**EMS SKILL**

**CARDIAC EMERGENCY: AUTOMATED EXTERNAL DEFIBRILLATION (AED)**

**PERFORMANCE OBJECTIVE**

Demonstrate competency in assessing signs of cardiopulmonary arrest and performing defibrillation using a semi-automated external defibrillator in compliance the 2015 Emergency Cardiac Care (ECC) standards.

**CONDITION**

Manage an adult patient who is found unresponsive with no signs of trauma. CPR may or may not be in progress. Necessary equipment will be adjacent to the manikin or brought to the field setting.

**EQUIPMENT**

Adult CPR manikin, AED trainer, adult defibrillator pads and attenuator (if available), cables, towel, safety razor, bag mask-ventilation (BMV) device, O2 connecting tubing, oxygen source with flow regulator, oropharyngeal and nasopharyngeal airways (various sizes), silicone spray (for manikin use), pediatric resuscitation tape, 1-2 assistants (optional), suction, goggles, various masks, gown, gloves, timing device.

**PERFORMANCE CRITERIA**

• Items designated by a diamond (⧫) must be performed successfully to demonstrate skill competency.

• Items identified by double asterisks (\*\*) indicate actions required if indicated.

• Items identified by the symbol (§) should be practiced.

• Ventilations and compressions must be performed at the minimum rate required.

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| **PREPARATION** |
| **Skill Component** | **Key Concepts** |
| ⧫ Establish body substance isolation precautions (BSI) | • Mandatory personal protective equipment – gloves must be worn at all times• Situational - goggles, masks, gown as needed |
| ⧫ Assess scene safety/scene size-up***\*\* Consider spinal motion restriction (SMR) – if indicated*** | • If trauma is suspected, manage as a trauma patient, which can be determined by the environment and the information obtained from bystanders. |
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| **PROCEDURE** |
| **Skill Component** | **Key Concepts** |
| ⧫ Assess the patient and initiate BLS procedures: •Check for responsiveness while assessing for breathing 5-10 seconds • Palpate for pulse for up to10 seconds* Start CPR beginning with compressions at a rate of 100-120/min.

 • Attach AED as soon as available**NOTE:** ***If an airway obstruction is present, the rescuer should perform obstructive airway maneuvers.*** | • The AED should **NOT** be applied to any patient who is conscious, has a pulse, is breathing, or meets Reference No. 814 or 815• The AED will *only* shock ventricular fibrillation and ventricular tachycardia. • Early defibrillation is critical in improving the survival of patients in ventricular fibrillation and pulseless ventricular tachycardia. • An AED can be used on an infant and child up to 8 years of age. Over 8 years old treat as for an adult.* Some AED models are designed for both pediatric and adult use. These devices deliver a reduced shock by 67% when pediatric pads are used.
* If an attenuator system is not available, use adult pads and the adult electrical dose. *Not treating a shockable rhythm in infants and children has the potential for greater harm than using adult pads and electrical dose.*
* Defibrillation stops all chaotic electrical impulses in the heart and allows the pacemaker to re-establish a viable heartbeat.
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| **IF CONTINUING FROM ONE (1) & TWO (2) PERSON ADULT/CHILD/INFANT CPR, MAY BEGIN HERE** |
|  **Skill Component** | **Key Concepts** |
| ⧫ Position the AED near the patient and the operator | • The AED should be placed near the operator to prevent reaching across the patient to press the “analyze” and “shock” buttons. |
| ⧫ Turn on the AED | • Some devices have an ON/OFF button; some turn on when the lid is opened. Once the AED is turned on, **DO NOT** turn off until the patient has been transferred to a higher medical care provider.  |
| ⧫ Expose the chest – *if not already done* | * The chest must be exposed prior to placing the AED pads
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| ⧫ Prepare pad sites for secure pad contact | * Metal surfaces do not pose a hazard to either patients or EMS providers.

• Water conducts electricity and may provide a pathway for energy from the AED to the provider or bystanders or from one electrode pad to another.* If the patient is lying in water, move them to a drier area.
* It is safe to use the AED snow or rain.
* If the patient is wet, dry them off prior to placing the AED pads on the chest

• Medication patches can block the delivery of energy to the heart and cause minor burns due to arcing. If medication pads would interfere with AED pad placement, remove them.• Chest hair may prevent the pads from adhering to the chest. Use a safety razor to shave the area where pads will be placed. A second set of pads may be used to epilate the chest hair if they are available.• Body jewelry to the torso may cause arcing and skin burns. Attempts should not be made to remove jewelry. If no other placement is available, place the pads directly over the jewelry. • Placing AED pads over pacemakers or implantable cardioverter defibrillators (ICDs) may reduce the energy delivered to the heart and damage these devices. Therefore, **DO NOT** place the pads over these devices. Place the pads about 1” from these devices. |
| ⧫ Apply the AED pads (must not touch or overlap): • **Adult** - Upper - right sternal border directly below the clavicle - Lower - left mid-axillary line, 5th - 6th intercostal space with top margin below the axilla • **Children/Infants < eight (8) years of age**  - Anterior-Posterior  1st pad anterior over sternum between nipples 2nd pad posterior between shoulder blades - Anterior-Anterior - Right pad – wrap over a small child’s shoulder - Left pad – left anterior to cover mid-clavicular and mid-axillary lines | • Some manufacturers recommend that pads are placed on specific sites/sides – follow the manufacturer’s guidelines.•AED pads must **NOT TOUCH EACH OTHER.** Place them about 1” apart.* If a child is older than 8 years-of-age or more than 55 pounds, use adult defibrillation pads..
* When pads touch, arcing may occur and result in skin burns.

 * When pads overlap, the AED is unable to read the rhythm and will result in “no shock advised.”
* If you are using an AED for an infant or child less than eight (8) years of age and the AED does not have child pads, you may use adult pads. The pads may need to be placed anterior and posterior so that they do not touch each other.
* If the AED does not have a pediatric dose of energy, use the adult dose.
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|  **Skill Component** | **Key Concepts** |
| ⧫ Stop CPR while analyzing for a shockable rhythm and follows the voice prompts***\*\*Ensure no one is touching the patient******\*\*If shock advised**** Continue chest compressions while charging the

AED***\*\*If no shock advised**** Resume chest compressions and breaths immediately
 | * The AED is unable to analyze the rhythm when there is artifact derived from touching the patient, chest compressions, poor pad contact, or other communication devices. This may result in the prompt to defibrillate when the patient is not in ventricular fibrillation or ventricular tachycardia.
* If there is no pulse and the AED indicates “shock,” perform CPR while the AED is charging.
* Minimize a delay in chest compression to 10 seconds or less.

• The pulse is **NOT CHECKED** immediately after defibrillation since palpating the pulse delays compressions and the resumption of circulation. * Resuming chest compressions immediately after delivering a shock helps to correct acidosis by providing oxygen and perfusion to the myocardium. This increases the heart’s ability to pump blood more effectively after the shock.
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| ⧫ Continue chest compressions and breaths at a ratio of 30:2, until ALS arrives, **OR** return of spontaneous circulation (ROSC) **OR** meets Los Angeles County Reference No. 814 criteria | * Los Angeles County Reference No. 814 Determination /Pronouncement of Death in the Field A. 1-12 – specifies when EMS personnel may determine death in the field.
* Los Angeles County Reference No. 815 Honoring Prehospital Do Not Resuscitate orders – specifies the procedures to be taken when a dying patient has a Do Not Resuscitation Order or an Advanced Health Care Directive.
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| **IF RETURN OF SPONTANEOUS CIRCULATION:** |
| **Skill Component** | **Key Concepts** |
| ⧫ Re-assess patient every five (5) minutes after ROSC: • Check for: - responsiveness - pulse  - breathing***\*\* Provide rescue breathing- if indicated******\*\* Obtain baseline vital signs******\*\* Place in position to the protect airway - if patient has adequate respirations*** | • The three (3) main considerations post-resuscitation are: - Perform pulse check about every five (5) minutes.  - Perform a primary and pertinent secondary assessment at least every five (5) minutes. - Keep AED turned on and attached to patient enroute unless switched to a manual monitor/defibrillator mode or unit.• If the patient loses pulses during transport, **DO NOT ANALYZE WHILE DRIVING**. To analyze rhythm, the ambulance must pull over and **STOP**. • If a pulse is present and the patient is not breathing adequately, deliver ventilations by utilizing a BMV device. * Placing the patient in left lateral position decreases the risk of aspiration. However, if the patient’s airway has been secured within an endotracheal tube, left lateral position is **NOT RECOMMENDED.**
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| **Skill Component** | **Key Concepts** |
| ⧫ Perform rescue breathing - if indicated • Ventilation rates using BMV or barrier device:  - Adult: 10-12 breaths /minute (one (1) breath every 5-6 seconds) * Child/infant: 12-20 breaths/minute (one (1) breath every 3-5 seconds)

 - **Advanced airway:** 10 breaths/minute (one (1) breath every six (6) seconds)§ Explain the care being delivered and the transport destination to the caregivers | • If respirations are absent or inadequate the rescuer must open the airway and ventilate the patient to prevent cardiac arrest and hypoxic injury to the brain and other organs.• Hypoxia may result in bradycardia and followed by cardiac arrest.* Communication is important when dealing with the patient, or caregiver. This is a very critical and frightening time for all involved and providing information helps in decreasing the stress they are experiencing.
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| **RE-ASSESSMENT****(Ongoing Assessment)**  |
| **Skill Component** | **Key Concepts** |
| ⧫ Repeat an ongoing assessment a minimum of every five (5) minutes once the child has return of spontaneous respirations and circulation: • Primary assessment • Relevant portion of the secondary assessment • Vital signs  | * This is an unstable patient and must be re-evaluated a minimum of every five (5) minutes or sooner, if any treatment is initiated, medication administered, or condition changes.
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| ⧫ Evaluate results of reassessment and compare to baseline condition and vital signs***\*\*Manage patient’s condition as indicated.*** | • Evaluating and comparing results with the baseline information assists with determining if the patient is improving, responding to treatment, or if their condition is deteriorating. |
|  **PATIENT REPORT AND DOCUMENTATION** |
| **Skill Component** | **Key Concepts** |
| § Verbalize/Document:* Documentation elements on the EMS Report form should include:
* if the arrest was witnessed
* if CPR was initiated and by whom
* the time CPR was initiated- if applicable
* If the AED indicated that a shock was advised or no shock was indicated
* the time from the arrest until the onset of CPR
* response to treatment/defib
* organ or tissue donor

   | • EMS Personnel are defined as EMTs and paramedics. Law enforcement and EMS personnel off duty who may have started CPR are considered citizens for documentation purposes.• The time of arrest cannot be determined in an unwitnessed cardiac arrest. However, documenting when the patient was last seen may be helpful.• When assessing for pulses with CPR in progress, have an additional rescuer palpate for a pulse. If there is no pulse with compressions this may be due to inadequate compressions or hypovolemia.• Response to CPR –The patient regains a pulse and/or respirations or remains pulseless and/or apneic.* Documenting reassessment information provides a comprehensive picture of patient’s response to treatment.
* Documentation must be on either the Los Angeles County EMS Report, ePCR, or departmental Patient Care Record form.

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Developed 1/01 Revised 10/2018

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**Supplemental Information**

**INDICATIONS:**

• Patient unresponsive to stimuli, non-breathing, and pulseless. (The AED will shock patients with a pulse if they are in ventricular tachycardia).

**CONTRAINDICATIONS:**

• Patients who are awake, have a pulse, or are breathing

• Patients who meet conditions outlined in Reference No. 814 or 815.

**COMPLICATIONS:**

• Burns to chest

• Inappropriate shocks or failure to shock

**NOTES:**

• Honor the patient’s wishes if they have a valid Advance Health Care Directive, POLST, or Prehospital Do Not Resuscitate order.

• The initial priority in cardiac arrest is to use the AED as soon as it is available because the “pump” is still primed.

• Never use the AED to triage or monitor patients who complain of chest pain and are awake, breathing or have a pulse.

• CPR prior to defibrillation results in improved survival rates.

• The AED operator is responsible to ensure that no one touches the patient when the AED is analyzing or when shocks are given.

• The arcing of electricity results in burns to the chest and/or the myocardium not receiving an appropriate electrical charge.

• Some manufacturers recommend that pads are placed on specific locations on the patient. Follow the manufacturer’s guidelines.

• An AED may be used in trauma if there is a reasonable suspicion that the accident was caused from a cardiac event.

* With most defibrillators, the 1st shock eliminates ventricular fibrillation more than 85% of the time. If the 1st shock fails, resumption of chest compressions is likely to be of a greater value than another shock.

• The time it takes to analyze the cardiac rhythm results in a delay of CPR resulting in ineffective circulation. Therefore, chest compressions should be initiated and resumed within 10 seconds after a shock has been delivered. Follow the voice prompt.

• Careful consideration should be made when determining the appropriate time to transport. Chest compressions in the back of a moving ambulance are generally ineffective.

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**Supplemental Information (Continued)**

**\*\*\*DO NOT modify pads under any circumstances\*\*\***

Adult: Anterior-Anterior Adult: Anterior-Posterior Child/Infant: Anterior-Anterior Child/Infant: Anterior-Posterior

    

**LOS ANGELES COUNTY EMS REFERENCE NUMBERS:**

• 502 - Patient Destination

• 510 – Pediatric Patient Destination

• 814 - Determination/Pronouncement of Death in the Field

• 815 - Honoring Prehospital Do-Not-Resuscitate (DNR) Orders

• 815.1 - State of California EMS Prehospital Do-Not-Resuscitate (DNR) Form

• 815.2 - Physician Orders for Life Sustaining Treatment (POLST) Form