A. Age delineation: Infant CPR guidelines apply to victims less than one year of age; Child CPR guidelines apply to victims one year of age to the onset of adolescence or puberty (about 12-14 years of age) and Adult guidelines apply to those older than adolescence / puberty.

B. High quality CPR should be initiated immediately and should not be interrupted for more than 10 seconds until a spontaneous pulse is established. High quality CPR includes: Minimizing interruptions in chest compressions, ensuring full chest recoil, pushing hard and fast (100-120 compressions per minute) and avoiding hyperventilation.

C. Rotate compressors every 2 minutes to prevent fatigue.

D. In order to minimize interruptions in chest compressions early in resuscitation, patients should not be moved until at least three rounds of CPR have been performed. (One round of CPR = five cycles of 30:2 compression to ventilations and defibrillation as indicated.) If the situation allows, consider continuing resuscitation on scene until return of spontaneous circulation (ROSC) or termination of resuscitation.

E. Patient care should be managed in an organized fashion, rotating treatment and therapies around CPR rounds. Team members should be assigned roles to limit confusion and enhance the chance of a successful resuscitation.

F. The evidence does not demonstrate a benefit with the use of mechanical piston devices for chest compressions versus manual chest compressions in patients with cardiac arrest. Manual chest compressions remain the standard of care for the treatment of cardiac arrest. However, such a device may be a reasonable alternative to conventional CPR in specific settings where the delivery of high-quality manual compressions may be challenging or dangerous for the provider. If device is used, follow manufacturer recommendations.

G. After an advanced airway is placed, rescuers no longer deliver “cycles” of CPR. Give continuous chest compressions at a rate of 100-120 compression/min without pausing for breaths. Deliver 10 breaths per minute (one breath every 6 seconds). Each breath is delivered over one second with enough volume to cause chest rise. Check rhythm every two minutes. Quantitative waveform capnography should be used to confirm airway placement and monitor quality of CPR.

H. The ideal defibrillation dose using a biphasic defibrillator is the dose at which the device waveform has been shown to be effective in terminating Ventricular Fibrillation (VF). Use manufacturer’s recommendations for defibrillation energy level. If unknown use maximum level (360J monophasic).

I. Each IV/IO push medication should be followed by a 20 ml NS flush for adults and 5-10 ml NS flush for pediatrics. If IV/IO cannot be established, epinephrine, atropine and lidocaine may be administered through the endotracheal tube. Drugs given through the ET tube are double the IV dose.

J. Pulse checks only need to be performed during rhythm analysis when an organized rhythm is present (i.e., sinus rhythm, junctional rhythm).

K. If patient has ROSC, provide treatment per the Post-Cardiac Arrest Care Protocol.
L. If there is no response to an adequate trial of BLS or ACLS on scene, termination of resuscitation should be considered. See Terminating Resuscitative Efforts for the Adult Patient Protocol.

A. Assess patient for responsiveness, respiratory status and pulse. Pulse and respiratory status check should last no longer than 10 seconds, begin CPR immediately and contact ALS unit.
   1. Compression rate: 100-120 compressions/min.
   2. Compression depth:
      a. Adults – at least 2"
      b. Child – at least 1/3 the AP diameter; about 2"
      c. Infant – at least 1/3 the AP diameter; about 1 1/2 "
   3. Compression-to-Ventilation Ratio (until advanced airway is placed):
      a. Adult – 30:2 for one or two rescuers
      b. Infant and Child – 30:2 for single rescuer; 15:2 for two rescuers
   4. Ventilations with advanced airway: one breath every 6 seconds (10 breaths per minute). Delivered asynchronously with chest compressions.

B. Apply AED and activate device. Pediatric attenuating system / pediatric pads are preferred for infant and child <8 years. If not available, use adult AED pads.
   1. **“Shock Advised”**
      a. Deliver shock
      b. Resume CPR as recommended by the American Heart Association for five cycles (about 2 minutes)
      c. Manage airway with BVM, supplemental oxygen, and airway adjunct or advanced airway procedure
      d. After five cycles of CPR – Activate AED to assess rhythm and deliver single shock if indicated.
      e. Resume CPR immediately beginning with chest compressions.
      f. Continue cycles of CPR and AED analysis with shock delivery as indicated for three rounds.
      g. Transport and Contact Medical Control and advise of cardiac arrest. Consider ALS intercept.
      h. If Return of Spontaneous Circulation at any time – Contact Medical Control and Transport. Consider ALS intercept.
   2. **“No Shock Advised”**
      a. Resume CPR as recommended by the American Heart Association for five cycles (about 2 minutes)
      b. Manage airway with BVM, supplemental oxygen, and airway adjunct or advanced airway procedure
      c. After five cycles of CPR – Activate AED to assess rhythm and deliver shingle shock, if indicated.
      d. Continue cycles of CPR and AED analysis with shock delivery, as indicated, for three rounds.
      e. Contact Medical Control and Transport Infant / Child victim. Consider ALS Intercept. For Adult victim – Consider if candidate for Termination of Resuscitation protocol.
      f. If Return of Spontaneous Circulation at any time – Contact Medical Control and Transport. Consider ALS intercept.
A. Apply cardiac monitor and check rhythm:

1. **Ventricular Fibrillation / Pulseless Ventricular Tachycardia:**
   a. Deliver single shock:
      - **Initial Adult dose:** energy level is device-specific for biphasic defibrillators (if unknown use 200 J); 360 J for monophasic defibrillators
      - **Subsequent Adult dose:** should be equivalent to initial dose and higher energy levels may be considered if available
      - **Initial Infant / Child dose:** 2-4 J/kg
      - **Subsequent Infant / Child dose:** 4 J/kg and higher energy levels may be considered, not the exceed 10 J/kg or the adult maximum (360 J)
   b. Resume CPR as recommended by the American Heart Association for five cycles (about 2 min.) while other team members are completing steps c & d.
   c. Manage airway with BVM, supplemental oxygen, and airway adjunct or advanced airway procedure
   d. Start IV/IO normal saline
   e. After five cycles of CPR, check rhythm – **no change** - deliver single shock
   f. Continue cycles of CPR and rhythm analysis with shock delivery for three rounds.
   g. Contact medical control and advise of cardiac arrest. Consider ALS intercept.
   h. If Return of Spontaneous Circulation at any time – Contact Medical Control and Transport. Consider ALS intercept.

2. **Asystole / Pulseless Electrical Activity (PEA)**
   a. Resume CPR as recommended by the American Heart Association for five cycles (about 2 min.) while other team members are completing steps b & c.
   b. Manage airway with BVM, supplemental oxygen, and airway adjunct or advanced airway procedure
   c. Start IV/IO normal saline
   d. After five cycles of CPR, check rhythm
   e. Continue cycles of CPR and rhythm analysis with shock delivery as indicated for three rounds.
   f. Consider treatable causes:
      - Hypovolemia – give fluid boluses (200-500 ml for adults; 20 ml/kg for infant / child)
      - Hypoxia – adequate airway management
      - Tension pneumothorax – perform needle decompression
      - Hypoglycemia – administer glucose IV/IO
   g. Contact Medical Control and Transport Infant / Child victim. Consider ALS Intercept. For Adult victim – Consider if candidate for Termination of Resuscitation protocol.
   h. If Return of Spontaneous Circulation at any time – Contact Medical Control and Transport. Consider ALS intercept.
A. Apply cardiac monitor and check rhythm:

1. Ventricular Fibrillation / Pulseless Ventricular Tachycardia:
   a. Deliversingle shock:
      - **Initial Adult dose**: energy level is device-specific for biphasic
defibrillators (if unknown use 200 J); 360 J for monophasic defibrillators
      - **Subsequent Adult dose**: should be equivalent to initial dose and higher
energy levels may be considered if available
      - **Initial Infant / Child dose**: 2-4 J/kg
      - **Subsequent Infant / Child dose**: 4 J/kg and higher energy levels may
be considered, not the exceed 10 j/kg or the adult maximum (360 J
   b. Resume CPR as recommended by the American Heart Association for five
      cycles (about 2 min.) while other team members are completing steps c & d.
   c. Manage airway with BVM, supplemental oxygen, and airway adjunct or advanced
      airway procedure
   d. Start IV/IO normal saline
   e. Administer Epinephrine 1:10,000 IVP every 3-5 minutes
      - **Adult dose** – 1 mg
      - **Infant / Child dose** – 0.01 mg/kg (0.1 ml/kg)
   f. After five cycles of CPR, check rhythm – no change - deliver single shock
   g. Resume CPR for five cycles (2 min.) while team members are completing step h.
   h. Administer antiarrhythmic:
      - **Amiodarone**
         o **Adult dose**: 300 mg IV/IO diluted in 20-30 ml NS (second dose
            150 mg IV/IO diluted in 20-30 ml NS)
         o **Infant / Child dose**: 5 mg/kg IV/IO; may be repeated up to two
times
      - **Lidocaine**
         o **Adult dose**: 1-1.5 mg/kg IV/IO (second dose 0.5 – 0.75 mg/kg
            IV/IO, may repeat in 5-10 minutes to max dose of 3 mg/kg)
         o **Infant / Child dose**: 1 mg/kg IV/IO
      - **Magnesium (for Torsades de pointes)**
         o **Adult dose**: 1-2 grams IV/IO
         o **Infant / Child dose**: 25-50 mg/kg IV/IO (max dose is 2 grams)
   i. Continue cycles of CPR and rhythm analysis with shock delivery as indicated and
      medication administration for three rounds.
   j. Contact medical control and advise of cardiac arrest.
   k. Return of Spontaneous Circulation at any time – Contact Medical Control and
      Transport.

2. Asystole / PEA
   a. Resume CPR as recommended by the American Heart Association for five
      cycles (about 2 min.) while other team members are completing steps b - e.
   b. Manage airway with BVM, supplemental oxygen, and airway adjunct or advanced
      airway procedure
   c. Start IV/IO normal saline
   d. Administer Epinephrine 1:10,000 IV/IO every 3-5 minutes
      - **Adult dose** – 1 mg
      - **Infant / Child dose** – 0.01 mg/kg (0.1 ml/kg)
e. Consider treatable causes:
   - Hypovolemia – give fluid boluses (200-500 ml for adults; 20 ml/kg for infant / child)
   - Hypoxia – adequate airway management
   - Hyperkalemia – consider sodium bicarbonate / calcium
   - Tension pneumothorax – perform needle decompression
   - Tricyclic overdose – consider sodium bicarbonate
   - Hypoglycemia – administer glucose IV/IO
f. After five cycles of CPR, check rhythm
g. Continue cycles of CPR and rhythm analysis with shock delivery as indicated and medication administration for three rounds.
h. Contact Medical Control and Transport Infant / Child victim. For Adult victim – Consider if candidate for Termination of Resuscitation protocol.
i. If Return of Spontaneous Circulation at any time – Contact Medical Control and Transport.

A. Special Considerations:
   1. In some special resuscitation situations, such as preexisting metabolic acidosis, hyperkalemia, or tricyclic antidepressant overdose sodium bicarbonate can be beneficial. However, routine use of sodium bicarbonate is not recommended for patients in cardiac arrest. When it is used for special situations, administer 1 mEq/kg IV/IO.
   2. For dialysis patient / Hyperkalemic patient in cardiac arrest administer:
      a. Calcium gluconate (10%) 15-30 ml IV/IO over 2-5 minutes, flush line vigorously with normal saline, then administer:
      b. Sodium Bicarbonate 50 mEq IV/IO over 5 minutes.
   3. If there is a high index of suspicion of narcotic overdose administer naloxone (Narcan). Administer up to 2 mg naloxone (Narcan) May repeat dose one time in 2-3 minutes if there is no improvement.
POST-CARDIAC ARREST CARE

Basic EMT

A. Continuous monitoring of pulse oximeter, capnography and vital signs.

B. Maintain airway management. Supplemental oxygen to keep SpO₂ > 94%. Ventilate at rate of 10-12 breaths per minute and titrated to achieve PETCO₂ of 35-40 mm Hg.

C. Perform a 12-lead ECG and transmit

D. Elevate head 30° if tolerated.

E. Transport. Consider ALS intercept.

Advanced EMT / Paramedic

A. Treat hypotension (SBP < 90 mmHg in adults and age-specific for pediatrics)
   1. Adult dose – 250 ml bolus of normal saline. May repeat as needed.
   2. Infant / child – 20 ml/kg
   3. Consider treatable causes

B. Treat dysrhythmia per protocol.
TERMINATING RESUSCITATIVE EFFORTS FOR ADULT PATIENTS

GENERAL CONSIDERATIONS

A. Field termination of resuscitation reduces unnecessary transport reducing associated road hazards

B. Also reduces inadvertent EMT exposure to potential hazards and the higher cost of Emergency Department pronouncement.

C. More importantly the quality of CPR is compromised during transport, and survival is linked to optimizing scene care rather than rushing to the hospital.

D. This protocol should only be considered for adult patients.
   1. No predictors of neonatal or pediatric out-of-hospital resuscitation success or failure have been established. No validated clinical decision rules have been derived and evaluated. Further research in this area is needed.
   2. Follow Pediatric BLS and PALS guidelines, contact Medical Control and transport the pediatric patient to the most appropriate facility.

E. Notifying family members of the death of a loved one is an important aspect of resuscitation and should be performed compassionately, with care taken to consider the family’s culture, religious beliefs and preconceptions surrounding death, and any guilt they may feel associated with the event or circumstances preceding the event.

Basic EMT / Advanced EMT

A. Rescuers who start BLS should continue resuscitation until one of the following occurs:
   1. Restoration of effective, spontaneous circulation
   2. Care is transferred to a team providing advanced life support
   3. The rescuer is unable to continue because of exhaustion, the presence of dangerous environmental hazards, or because continuation of the resuscitative efforts places others in jeopardy
   4. Reliable and valid criteria for indicating irreversible death are met, criteria for obvious death are identified, or criteria for termination of resuscitation are met.

B. “BLS Termination of Resuscitation Rule”. All three of the following criteria must be present before moving the patient to the ambulance to consider terminating BLS resuscitative efforts for the adult patient:
   1. Cardiac arrest was not witnessed by the EMT or first responder;
   2. No return of spontaneous circulation (ROSC) after three full rounds of CPR and AED analysis; AND
   3. No AED shocks were delivered

C. When the above criteria are met, the team continues CPR per AHA guidelines while the EMT in charge contacts Medical Control and request permission to terminate resuscitation.
   1. Once resuscitative efforts are terminated follow the DOA Protocol.
2. Documentation should be completed and forwarded to your Medical Control EMS Office within 48 hours of the call.

D. If any of the three criteria are missing or Medical Controls does not authorize terminating resuscitation, continue resuscitation and transport to most appropriate facility.

**Paramedic**

A. Consider termination of resuscitation efforts for the adult cardiac arrest patient that does not respond to at least 20 minutes of ALS care.

B. “ALS Termination of Resuscitation Rule”. All of the following criteria must be met before moving the patient to the ambulance to consider termination of ALS resuscitative efforts for the adult patient:
   1. The cardiac arrest was not witnessed;
   2. No bystander CPR was provided;
   3. No ROSC after full ALS care; AND
   4. No AED shocks were delivered.

C. When the above criteria are met, the team continues CPR per AHA guidelines while the EMT in charge contacts Medical Control and request permission to terminate resuscitation.
   1. Once resuscitative efforts are terminated follow the DOA Protocol.
   2. Documentation should be completed and forwarded to your Medical Control EMS Office within 48 hours of the call.

D. If any of the four criteria are missing or Medical Controls does not authorize terminating resuscitation, continue resuscitation and transport to most appropriate facility.
ADULT CARDIAC ARREST

1. START CPR
   - GIVE OXYGEN
   - ATTACH MONITOR / DEFIBRILLATOR

   YES

   SHOCKABLE RHYTHM?

   NO

   VF/VT

2. CPR 2 MINUTES
   - IV / IO ACCESS

3. SHOCK

4. SHOCKABLE RHYTHM?
   - YES

   CPR 2 MINUTES
   - ADMINISTER EPINEPHRINE 1 MG 1:10,000 EVERY 3-5 MINUTES IV PUSH
   - CONSIDER ADVANCED AIRWAY, CAPNOGRAPHY

   NO

   SHOCKABLE RHYTHM?

5. SHOCK

6. CPR 2 MINUTES
   - ADMINISTER EPINEPHRINE 1 MG 1:10,000 EVERY 3-5 MINUTES IV PUSH
   - CONSIDER ADVANCED AIRWAY, CAPNOGRAPHY

7. SHOCK

8. CPR 2 MINUTES
   - ADMINISTER AMIODARONE 300 MG IV PUSH, SECOND DOSE 150MG

9. ASYSTOLE / PEA

10. CPR 2 MINUTES
    - IV / IO ACCESS
    - ADMINISTER EPINEPHRINE 1 MG 1:10,000 EVERY 3-5 MINUTES IV PUSH
    - CONSIDER ADVANCED AIRWAY, CAPNOGRAPHY

11. CPR 2 MINUTES
    - TREAT REVERSIBLE CAUSES

12. IF NO SIGNS OF ROSC
    - GO TO 10 OR 11
    - IF ROSC GO TO POST-CARDIAC ARREST CARE PROTOCOL

   SHOCKABLE RHYTHM?

   NO

   YES

   NO

   YES

   GO TO 5 OR 7

PLEASE NOTE!
THIS ALGORITHM IS NOT PROVIDER SPECIFIC.
EXPECTATION IS THAT YOU ARE TO PERFORM SKILLS BASED ON YOUR SCOPE OF PRACTICE.

► ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼
POST ARREST CARE

- CONTINUOUS MONITORING OF PULSE OXIMETER, CAPNOGRAPHY, AND VITALS
  - MAINTAIN O2 SATS ≥ 94%
  - MAINTAIN END TIDAL CO₂ 35-40 MMHG
- MAINTAIN AIRWAY MANAGEMENT
  - VENTILATE 10-12 BREATHS PER MINUTE
- PERFORM 12 LEAD ECG AND TRANSMIT
- ELVATE HEAD OF PATIENT 30° IF TOLERATED
- TRANSPORT. CONSIDER ALS INTERCEPT

- TREAT HYPOTENSION
  - ADULTS 1-2 LITERS OF NORMAL SALINE
  - INFANT / CHILD 20 ML/KG
  - CONSIDER TREATABLE CAUSES
- TREAT DYSRHYTHMIA PER PROTOCOL
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