



**CARDIOPULMONAR
RESUSCITATION – AHA 2015**

- 70% of **out-of-hospital cardiac arrests (OHCAs)** occur in the home, and approximately 50% are unwitnessed. Outcome from OHCA remains poor: only 10.8% of adult patients with nontraumatic cardiac arrest.
- **In-hospital cardiac arrest (IHCA)** has a better outcome 22.3% - 25.5% of adults surviving to discharge



IHCA and OHCA Chains of Survival

IHCA



OHCA



○ Immediate Recognition & Activation of the Emergency Response System

patient is **unresponsive** with **abnormal or absent breathing** → assume that the patient is in **cardiac arrest** → **Call for HELP**

○ Check for a pulse → no more than 10 seconds

- Ideally, the pulse check is performed simultaneously with the check for no breathing or only gasping

○ Early CPR

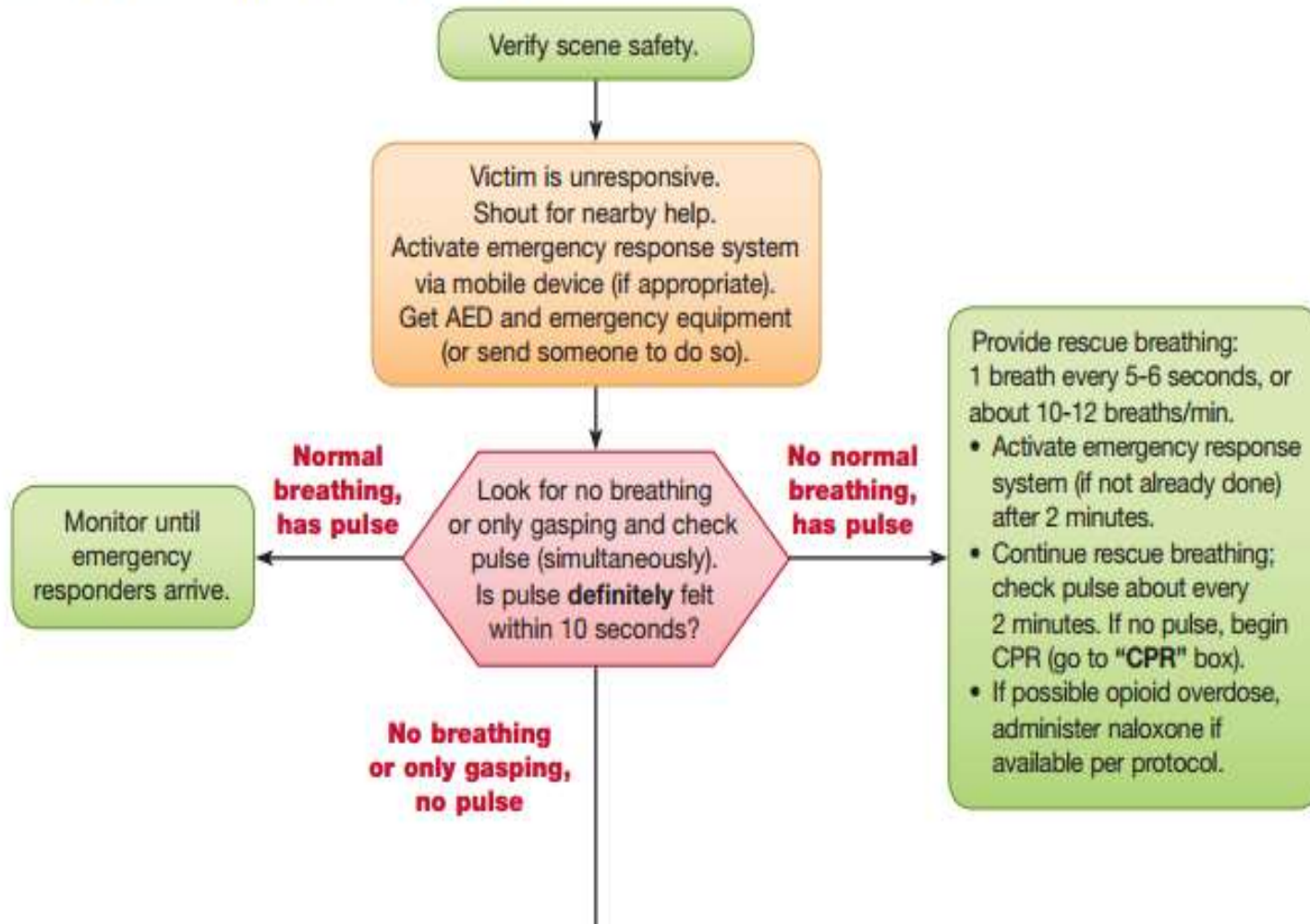
- a compression-to-ventilation ratio of 30:2
- begin the CPR sequence with chest compressions rather than breaths (C-A-B vs A-B-C)

○ Early Defibrillation

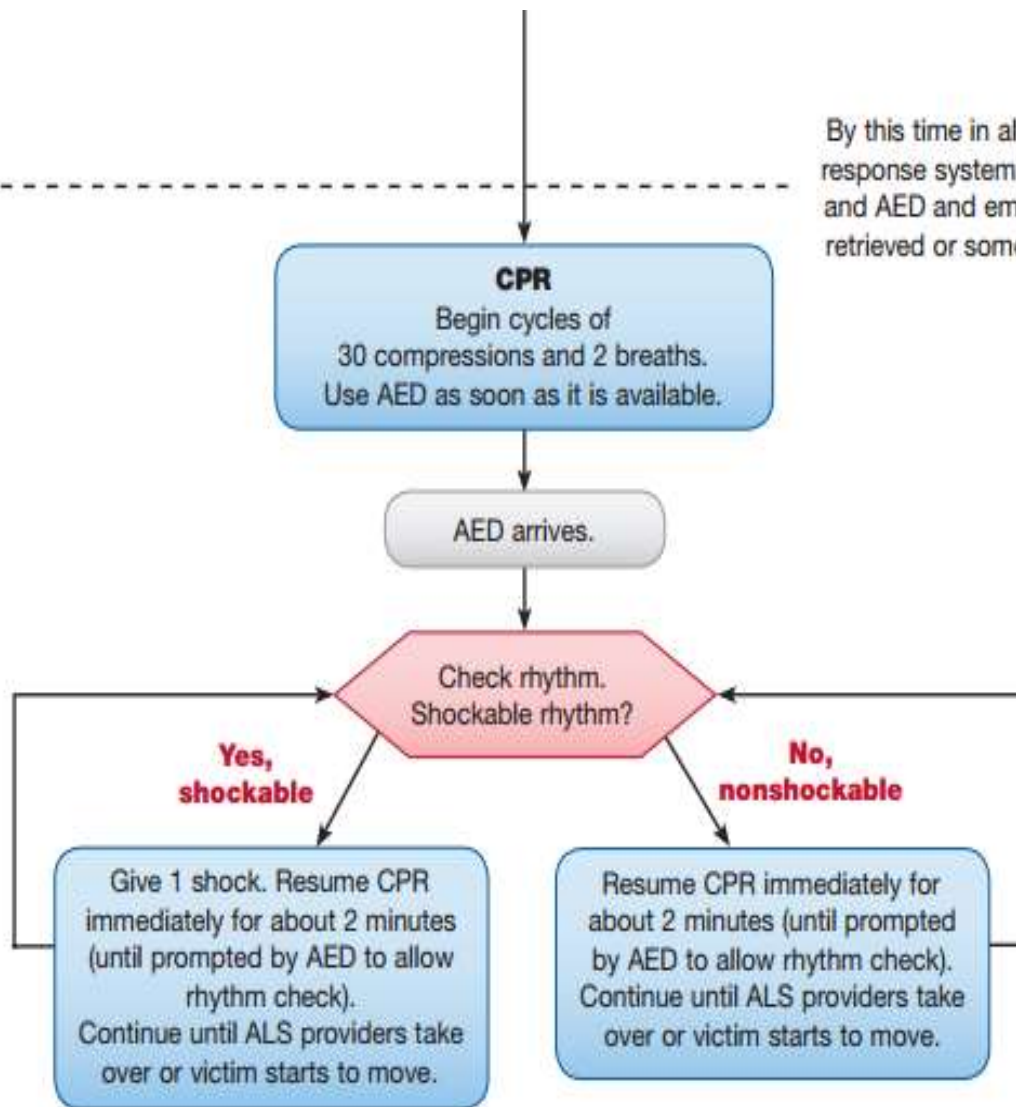
- The AED or manual defibrillator is used as rapidly as possible



BLS Healthcare Provider Adult Cardiac Arrest Algorithm—2015 Update



By this time in all scenarios, emergency response system or backup is activated, and AED and emergency equipment are retrieved or someone is retrieving them.



HIGH-QUALITY CPR

- ➔ improves survival from cardiac arrest, including
 - Ensuring chest compressions of adequate rate
 - 100 x/min – 120 x/min
 - Ensuring chest compressions of adequate depth
 - at least 2 inches or 5 cm for an average adult, while avoiding excessive chest compression depths (greater than 2.4 inches or 6 cm)
 - Allowing full chest recoil between compressions
 - Minimizing interruptions in chest compressions
 - to pause compressions for less than 10 seconds
 - Avoiding excessive ventilation



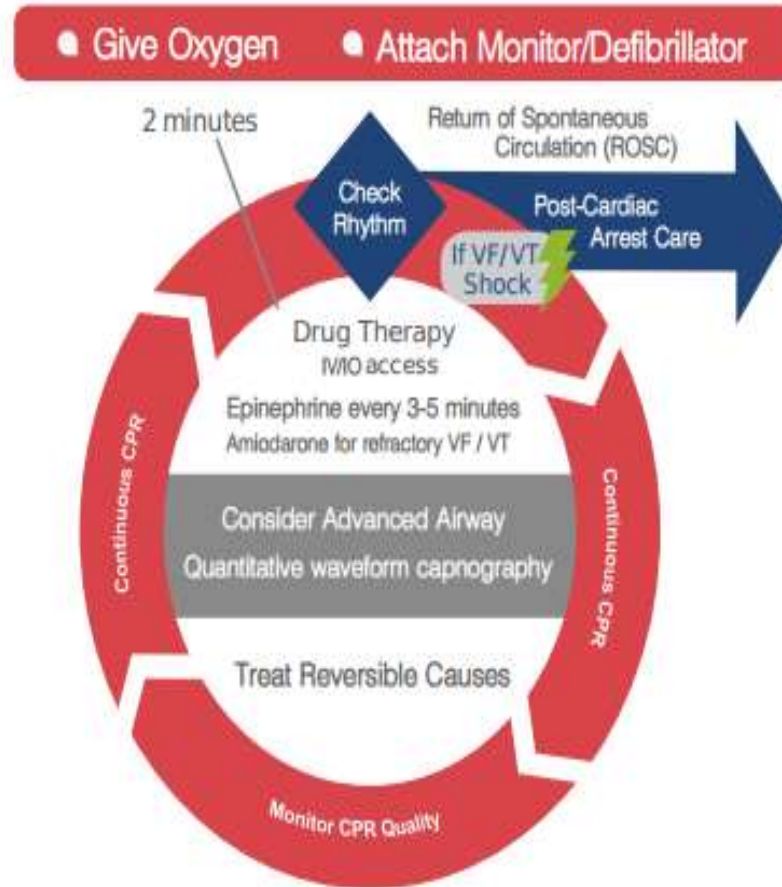
AIRWAY & BREATHING

- During CPR without an advanced airway, a **compression-to-ventilation ratio of 30:2** is used.
- Delivers breaths during pauses in compressions and each breath **over approximately 1 second**
 - head tilt–chin lift maneuver → no evidence of head or neck trauma
- When the victim has an advanced airway during CPR, **NO longer** deliver cycles of 30:2 → to deliver 1 breath every 6 seconds (10 breaths per minute) while continuous chest compressions are being performed



Shout for Help/Activate Emergency Response

START CPR





Doses/Details for the Cardiac Arrest Algorithms

CPR Quality

- Push hard (≥ 2 inches [5cm]) and fast (≥ 100 /min) and allow complete chest recoil.
- Minimize interruptions in compressions.*
- Avoid excessive ventilation
- Rotate compressor every 2 minutes
- If no advanced airway, 30:2 compression-ventilation ratio
- Quantitative waveform capnography
- If $PETCO_2 < 10$ mm Hg, attempt to improve CPR quality
- Intra-arterial pressure
- If relaxation phase (diastolic) pressure < 20 mm Hg, attempt to improve CPR quality.

Drug Therapy

- **Epinephrine IV/IO Dose:** 1 mg every 3-5 minutes
- **Vasopressin IV/IO Dose:** 40 units can replace first or second dose of epinephrine
- **Amiodarone IV/IO Dose**:** First dose: 300 mg bolus.
second dose: 150 mg

Advanced Airway***

- Supraglottic advanced airway or endotracheal intubation
- Waveform capnography to confirm and monitor ET tube placement
- 8-10 breaths per minute 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

Shock Energy

- **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

Reversible Causes

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



ANTI ARHTYMIA AGENT

- can be used during cardiac arrest for refractory ventricular dysrhythmias
- Refractory VF/pVT is
 - generally refers to failure to terminate VF/pVT with 3 stacked shocks, or with the first shock
 - “persistent or recurrent VF/pVT after 1 or more shocks
- Refractory VF/pVT to improve rates of ROSC → **Amiodarone** (weak recommendation, moderate-quality evidence)
- Lidocaine or nifekalant as an alternative to amiodarone in adult patients with refractory VF/pVT (weak recommendation, very-low-quality evidence).



TACHYARRHYTHMIA

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 O_2 sat < 94%)
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry

Persistent Tachyarrhythmia Causing:

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

Y

Synchronized Cardioversion*

- Consider sedation
- If regular narrow complex, consider adenosine

N

Wide QRS?
0.12 second

Y

- IV access and 12-lead ECG if available.
- Consider adenosine only if regular and monomorphic.
- Consider antiarrhythmic infusion.
- Consider expert consultation.

N

- IV access and 12-lead ECG if available.
- Vagal Maneuvers.
- Adenosine (if regular)
- β -Blocker or calcium channel blocker.
- Consider expert consultation.



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.



BRADYARRHYTHMIA

Assess appropriateness for clinical condition.
Heart rate typically $< 50/\text{min}$ 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



Persistent bradyarrhythmia causing:

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



Monitor and observe



Atropine IV Dose:

First dose: 0.5 mg bolus
Repeat every 3-5 minutes
Maximum: 3 mg

If atropine ineffective:

- Transcutaneous pacing**
OR
- Dopamine IV infusion:
2-10 mcg/kg per minute
OR
- Epinephrine IV infusion:
2-10 mcg per minute

Consider:

- Expert consultation
- Transvenous pacing

