



# Highlights of the 2010 American Heart Association Guidelines for CPR and ECC

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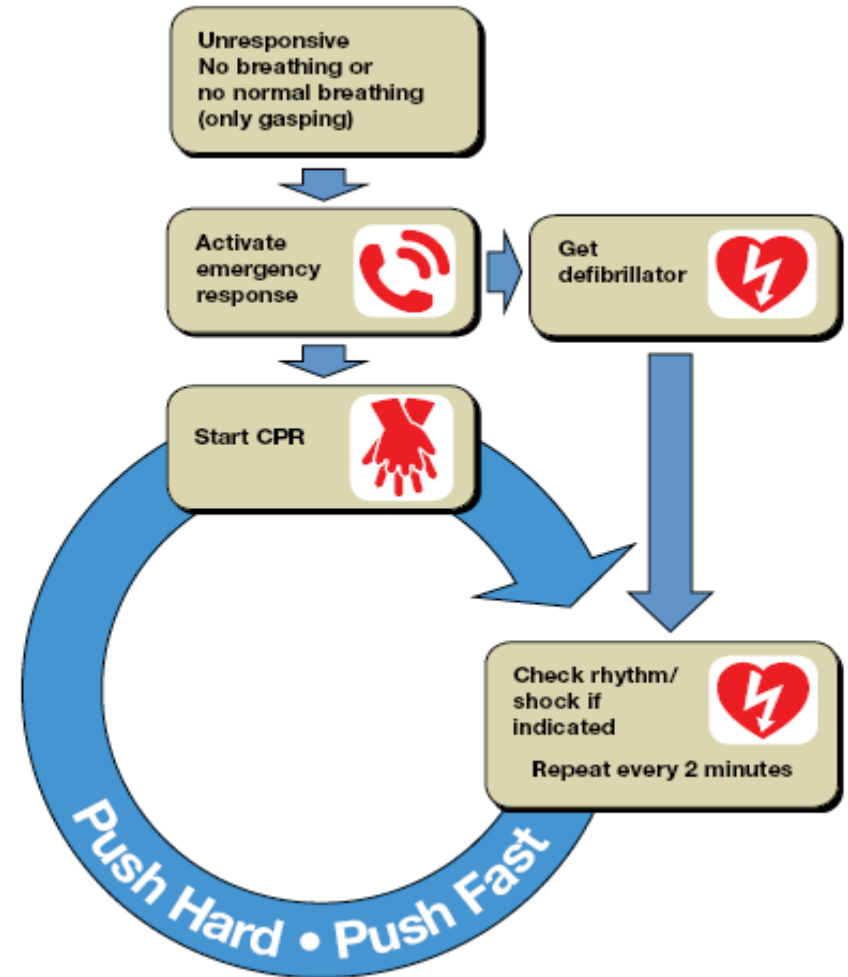
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# Key issues and major changes for lay rescuer adult CPR

- The simplified universal adult BLS algorithm.
- Initiation of CPR if the victim is unresponsive with no breathing or no normal breathing (ie, victim is only gasping).



- A-B-C  C-A-B



# Key issues and major changes for lay rescuer adult CPR

- Removed “Look, listen, and feel for breathing”.
- Continued emphasis on **high-quality CPR**:
  1. Chest compressions of adequate rate [at least 100/min (rather than “approximately” 100/min)] and depth [changed from the range of 1 ½ to 2 inches to at least 2 inches (5 cm)],
  2. Allowing complete chest recoil after each compression,
  3. Minimizing interruptions in compressions,
  4. Avoiding excessive ventilation.



# Key issues and major changes for healthcare providers

- Identify a short period of seizure-like activity or agonal gasps after cardiac arrest.
- Instruct untrained lay rescuers to provide Hands-Only CPR.
- Briefly checks for no breathing or no normal breathing. Activates the emergency response system and retrieves the AED. Should not spend more than 10 seconds checking for a pulse, and if a pulse is not definitely felt within 10 seconds, should begin CPR and use the AED when available.
- Removed “Look, listen, and feel for breathing”.



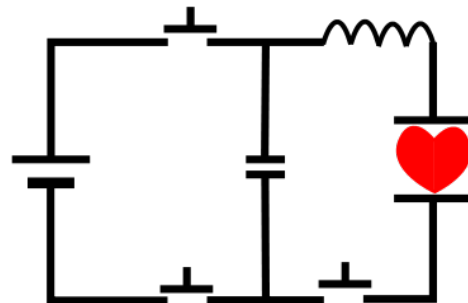
# Key issues and major changes for healthcare providers

- **High-quality CPR.**
- Cricoid pressure during ventilations is generally not recommended.
- C-A-B rather than A-B-C.
- Reduce the time between the last compression and shock delivery and the time between shock delivery and resumption of compressions immediately after shock delivery.
- Focus on using a team approach during CPR.



# ELECTRICAL THERAPIES

- Integration of AEDs into the Chain of Survival system for public places
- Consideration of AED use in hospitals
- AEDs can now be used in infants if a manual defibrillator is not available



# ELECTRICAL THERAPIES

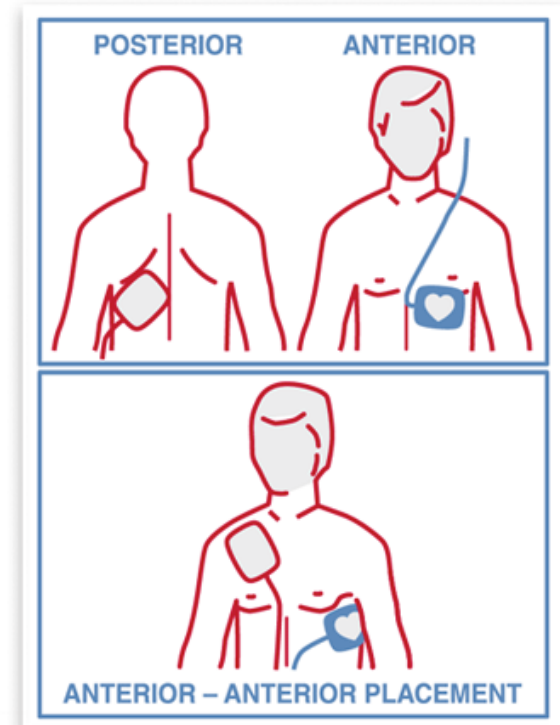
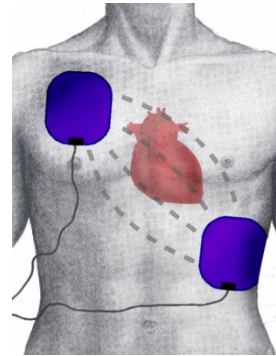
- Shock first versus CPR first in cardiac arrest
- 1-shock protocol versus 3-shock sequence for VF
- Biphasic and monophasic waveforms
- Escalating versus fixed doses for second and subsequent shocks





# ELECTRICAL THERAPIES

- Electrode placement  
anterior-lateral, anterior-posterior,  
anterior–left infrascapular, and  
anterior–right infrascapular
- External defibrillation with  
implantable cardioverter-  
defibrillator
- Synchronized cardioversion  
Atrial fibrillation : 120 to 200 J  
Atrial flutter and other  
supraventricular rhythms : 50 to  
100 J  
Adult stable monomorphic VT : 100  
J.



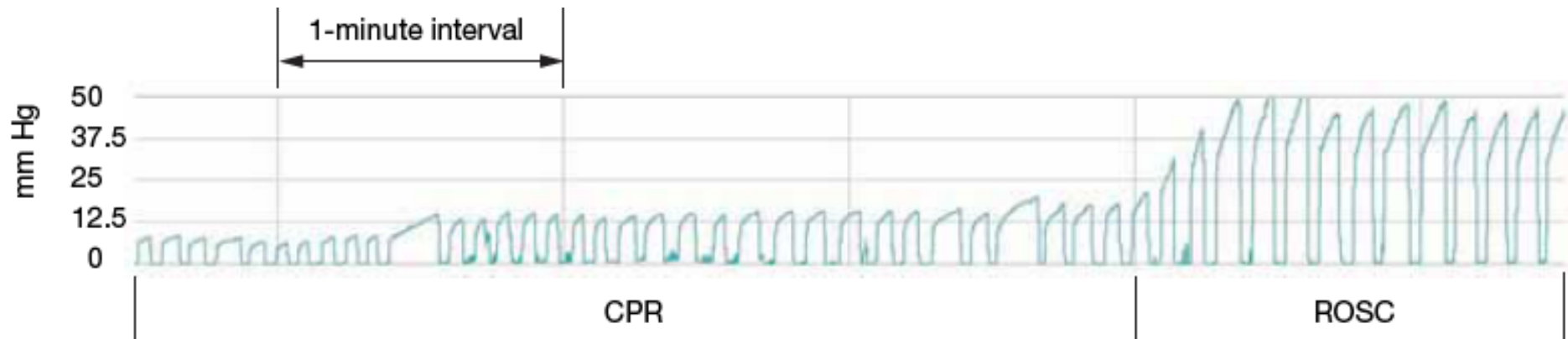
# The major changes in ACLS

- Quantitative waveform capnography is recommended for confirmation and monitoring of endotracheal tube placement and CPR quality.



# The major changes in ACLS

- There is an increased emphasis on physiologic monitoring to optimize CPR quality and detect ROSC.



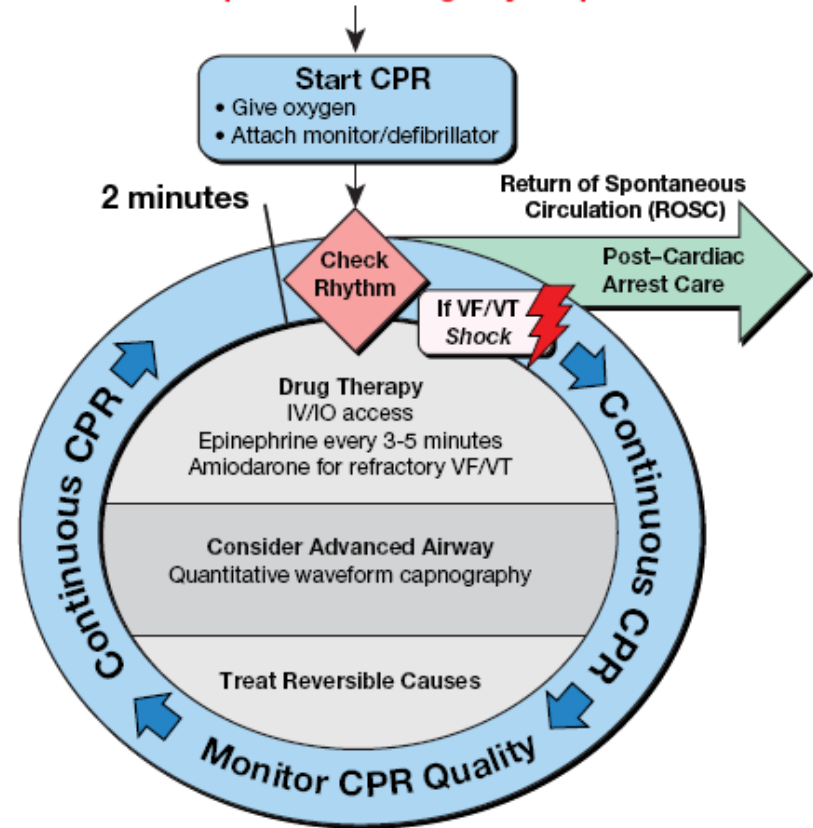
# The major changes in ACLS

- The traditional cardiac arrest algorithm was simplified and an alternative conceptual design was created to emphasize the importance of **high-quality CPR**.

## Circular ACLS Algorithm

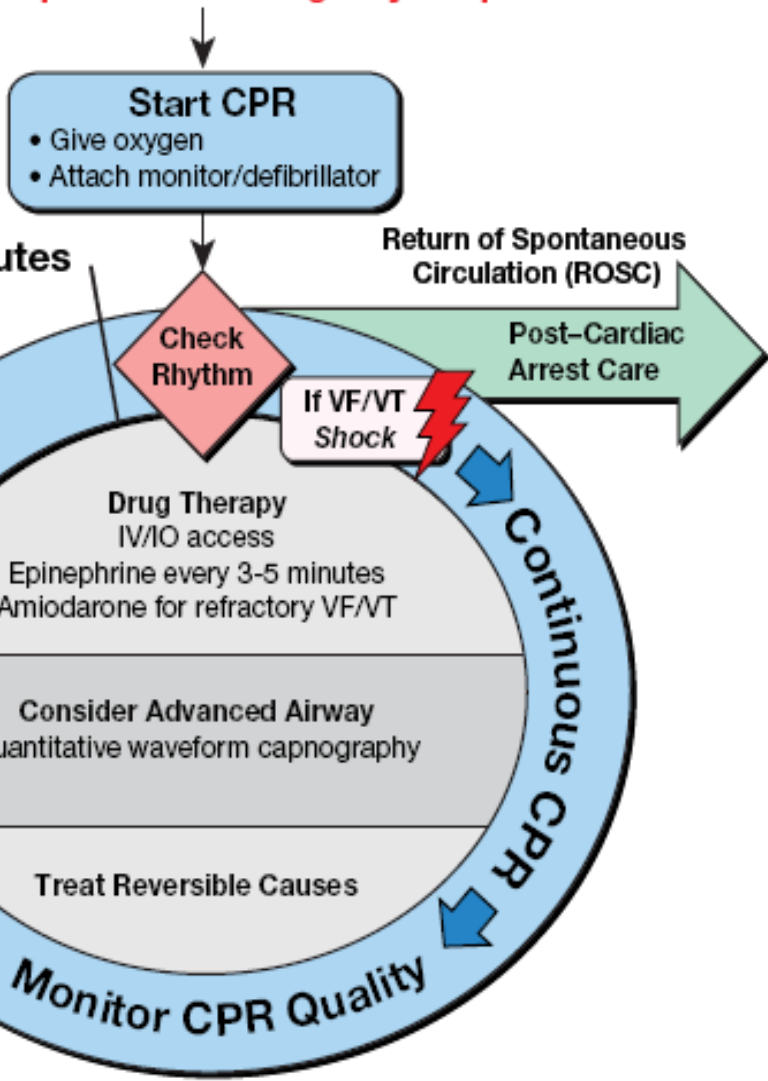
### Adult Cardiac Arrest

Shout for Help/Activate Emergency Response



# Adult Cardiac Arrest

**Shout for Help/Activate Emergency Response**



## CPR Quality

- Push hard ( $\geq 2$  inches [5 cm]) and fast ( $\geq 100$ /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

## Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in  $PETCO_2$  (typically  $\geq 40$  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

## 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

## Reversible Causes

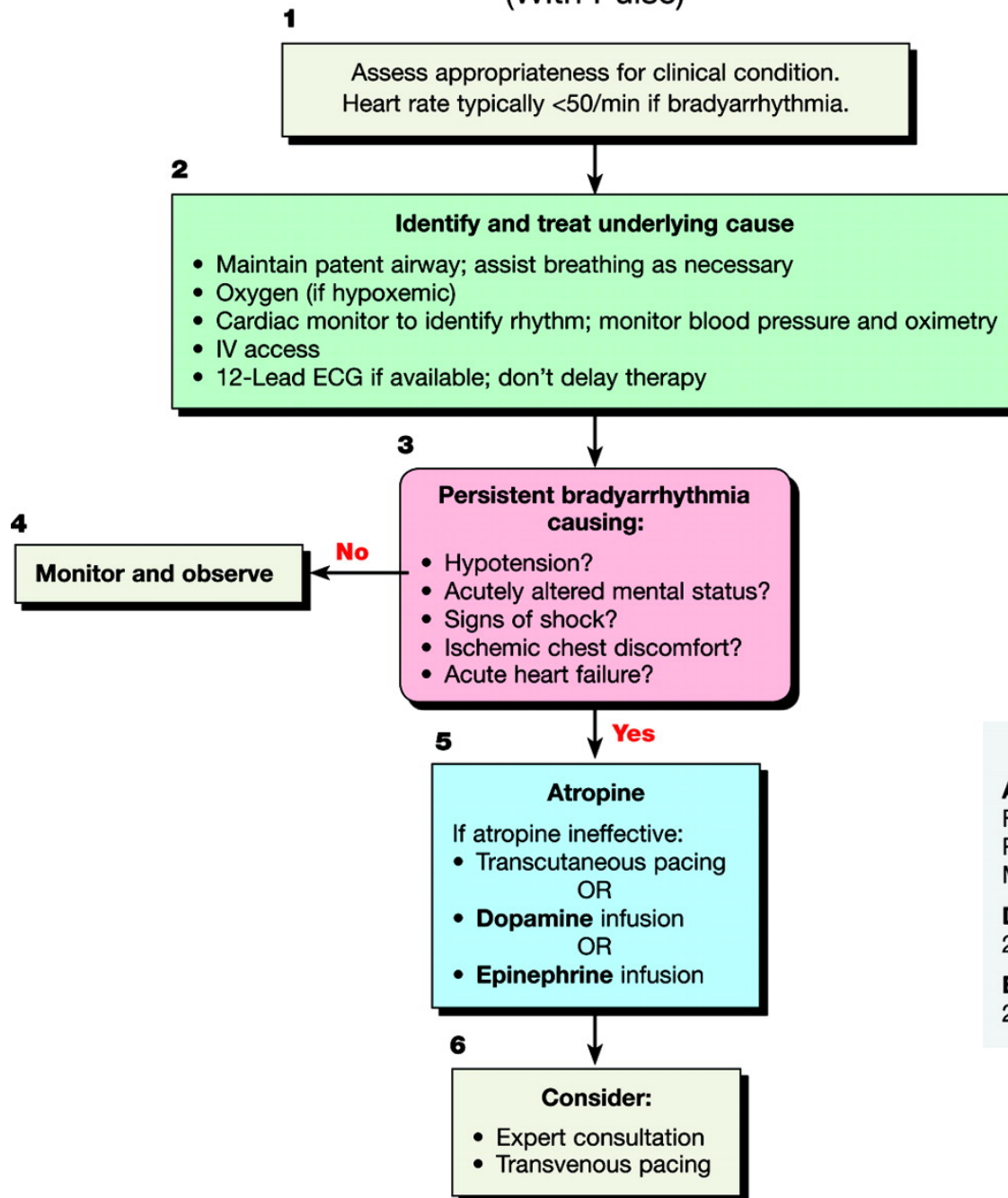
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|---------------------------|-------------------------|
| – Hypovolemia             | – Tension pneumothorax  |
| – Hypoxia                 | – Tamponade, cardiac    |
| – Hydrogen ion (acidosis) | – Toxins                |
| – Hypo-/hyperkalemia 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

# The major changes in ACLS

- Atropine is no longer recommended for routine use in the management of pulseless electrical activity (PEA)/asystole.
- Systematic post–cardiac arrest care after ROSC should continue in a critical care unit with expert multidisciplinary management and assessment of the neurologic and physiologic status of the patient. This often includes the use of therapeutic hypothermia.



# Adult Bradycardia (With Pulse)



## Doses/Details

### Atropine IV Dose:

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

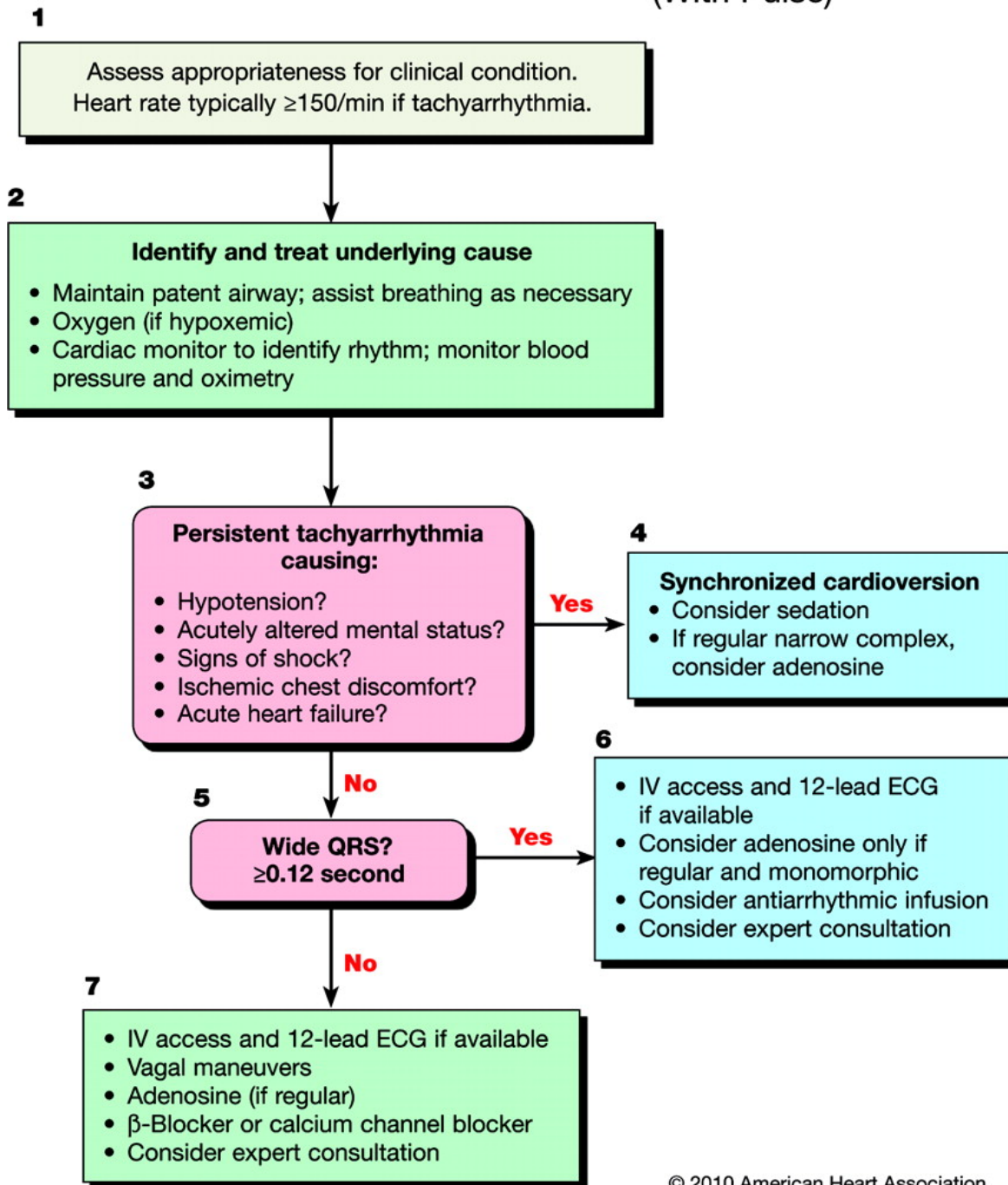
### Dopamine IV Infusion:

2-10 mcg/kg per minute

### Epinephrine IV Infusion:

2-10 mcg per minute

# Adult Tachycardia (With Pulse)



## 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.

#### Sotalolol IV Dose:

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



# Initial and Later Key Objectives of Post-Cardiac Arrest Care

1. Optimize cardiopulmonary function and vital organ perfusion after ROSC
2. Transport/transfer to an appropriate hospital or critical care unit with a comprehensive post-cardiac arrest treatment system of care
3. Identify and treat ACS and other reversible causes
4. Control temperature to optimize neurologic recovery
5. Anticipate, treat, and prevent multiple organ dysfunction. This includes avoiding excessive ventilation and hyperoxia.



# key issues in pediatric BLS

- C-A-B rather than A-B-C.
- **High-quality CPR.**
- Modification of recommendations regarding adequate depth of compressions to at least one third of the anterior-posterior diameter of the chest; this corresponds to approximately 1 ½ inches (about 4 cm) in most infants and about 2 inches (5 cm) in most children.
- Removal of “look, listen, and feel for breathing”.



# key issues in pediatric BLS

- De-emphasis of the pulse check for healthcare providers: For a child who is unresponsive and not breathing, if a pulse cannot be detected within 10 seconds, healthcare providers should begin CPR.
- Use of an AED for infants: For infants, a manual defibrillator is preferred to an AED for defibrillation. If a manual defibrillator is not available, an AED equipped with a pediatric dose attenuator is preferred. If neither is available, an AED without a pediatric dose attenuator may be used.



# PEDIATRIC ADVANCED LIFE SUPPORT

- Refinement of existing recommendations rather than new recommendations; new information is provided for resuscitation of infants and children with selected congenital heart defects and pulmonary hypertension.
- Monitoring capnography/capnometry.
- The PALS cardiac arrest algorithm was simplified to emphasize organization of care around 2-minute periods of uninterrupted CPR.
- The initial defibrillation energy dose of 2 to 4 J/kg of either monophasic or biphasic waveform is reasonable. For second and subsequent doses, give at least 4 J/kg.



# PEDIATRIC ADVANCED LIFE SUPPORT

- Once spontaneous circulation has been restored, to maintain an arterial oxyhemoglobin saturation  $\geq 94\%$  but  $< 100\%$  to limit the risk of hyperoxemia.
- New sections have been added on resuscitation of infants and children with congenital heart defects, including single ventricle, palliated single ventricle, and pulmonary hypertension.
- Several recommendations for medications have been revised. These include not administering calcium except in very specific circumstances and limiting the use of etomidate in septic shock.



# PEDIATRIC ADVANCED LIFE SUPPORT

- Indications for postresuscitation therapeutic hypothermia have been clarified somewhat.
- New diagnostic considerations have been developed for sudden cardiac death of unknown etiology.
- Providers are advised to seek expert consultation, if possible, when administering amiodarone or procainamide to hemodynamically stable patients with arrhythmias.
- The definition of wide-complex tachycardia has been changed from  $>0.08$  second to  $>0.09$  second.



# NEONATAL RESUSCITATION

- Once positive-pressure ventilation or supplementary oxygen administration is begun, assessment 3 clinical characteristics: heart rate, respiratory rate, and evaluation of the state of oxygenation
- Anticipation of the need to resuscitate: elective cesarean section
- Ongoing assessment
- Supplementary oxygen administration
- Suctioning



# NEONATAL RESUSCITATION

- Ventilation strategies (no change from 2005)
- Recommendations for monitoring exhaled CO<sub>2</sub>
- Compression-to-ventilation ratio
- Thermoregulation of the preterm infant (no change from 2005)
- Postresuscitation therapeutic hypothermia
- Delayed cord clamping
- Withholding or discontinuing resuscitative efforts (no change from 2005)





# FIRST AID

- Supplementary oxygen administration
- Epinephrine and anaphylaxis
- Aspirin administration for chest discomfort
- Tourniquets and bleeding control
- Hemostatic agents
- Snakebites
- Jellyfish stings
- Heat emergencies



# SUMMARY

- Too few victims of cardiac arrest receive bystander CPR.
- CPR quality must be high and that victims require excellent post–cardiac arrest care by organized teams with members who function well together.
- Education and frequent refresher training are likely the keys to improving resuscitation performance.

