Highlights of 2010 American Heart Guidelines

CPR

- Compressions rate of at least 100/min. allow for complete chest recoil
- Adult CPR depth of at least 2 inches
- Child/Infant CPR depth of 1/3 anterior/posterior chest diameter or
    - 1.5 inches for infant
    - 2 inches for children
- Change from A-B-C to C-A-B in sequence
    - Check for Responsiveness, call 911, check for pulse and begin compressions.
    - After 30 compression check airway (head tilt) and give 2 ventilations
- Critical initial elements of CPR are chest compressions and early defibrillation
    - Pulse check De-emphasized (less than 10 seconds
- Healthcare providers are encouraged to tailor rescue actions to the most likely cause of arrest.
- If bystander is not trained in CPR, they are instructed to do compression only CPR.
- The routine use of cricoids pressure in cardiac arrest is not recommended.
- Training should encourage rescuers to work as effective teams.

Chain of Survival

Early Recognition Early CPR Early Defibrillation Advanced Life Support Post Arrest Care

- Adult Chain of survival links are:
    - Immediate recognition and activation of Code team or 911
    - Early CPR-emphasis on chest compressions
    - Rapid Defibrillation
    - Effective Advanced Life Support
    - Integrated Post-Cardiac Arrest Care.

Electrical Therapies

- Consider AED use in hospitals.
- Establish AED programs in public locations
- Use Pediatric pads for children age 1-8 with the AED, if not available use standard Adult pads
- Infants (less than 1 year) a manual defibrillator is preferred
    - Carondelet policy states that manual defibrillator will be used in children and infants under 1 year.
- Provide immediate CPR and use the AED/Defibrillator as soon as it is available.
- Goal of shock delivery for VF/pulseless VT is less than 3 minutes from collapse. CPR should be performed while the defibrillator is readied.
- Recommendation remains single-shock defibrillation followed by 2 minutes of CPR.
- Pediatric Defibrillation
    - Initial dose of 2 to 4 j/kg
    - Subsequent shocks, at least 4 j/kg, not to exceed 10j/kg or the adult maximum dose.
- Electrode Placement, anterior-lateral pad position is a reasonable default electrode placement.
    - Anterior-posterior, anterior-left infrascapular, and anterior-right infrascapular are also reasonable.
- Defibrillation with Implantable Cardioverter-Defibrillator
    - Anterior-posterior and anterior-lateral are both generally acceptable
    - Do not delay defibrillation
    - Avoid placing the pads or paddles directly over the implanted device.

- Synchronized Cardioversion
    - Supraventricular Tachyarrhythmias
        - Atrial fibrillations initial biphasic energy dose of 120-200 J.
        - Atrial flutter & other supraventricular rhythms generally require less energy: initial 50-100 J with either monophasic or biphasic device.
    - Ventricular tachycardia
        - Adult stable monomorphic VT responds well to biphasic waveform cardiovsersion shocks at initial energies of 100 J.

Synchronzied cardioversion must not be used for treatment of VF because the device is unlikely to sense a QRS wave, and thus, a shock may not be delivered. Synchronized cardioversion should also not be used for pulseless VT or polymorphic VT (irregular VT). These rhythms require delivery of high-energy unsynchronized shocks (Defibrillation)

- Pacing
    - Not routinely recommended for patients in asystolic cardiac arrest.
    - Reasonable in symptomatic bradycardia with pulse. If transcutaneous pacing fails, transvenous pacing initiated by a trained provider with experience in centeral venous access and intracardiac pacing is probably indicated.
- Precordial thump
    - Should not be used for unwitnessed out-of-hospital cardiac arrest
    - May be considered for patients with witnessed, monitored unstable VT, if defibrillator is not immediately ready for use. Do not delay CPR and shock delivery.
- Impedance threshold devices
    - Has not improved long-term survival in patients with cardiac arrest.

- Continuous quantitative waveform capnography is now recommended for intubated patients throughout the periarrest period.
- The traditional cardiac arrest algorithym was simplified to emphasize the importance of high-quality CPR
- Atropine is no longer recommended for routine use in management of pulse PEA/Asystole
- Chronotropic drug infusion are recommended as an alternative to pacing in symptomatic and unstable bradycardia
- Adenosine is recommended as safe and potentially effective for both treatment and diagnosis in the initial management of undifferentiated regular monomorphic wide-complex tachycardia. It <u>should not</u> be used for irregular wide-complex tachycardias because it may cause degeneration of the rhythm to VF.
- Systematic post-cardiac arrest care after Return of Spontaneous Circulation (ROSC) should continue in a critical care unit with expert multidisciplinary management and assessment of the neurologic and physiologic status of the patient.
    - Often includes the use of therapeutic hypothermia.
    - Cardiopulmonary and Neurologic Support
    - PCI when indicated
    - Electroencephalogram for diagnosis of seizures (common in post arrest comatose patients)
- Key Objectives of Post-Cardiac Arrest Care
    - Optimize cardiopulmonary function and vital organ perfusion after ROSC
    - Transport/transfer to an appropriate hospital or critical care unit with a comprehensive post-cardiac arrest treatment system of care.
    - Identify and treat Acute Coronary Syndrome and other reversible causes
    - Control temperature to optimize neurologic recovery
    - Anticipate, treat and prevent multiple organ dysfunction. This includes avoiding excessive ventilation and hyperoxia (monitored oxyhemoglobin saturation to maintain a saturation of equal or > than 94% but < 100%).

- The new guidelines include specific treatment recommendations for fifteen specific cardiac arrest situations. These can be found in the current "Circulation" publication. The six additional situations are:
    - Morbid obesity
    - Pulmonary embolism
    - Avalanche
    - PCI
    - Cardiac tamponade
    - Cardiac surgery

Acute Coronary Syndrome

- Important component of STEMI is out-of-hospital 12 lead ECGs
- Triage to Hospitals capable of performing PCI
- Clinical finding of coma in Patients before PCI are common after out-of-hospital cardiac arrest and should not be a contraindication of consideration of immediate angiography and PCI.
- Supplementary oxygen is not needed for patients without evidence of respiratory distress if the oxyhemoglobin saturation is ≥ 94%.
- Morphine should be given with caution to patients with unstable angina.
    - Morphine is indicated in STEMI when chest discomfort is unresponsive to nitrates
    - Morphine should be used with caution in unstable angina/non-STEMI (associated with increased mortality)

Stroke

- Unless patient is hypotensive (systolic blood pressure <90 mm Hg) Pre-hospital treatment of blood pressure is not recommended.
- A growing body of evidence indicates improvement in 1-year survival rate, functional outcomes and quality of life when patients are cared for in a dedicated stroke unit.

- Guidelines for use of TPA have been updated to be consistent with the American stroke Association/AHA recommendations.
- Treatment of a carefully selected patients with acute ischemic stroke with IV rtPA between 3 and 4.5 hours after symptom onset has also been shown to improve clinical outcome.
    - however the degree of clinical benefit is smaller than that achieved with treatment within 3 hours.
    - at present the use of IV rtPA within 3 to 4.5 hours after symptoms onset has not been approved by the US Food and Drug Administration
- The table for management of hypertension in stroke patients has been updated.

Pediatrics

- Use CAB sequence
- Depth for Child CPR is at least one third of the anterior-posterior diameter of chest
    - About 2 inches in most children
    - Approximately 1 ½ inches in infants
- Pulse check De-emphasized, not more than 10 seconds
- For infants, a manual defibrillator is preferred to AED
    - If not available-use pediatric pad with AED
    - If neither is available, and AED without a pediatric dose attenuator may be used.
    - High-dose shock is preferable to no shock shockable rhythms
- Monitoring capnography/capnometry is recommended to confirm proper Endotracheal tube position & optimize the quality of chest compressions
- Initial defibrillation energy dose of 2 to 4 J/KG either monoophasic or biphasic waveform is reasonable
- Second and subsequent dose, give at least 4 J/KG (not to exceed 10 J/kg or the adult dose
- Once spontaneous circulation has been restored, maintain an arterial oxyhemoglobin saturation ≥94% but <100%.

- Resuscitation of Infants & children with congenital heart defects
    - New sections have been added
- Do not administer calcium except in very specific circumstances
- Limit use of etomidate in septic shock
- Indications for postresuscitaion therapeutic hypothermia have been clarified
- New diagnostic considerations have been developed for sudden cardiac death of unknown etiology
- Seek expert consultation when administering amiodarone or procainamide In hemodynamically stable patients with arrhythmias.
- The definition of wide-complex tachycardia has been changed from >0.08 seconds to >0.09 seconds.
- Post Cardiac Arrest Care
    - Therapeutic hypothermia (32^{o}C to 34^{o}C) for 12 to 24 hours, may also be considered for infants and children
    - When sudden, unexplained cardiac death occurs in children & young adults
        - Obtain a complete past medical and family history (including history of syncopal episodes, seizures, unexplained accidents/drowning and sudden unexpected death at <50 years of age.
        - Where resources allow, have an unrestricted complete autopsy .
            - Tissue should be preserved for genetic analysis to determine the presence of channelopathy

Neonatal Resuscitation

- Neonatal cardiac arrest is predominantly asphyxial, so A-B-C resuscitation sequence with a 3:1 compression-to ventilation ratio has been maintained except when etiology is clearly cardiac.

- Once positive-pressure ventilation or supplementary oxygen administration is begun, assessment should consist of simultaneous evaluation of 3 clinical characteristics:
    - Heart Rate
    - Respiratory Rate
    - Evaluation of state of oxygenation (optimally determined by pulse oximetry rather than simple assessment of color)

- Infants without antenatal risk factors who are born by elective cesarean section performed under regional anesthesia at 37-39 weeks of gestation have a decreased requirement for intubation, but a slightly increased need for mask ventilation compared with infants after normal vaginal delivery.
    - Must be attended by a person capable of providing mask ventilation but not necessarily by a person skilled in neonatal intubation

- Pulse oximetry with probe attached to the right upper extremity, should be used to assess any need for supplementary oxygen.
    - Term babies, it is best to begin resuscitation with air rather than 100% oxygen
    - Administration of supplementary oxygen should be regulated by blending oxygen and air, amount to be delivered by oximetry monitored from the right upper extremity (wrist or palm)
- Suctioning immediately after birth (including suctioning with a bulb syringe) should be reserved for babies who have obvious obstruction to spontaneous breathing or require positive-pressure ventilation.
    - There is no evidence that <u>active</u> babies benefit from airway suctioning, even in the presence of meconium and there is evidence of risk associated with this suctioning.
    - There is insufficient evidence to recommend a change in the current practice of performing endotracheal suctioning of nonvigorous babies with meconium stained amniotic fluid.

- Positive-pressure ventilations should be administered with sufficient pressure to increase the heart rate or create chest expansion, this is unchanged from the 2005 guidelines.
- Exhaled CO2 detectors are recommended to confirm endotracheal intubation.
    - The recommended compression-to-ventilation ratio remains 3:1. If the arrest is know to be of cardiac etiology, a higher ratio (15:2) should be considered.
- It is recommended that infants born at ≥36 weeks of gestation with evolving moderate to severe hypoxic-ischemic encephalopathy should be offered therapeutic hypothermia.
- There is increasing evidence of benefit of delaying cord clamping for at least 1 minute in term and preterm infants not requiring resuscitation.

<u>Consider Terminating Resuscitative Efforts in Out of Hospital Cardiac Arrest</u>

- For adults receiving BLS only (Out of Hospital)
    - Arrest not witnessed by EMS provider or first Responder
    - No ROSC (Return of Spontaneous Circulation) after 3 complete rounds of CPR and AED analyses
    - No AED shocks delivered
- Adults experiencing ALS
    - Arrest not witnessed by anyone
    - No bystander CPR provided
    - No ROSC after complete ALS care in the field
    - No shocks delivered

Implementation of these rules includes contacting online medical control when criteria met.

- No such criteria have been established for pediatric (neonate, infant, or child) out-of-hospital cardiac arrest, because no predictors of resuscitation outcome have been validated for out-of-hospital cardiac arrest in this population.

Prognostic Indicators in Adult Postarrest Patient Treated with Therapeutic Hypothermia

- It is recommended that clinical neurologic signs, electrophysiologic studies, biomarkers, and imaging be performed where available at 3 days after cardiac arrest.
    - Then use best clinical judgment based on this testing to make a decision to withdraw life support when appropriate.

More detailed information is available in the “Circulation” publication dated November 2, 2010