The 2010 Guidelines for ACLS focus heavily on Basic Life Support, specifically **high quality CPR with effective ventilations** for all cardiac arrest patients. All **interruptions** to chest compressions (breaths, switching rescuers, rhythm analysis, etc.) should be limited to **10 seconds or less**. All interventions, including rhythm and pulse checks, should be organized around **2 minute cycles of CPR**.

Insertion of an **advanced airway** during arrest scenarios is **no longer recommended**, unless ventilations with a bag mask system in conjunction with airway adjuncts are **ineffective**. Placement of an **advanced airway with waveform capnography monitoring should be considered** for arrest patients who have achieved ROSC but continue to require assisted ventilations. **Waveform capnography** measures exhaled CO2 – it is the **best way to determine proper placement of an ET tube**. (Ascultation should also be done frequently to confirm placement.) Care should be taken to avoid using **circumferential ties around the patient’s neck**, when securing an airway in place, so as not to obstruct venous return from the brain.

Waveform capnography **PETCO2 levels ≥ 10 mmHg** indicate adequate chest compressions. If intra-arterial relaxation pressure (as measured by using an intra-arterial catheter) during CPR is < **20 mmHg** attempt to improve chest compressions.

Providers should keep in mind that it is extremely important to do a thorough assessment immediately upon initial contact with the patient. If the patient is **responsive**, use the **ACLS Survey**. Obtain vital signs and a complete patient history. Consider interventions for ACS and other differential diagnoses. If the patient is **unresponsive**, use the **BLS Survey**.

**BLS Survey**

1. **Check responsiveness**; check for absent or abnormal breathing.
2. **Call 911** (activate the emergency response system); get the AED.
3. **Circulation** (check the carotid pulse 5-10 seconds). If no **definite** pulse within 10 seconds, start CPR.
   - If no pulse, start CPR (30:2)
     - Compress the center of the chest, lower half of the sternum, hard and fast (at least 2” depth, at least 100 compressions per minute).
     - Allow complete chest recoil after each compression.
     - **Minimize interruptions in compressions** (10 seconds or less).
     - **Switch providers** about every 2 minutes to avoid fatigue.
     - Avoid excessive ventilation.
   - If pulse is present, start rescue breathing at 1 breath every 5 – 6 seconds (10 to 12 breaths per minute).
   - Check pulse about every 2 minutes.
4. Defibrillation
   - If no pulse, check for a shockable rhythm with an AED/defibrillator as soon as it arrives.
   - Provide shocks as indicated.
   - Follow each shock immediately with CPR, beginning with compressions.

Use self-adhesive ("hands-free") AED pads to allow for more rapid defibrillation and reduce the risk of arcing. If an AED does not promptly analyze the rhythm, resume chest compressions and ventilations, then have someone check the AED connections and pads. Resume chest compressions while the defibrillator is charging if it will take more than 10 seconds to charge. Check to be sure O2 is not flowing over the patient's body during the shock.

Note: The BLS Survey does not include ALS techniques such as intubation or IV access/drug administration.

ACLS Survey

A. Airway - Patent? Adjunct or advanced indicated?
B. Breathing - Adequate = 12 to 20 breaths per minute, non-laborated? Room air O2 saturation ≥ 94%?
D. Differential Diagnosis -Reversible causes of symptoms or arrest?).
   H’s – Hypovolemia, Hypoxia, Hydrogen ion (acidosis), Hyper-/hypokalemia, Hypothermia
   T’s – Tension pneumothorax, Tamponade (cardiac), Toxins, Thrombosis (pulmonary or coronary)

Peripheral IV access is preferred for drug administration. A 20 ml flush of normal saline or lactated ringers should be administered immediately after each drug; elevate the extremity.

During CPR, once an advanced airway is in place, chest compressions continue uninterrupted while the patient is ventilated once every 6 - 8 seconds (8 to 10 breaths per minute).

If the patient’s PETCO2 level abruptly increases to 35 or greater, assume ROSC. If ROSC is achieved but the patient remains comatose (no response to verbal commands) consider placement of an advanced airway with waveform capnography and hypothermia. The first treatment priority for a patient with ROSC is airway and ventilation. Providers should then order labs, 12 lead, chest x-ray (if necessary) and seek expert consultation. Hypotensive patients can receive 1 – 2 liters of fluid post arrest, to raise systolic BP to minimum 90 mmHg. During arrest, if necessary, 250 – 500 ml of fluid may be administered to raise systolic BP to 90 mmHg.

TO TREAT:

❖ Refractory VF/Pulseless VT (after second shock) –
   - Epinephrine 1 mg (every 3-5 minutes) and/or Vasopressin 40 units (once only to replace first or second dose of Epinephrine).
   - Amiodarone 300 mg (second dose 150 mg) or Lidocaine (1 to 1.5 mg/kg, additional 0.5 to 0.75 mg/kg, repeat in 5 – 10 minutes; maximum 3 doses or total of 3 mg/kg).
The first treatment priority for a patient in VF or pulseless VT is defibrillation!

Note: Both Epinephrine (vasopressor) and Amiodarone (antiarrhythmic) may be administered after the second shock during the same 2 minute cycle of CPR.

❖ PEA/Asystole –
   • Epinephrine 1 mg (every 3-5 minutes)

Note: Asystole is typically the first rhythm in unassisted arrest (where no CPR was performed) or the final rhythm in a prolonged arrest scenario which began in another rhythm. It is reasonable to consider terminating care of a patient in persistent asystole, after consultation. Providers may stop or withhold resuscitative efforts if rigor mortis is present, the patient has a legitimate DNR, the patient has injuries incompatible with life (i.e. decapitation) or the situation is unsafe.

❖ Asymptomatic Bradycardia -
   • Monitor and observe.

❖ Symptomatic Bradycardia -
   • Atropine .5 mg (every 3 – 5 minutes to a total of 3 mg)
   • TCP
   • Dopamine Infusion (2 – 10 mcg/kg/min)
   • Epinephrine Infusion (2 – 10 mcg/min)

❖ Stable Tachycardia -
   • Vagal maneuvers
   • Adenosine (6 mg RAPID IV push with RAPID flush and limb elevation; second dose 12 mg) with regular wide or narrow complex

❖ Unstable Tachycardia –
   • Synchronized cardioversion (consider sedation):
     ▪ Narrow regular: 50 – 100 J
     ▪ Narrow irregular: 120-200 J
     ▪ Wide regular: 100 J
     ▪ Wide irregular: Defibrillation dose (200 J biphasic or 360 J monophasic) Not Synchronized

When evaluating heart rhythms, providers should consider:

1. Are there organized complexes?
   ✓ If no, follow VF/Pulseless VT algorithm.
If yes, does the patient have a pulse?
- If no pulse, follow PEA algorithm. An organized rhythm is not shockable!
- If yes pulse, check airway and breathing, continue evaluation.

2. Is the rate slow or fast? (< 60 or >100 bpm)
- If yes, follow the Bradycardia or Tachycardia algorithm based on whether or not the patient is symptomatic.

Providers should treat the patient, not the monitor! Constantly re-assess patient status, vital signs and any signs and symptoms. Consider possible causes of signs and symptoms (Hs and Ts). Many organizations have METs (medical emergency teams) or RRTs (rapid response teams), the primary purpose of which is to improve patient outcomes by identifying and treating early clinical deterioration.

Upon patient assessment, if ACS is suspected, consider MONA (morphine, oxygen, nitroglycerine, aspirin) after verifying there are none of the following contraindications:

- Morphine - Systolic BP < 90 mmHg; symptomatic Bradycardia.
- Oxygen – No significant contraindications with ACS.
- Nitroglycerine – Systolic BP < 90 mmHg; drop in systolic BP of 30 points or more below baseline; phosphodiesterase inhibitor use within 48 hours; bradycardia < 50/min; tachycardia >100/min.
- Aspirin – recent stomach/GI bleeding; aspirin allergy.

If stroke is suspected, EMS providers should use the Cincinnati Pre-Hospital Stroke Scale and transport to the correct facility (stroke center with functioning CT capability) so that patients can receive treatment within 3 hours of the first onset of symptoms. If suctioning is necessary, providers should choose a large bore rigid tip type catheter and suction only when withdrawing the catheter and for no more than 10 seconds.

(Theses materials were created as a review/study guide by Rescue One Training for Life, Inc. and are not a product of, nor endorsed by, the American Heart Association.)

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