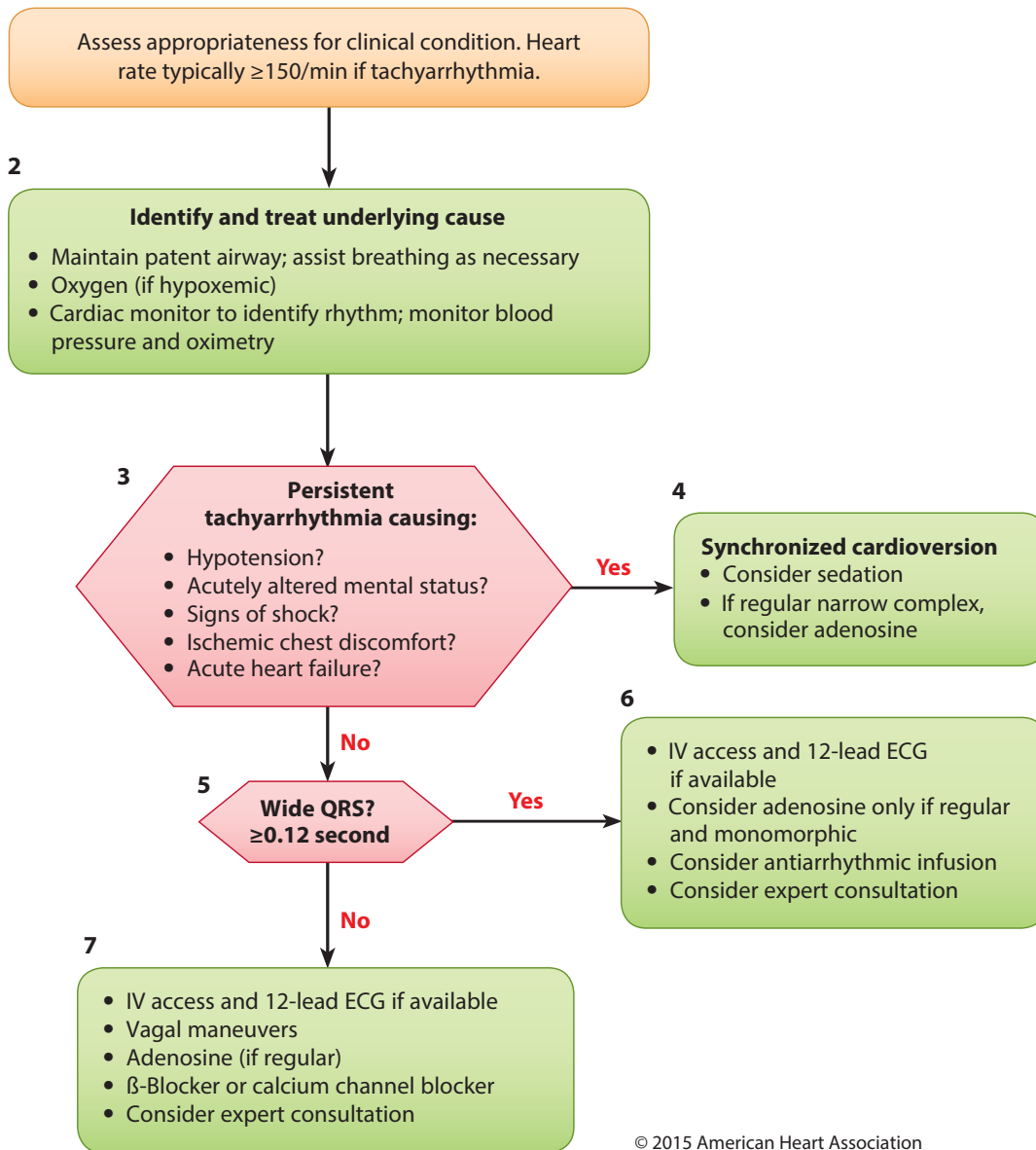


Adult Immediate Post-Cardiac Arrest Care Algorithm—2015 Update



Doses/Details
<p>Ventilation/oxygenation: Avoid excessive ventilation. Start at 10 breaths/min and titrate to target PETCO₂ of 35-40 mm Hg. When feasible, titrate FIO₂ to minimum necessary to achieve SpO₂ ≥94%.</p> <p>IV bolus: Approximately 1-2 L normal saline or lactated Ringer's</p> <p>Epinephrine IV infusion: 0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)</p> <p>Dopamine IV infusion: 5-10 mcg/kg per minute</p> <p>Norepinephrine IV infusion: 0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)</p>
Reversible Causes
<ul style="list-style-type: none"> • Hypovolemia • Hypoxia • Hydrogen ion (acidosis) • Hypo-/hyperkalemia • Hypothermia • Tension pneumothorax • Tamponade, cardiac • Toxins • Thrombosis, pulmonary • Thrombosis, coronary

Adult Tachycardia With a Pulse Algorithm 1



Doses/Details

Synchronized cardioversion:

Initial recommended doses:

- Narrow regular: 50-100 J
- Narrow irregular: 120-200 J biphasic or 200 J monophasic
- Wide regular: 100 J
- Wide irregular: defibrillation dose (*not* synchronized)

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.

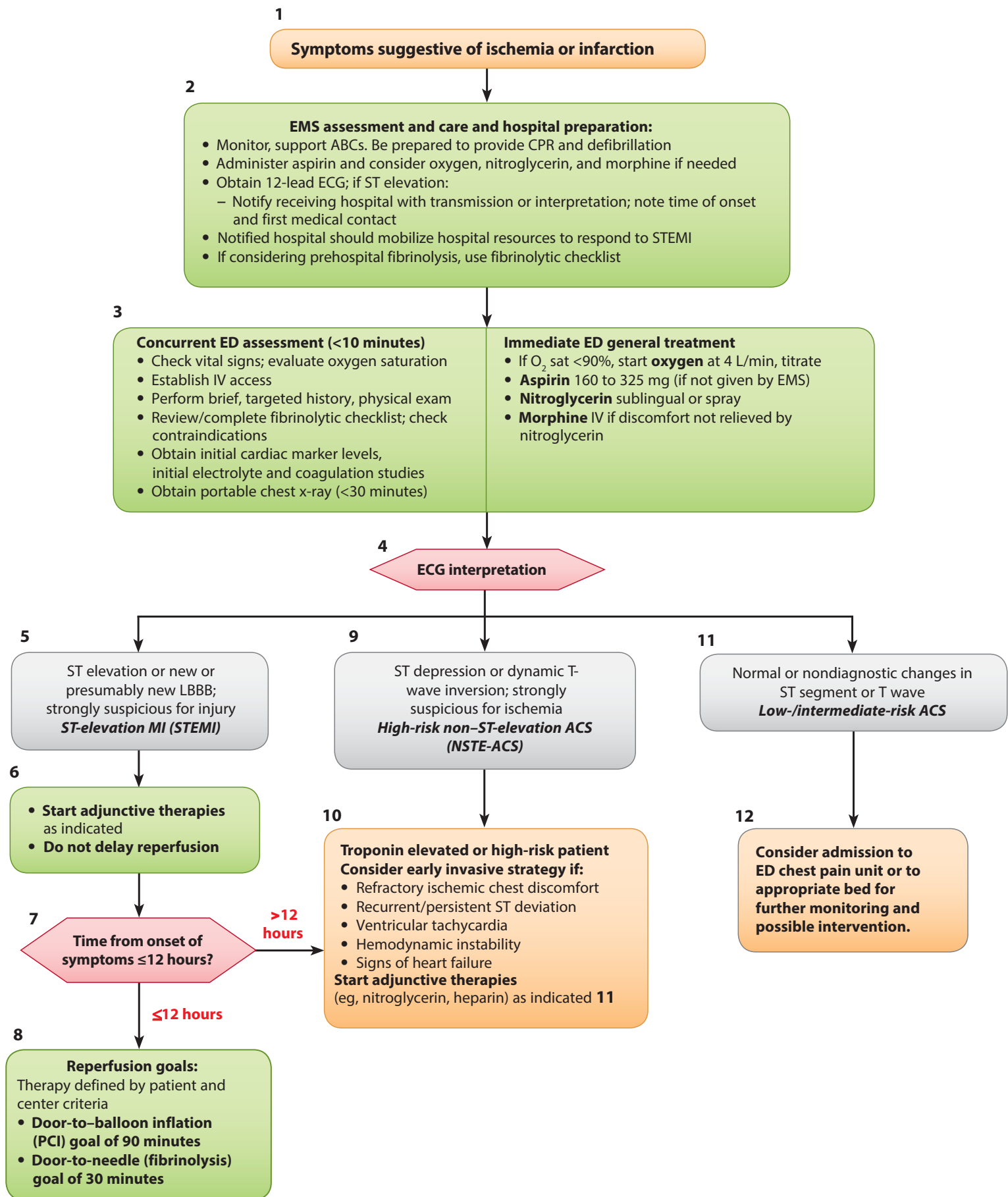
Amiodarone IV dose:

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.

Acute Coronary Syndromes Algorithm—2015 Update



Common Vasoactive Drugs

Drug	Typical Starting Dose (Then Titrate to Effect)
Epinephrine	<p>0.1–0.5 mcg/kg/min (In 70-kg adult, 7–35 mcg/min)</p> <ul style="list-style-type: none"> Useful for symptomatic bradycardia if atropine and transcutaneous pacing fail or if pacing is not available Used to treat severe hypotension (eg, systolic blood pressure <70 mm Hg) Useful for anaphylaxis associated with hemodynamic instability or respiratory distress¹
Norepinephrine	<p>0.1–0.5 mcg/kg/min (In 70-kg adult, 7–35 mcg/min)</p> <ul style="list-style-type: none"> Used to treat severe hypotension (eg, systolic blood pressure <70 mm Hg) and a low total peripheral resistance Relatively contraindicated in patients with hypovolemia. It may increase myocardial oxygen requirements, mandating cautious use in patients with ischemic heart disease Usually induces renal and mesenteric vasoconstriction; in sepsis, however, norepinephrine improves renal blood flow and urine output^{2,3}
Phenylephrine	<p>0.5–2.0 mcg/kg/min (In 70-kg adult, 35–140 mcg/min)</p> <ul style="list-style-type: none"> Used to treat severe hypotension (eg, systolic blood pressure <70 mm Hg) and a low total peripheral resistance
Dopamine	<p>5–10 mcg/kg/min</p> <ul style="list-style-type: none"> Used to treat hypotension, especially if it is associated with symptomatic bradycardia Although low-dose dopamine infusion has frequently been recommended to maintain renal blood flow or improve renal function, more recent data have failed to show a beneficial effect from such therapy^{4,5}
Dobutamine	<p>5–10 mcg/kg/min</p> <ul style="list-style-type: none"> The (+) isomer is a potent beta-adrenergic agonist, whereas the (–) isomer is a potent alpha-1-agonist⁶ The vasodilating beta₂-adrenergic effects of the (+) isomer counterbalance the vasoconstricting alpha-adrenergic effects, often leading to little change or a reduction in systemic vascular resistance

Common Vasoactive Drugs	
Drug	Typical Starting Dose (Then Titrate to Effect)
Milrinone	<p>Load 50 mcg/kg over 10 minutes then infuse at 0.375 mcg/kg/min</p> <ul style="list-style-type: none"> • Used to treat low cardiac output • May cause less tachycardia than dobutamine

References

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For 2010 IV Drugs for Tachycardia information please visit

<https://eccguidelines.heart.org/index.php/tables/2010-iv-drugs-used-for-tachycardia-2/>