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**EMS SKILL**

**CARDIAC EMERGENCY: CARDIOPULMONARY RESUSCITATION**

**CHILD – 1 and 2 RESCUER CPR**

**PERFORMANCE OBJECTIVES**

Assess signs of cardiopulmonary arrest in a child and perform one (1) and two (2) person demonstrate competency in performing cardiopulmonary resuscitation and managing a full arrest.

**CONDITION**

Assess and perform cardiopulmonary resuscitation for a child who appears to be unresponsive. Necessary equipment will be adjacent to the manikin or brought to the field setting.

**EQUIPMENT**

Child CPR manikin, bag- mask- valve device, O2 connecting tubing, oxygen source with flow regulator, AED, oropharyngeal and nasopharyngeal airway appropriate for manikin, silicone spray, water-soluble lubricant, towels for positioning, goggles, masks, gown, gloves, suction, timing device.

**PERFORMANCE CRITERIA**

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

• Items identified by double asterisks (\*\*) indicate actions that are required, if indicated, by the scenario.

• Items identified by (§) should be practiced.

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

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| **PREPARATION** |
| **Skill Component** | **Key Concepts** |
| ⧫ Take body substance isolation precautions | • Mandatory personal protective equipment – gloves at all times |
| ⧫ Assess scene safety/scene size-up***\*\* Consider spinal motion restriction (SMR) - if indicated*** | • If trauma is suspected, treat as trauma (determined by environment and information obtained from bystanders).• Depending on the size of the child and if SMR is required, an additional rescuer is needed to maintain in-line axial stabilization. |
| ⧫ Determines if additional BSI is needed | • Situational - goggles, masks, gown as needed |
| § Approaches the child and explains the care being delivered and the transport destination to the patient/caregiver | • Communication is important when dealing with the patient, family, 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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| **PROCEDURE** |
| **Skill Component** | **Key Concepts** |
| ⧫ Check responsiveness:***\*\*Tap the child’s shoulder and shout “Are you OK?”*** | • **DO NOT** start CPR on a sleeping child. Always tap the shoulder and shout “Are you OK?”* Healthcare Providers must call for help upon finding a patient unresponsive while continuing to assess the breathing and pulse. The goal is to get the AED there as soon as possible.
* CPR should not be initiated in children who meet the criteria for: Reference No. 814 or 815.
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| **Skill Component** | **Key Concepts** |
| ⧫ Call for additional resources – if needed***\*\*Calls for ALS (911)******\*\*Request an AED* - *if not already on scene******\*\*If the event was NOT witnessed, perform about two (2) minutes (5 cycles of 30:2 or 10 cycles of 15:2) CPR prior to leaving the childt to call 911*** |  • If two (2) rescuers are present, the 2nd rescuer should contact ALS and get the AED.• If four (4) team members are present: One (1) rescuer calls for ALS and defibrillator One (1) rescuer initiates chest compressions Two (2) rescuers provides ventilation |
|  ⧫ Check for a carotid or femoral pulse while simultaneously assessing for breathing: ***\*\* Assess for a carotid or femoral pulse for no less than 5 seconds but for no longer than 10 seconds*** ***\*\* Assess breathing for up to 10 seconds*** | * The femoral pulse can be located by using two (2) fingers in the inner thigh midway between the hip bone and the pubic bone and just below the crease where the leg meets the torso (groin).

 * Care must be taken to avoid placing excessive pressure on the carotid or femoral pulse. Pressing too hard may obliterate the pulse in a small child.
* Palpating for the presence of a carotid pulse should be performed on same side as the rescuer. **DO NOT** reach across the neck. An alternative to palpating a carotid pulse is to palpate the femoral pulse.

Continued…* It can be difficult to determine the presence of a pulse in a small child. Therefore, if you do not feel a pulse within 10 seconds, and the child is unresponsive, begin chest compressions.
* When assessing for breathing, scan the patient’s chest for rise and fall for no longer than 10 seconds.
* Unnecessary CPR is less harmful than if CPR is not performed when indicated.
* An alternative to palpating the carotid/femoral pulse is by utilizing a stethoscope to auscultate an apical heart rate. (each lub-dub = 1 beat)
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| ⧫ Placed the patient onto a hard surface – *if indicated* ***\*\* Place a CPR board under the child or move onto the floor*** | * Chest compressions must be performed on a hard surface. If the patient is on a soft surface, place a CPR board under the child or move the child to the floor.
* A hard surface allows for the compression of the heart between the chest wall and the vertebrae for increased blood flow.
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| ⧫ Expose the chest | • Exposing the chest aids with proper hand placement on the chest. |
| ⧫ Initiate chest compressions*:*\*\* Perform compressions over the lower ½ half of the breastbone ***\*\* \*\*Use 1 or 2 hands:***  - One (1) hand - heel of hand on lower ½ of breastbone - Two (2) hands – heel of one hand on breastbone with the other hand on top of the 1st hand \*\* Depth: at least ⅓ of anterior-posterior chest size or about 2 inches  \*\* Rate: at least 100-120/minute (30:2) for 1 rescuer and (15:2) for 2 rescuers.***\*\* Start compression cycle - (C-A-B sequence)***- if no pulse or signs of circulation- if pulse < 60 beats/minute with poor perfusion***\*\*Allow for complete chest recoil between compressions******\*\*Attach the AED as soon available******\*\* DO NOT compress on or near the xiphoid process***Continued…***\*\*Minimize delays and interruptions of compression to*** ***less than 10 seconds.***  | * **DO NOT DELAY THE INITIATION OF CHEST COMPRESSIONS**
* If the child has a pulse rate of less than 60/minute with poor perfusion, CPR must be initiated. Bradycardia in children causes the cardiac output to be insufficient for adequate perfusion and cardiac arrest may be imminent.
* Chest compressions should be initiated if you are unsure that if the child has a pulse. Unnecessary CPR is less harmful than if CPR is not performed when indicated.
* It is important to allow for full recoil of the chest at the end of each compression and minimize interruptions and delays of chest compressions to 10 seconds or less.

• The viability of organs is directly affected by perfusion and oxygenation. The longer a child is without CPR, the greater the damage to vital organs.* For most children, the compression technique will be the same as for an adult: heel of one hand on sternum with the other hand on top of the 1st hand.

 **1 handed method:*** Heel of one hand on the breastbone

 **2 handed method:**  - place the heel of one hand on top of the 1st handContinued… - fingers may be extended or interlaced, but must be kept off chest - shoulders directly over hands - arms straight and elbows locked - delivers force of compression straight down in order to be more effective - allow chest to return to normal position  - use the AED as soon as it becomes available. Some AED models are designed for both pediatric and adult use.* CPR must be continued while charging to minimize delays and interruptions in compressions.
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| **MAY SWITCH TO AED SKILL HERE** |
|  **Skill Component** | **Key Concepts** |
| ⧫ Resume chest compressions immediately after a shock has been delivered | * Pulse checks **ARE NOT** performed after a shock has been delivered.
* By immediately resuming chest compressions after shocking the patient, the chances for ROSC are increased.
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| ⧫ Open/Maintain a patent airway:• Medical * head-tilt/chin-lift

• Trauma- jaw-thrust- neutral position (external ear canal should be level with the top of the shoulder ***\*\* Clear/suction airway - if indicated******\*\* Consider nasopharyngeal or oropharyngeal airway - if indicated***  | • The use of shoulder padding maintains proper airway and spinal alignment.* Use jaw thrust maneuver when head, neck or spine injury is suspected.

• If the jaw thrust maneuver does not open the airway to allow for adequate ventilation, use the head tilt-chin lift technique.• It may be necessary to move a child’s head through a range of positions to provide an optimal airway. (Only if no trauma is suspected) However, an attempt should be made to minimize movement of the spine and the head and neck. • The tongue and epiglottis may obstruct the entrance of the trachea due to inspiratory efforts creating negative pressure in the airway.• The child’s airway is more compliant and may collapse during respiratory effort. The airway is easily obstructed by mucus, blood, pus, edema, external compression and hyperextension |
| ⧫ Manage ventilations: • Give two (2) breaths with BMV device or pocket mask -  (Each breath over one (1) second)  • Insert an oral airway or nasopharyngeal airway - *if indicated* ***\*\* Ensure adequate chest rise*** ***\*\* Avoid excessive ventilation*** | • While performing ventilations, use *only* enough force to allow for good chest rise. Over-inflation causes gastric distention which will affect tidal volume by elevating the diaphragm.* Do not make more than one (1) attempt to ensure adequate chest rise and fall as this causes a delay in resuming chest compressions.

• Using a BMV by a single rescuer is difficult and may not be as effective as a pocket mask due to inadequate seal and this may reduce the number of compressions delivered per minute.• EMS personnel often deliver excessive ventilations during CPR which may result in: - Increased intrathoracic pressure and impedance of venous return resulting in decreased cardiac output, cerebral blood flow, and coronary perfusion - Air trapping and barotraumas in children with small-airway obstruction - Increases risk of regurgitation and aspiration in children without an advanced airway |

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| **Skill Component** | **Key Concepts** |
| ⧫ Switch roles after about 2 minutes (5 cycles of 30:2 or 10 cycles of 15:2) – *if additional rescuers are available****\*\* Resumes CPR beginning with compressions and ending with ventilation at a rate of 100-120/minute*** ***\*\* Establishes a compression to ventilation ratio of*** ***30:2 for one (1) rescuer and 15:2 for two (2) rescuers.*** ***\*\* Delivers two (2) breaths (Each breath over one (1)second)*** ***\*\* Completes about two (2) minutes of CPR***  | • Switching roles about every two (2) minutes (five (5) cycles) prevents rescuer fatigue.• Switching roles should take less than five (5) seconds.• If using an AED, make the switch when the AED is analyzing the rhythm to minimize interruptions and delays in compressions to 10 seconds or less.  * The universal rate for compressions in all cardiac arrest patients is 100 to 120/minute with the exception of the neonate.
* A compression cycle consists of 30 compressions and two (2) ventilations.
* Five (5) compression cycles should take approximately two (2) minutes.
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| ⧫ Continue CPR until ALS arrives or patient shows signs of return of spontaneous circulation (ROSC) • If circulation is present and breathing is normal – place in recovery position and monitor • If circulation present, but breathing is absent or inadequate - continue with rescue breathing 12-20 ventilations/minute (one (1) breath every 3-5 seconds) • If no circulation present - continue CPR ratio of 15:2 ***\*\* Start compressions - if heart rate is less than*** ***60/minute with poor perfusion*** | • Signs of return of ROSC include movement and/or response to verbal or tactile stimuli.• If there has been no ROSC after 20 minutes of EMS resuscitation and there are no other resources are enroute, consider transport to the nearest receiving hospital -- Reference No. 510. |
| **IF RETURN OF SPONTANEOUS CIRCULATION** |
|  **Skill Component** | **Key Concepts** |
| ⧫ Re-assess patient a minimum of every five (5) ~~2~~ minutes after ROSC: • Check for:* **R**esponsiveness
* **P**ulse
* **B**reathing

***\*\* Place in position to protect airway - if patient has adequate respirations*** | • The main considerations post-resuscitation are: - Perform pulse check a minimum of every five (5) minutes.  - Perform a primary and pertinent secondary assessment every 5 minutes.* Signs of poor perfusion are cool extremities, pallor, mottling, cyanosis, delayed capillary refill and continued decline of level of consciousness.
* Placing the patient in left lateral position decreases the risk of aspiration.
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| ⧫ Perform rescue breathing (covering the nose and mouth) - *if indicated* • Ventilation rate: - BMV device - 12-20 breaths/minute  (one (1) breath every 3-5 seconds)* Each breath over one (1) second)
 | * The use of positive pressure ventilation is indicated when a pulse is present but the child is not breathing adequately.

• 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 cardiac arrest.• Children under 12 years of age or less than 40Kg on the Pediatric Resuscitation Tape shall be managed with a BMV device, NP or OP. |

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| **RE-ASSESSMENT****(Ongoing Assessment)** |
| **Skill Component** | **Key Concepts** |
| § Re-assess the patient at least every five (5) minutes once the patient has return of spontaneous respirations and circulation (ROSC):* **R**esponsiveness
* **P**ulse
* **B**reathing

***\*\* Manage patient’s condition as indicated.*** |  * This is an unstable patient and must be re-evaluated about every five (5) minutes if any treatment is initiated, medication administered, or if the patient’s condition changes.
* Unstable patients are patients who have abnormal vital signs, signs/symptoms of poor perfusion, or if there is a suspicion that the patient’s condition may deteriorate.
* The main considerations of post-resuscitation are:
* Check for a pulse about every five (5)minutes
* Perform a primary and pertinent secondary assessment at least every five (5) minutes.
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| § Evaluate results of on-going assessment and compare to baseline condition and vital signs***\*\*Manage the child’s condition as indicated.*** | • Evaluating and comparing results assists with determining if the patient is improving, responding to treatment, or if their condition is deteriorating.* The need for additional treatment is based upon the information gained during the reassessment.
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| **PATIENT REPORT AND DOCUMENTATION** |
| **Skill Component** | **Key Concepts** |
| § Give patient report to equal or higher level of care personnel  | • When giving a report to a higher level of care, it should consist of all pertinent information regarding the assessment finding, treatment rendered and patient response to care provided. |
| § Verbalize/Document:* Documentation elements on 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 the arrest cannot be determined in an unwitnessed arrest. However, documenting when the child was last seen may be helpful.• When assessing for pulses with CPR, 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 – child regains pulse and/or respirations or remains pulseless and/or apneic.* Documenting reassessment information provides a comprehensive picture of patient’s response to treatment.

• Last assessment information, before patient care is transferred to ALS or hospital staff should be documented on the EMS form. • Documentation must be on either the Los Angeles County EMS Report. ePCR, or departmental Patient Care Record form.   |

Developed: 4/03 Revised: 10/2018



CARDIAC EMERGENCY / CARDIOPULMONARY RESUSCITATION

**CHILD – 1 and 2 RESCUER CPR**

**Supplemental Information**

**DEFINITIONS:**

• *Recovery position* –The child is turned onto their left side with their arm underneath them and bent at the elbow. Their hand is near the head. The hand of the upper arm is near the cheek, and the upper leg is bent to stabilize the child. *Due to the varied ages and sizes in pediatric patients, there is no universal recovery position for children.* The recovery position is preferred to maintain a patent airway and spinal stability, minimize risk of aspiration, and limit pressure on bony prominences and nerves. It also allows for visualization of respirations and skin color, and provides access for needed interventions.

 The recovery position is not recommended for small children unless the head is adequately supported

 since the airway may become obstructed.

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| **COMPLICATIONS:**• Gastric distention• Rib fractures• Sternal fractures• * Separation of ribs from sternum
* Hemothorax

• Lung and heart contusion• Fat emboli• Laceration of liver or spleen• Pneumothorax |  |  |

**PRECAUTIONS:**

• EMS personnel often deliver excessive ventilations during CPR which may result in:

 - increased intrathoracic pressure and impedance of venous return resulting in decreased cardiac output, cerebral blood flow, and coronary perfusion

 - air trapping and barotraumas in children with small-airway obstruction

 - increases risk of regurgitation and aspiration in children without an advanced airway

**NOTES:**

• Child CPR techniques are indicated for children 1 year-of-to the age topuberty. The signs of puberty are the development of breasts buds in females and hair under the armpits in males.

• The tongue is the most common cause of airway obstruction due to decreased muscle tone.

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• The tongue and epiglottis may obstruct the entrance of the trachea due to inspiratory efforts creating negative pressure in the airway:

• Move the child no more than necessary to maintain an open airway. An additional rescuer is needed to maintain in-line axial stabilization if spinal motion restriction is required.

• If the child is breathing adequately with no signs of trauma, place him/her in recovery position as soon as the primary assessment is completed and have suction immediately available. This prevents airway obstruction by the tongue, mucus, or vomitus.

• Insert an oropharyngeal or nasopharyngeal airway when providing positive pressure ventilations.

• Initially there is enough residual oxygen is in the blood to allow for organ perfusion.

* Once CPR has been started, the oxygen content in the blood is depleted within the first few minutes.
* Some signs of inadequate breathing include but are not limited to: respiratory distress, fast/slow respirations, bradycardia, stridor, cyanosis, poor perfusion, and altered LOC.

• Depending on the size of the child, an alternative to palpating the carotid pulse is palpating the femoral pulse.

* Place appropriate padding under the shoulders to maintain proper airway and spinal alignment.
* A CPR cycle begins with compressions and ends with ventilations.
* Insert an oropharyngeal or nasopharyngeal airway when providing positive pressure ventilations.



CARDIAC EMERGENCY / CARDIOPULMONARY RESUSCITATION

**CHILD – 1 and 2 RESCUER CPR**

**Supplemental Information**

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| **COMPONENTS OF AN AIRWAY BAG:** |
|  **BMV devices – adult, child, infant** |  **Portable suction**  |
|  **OP/NP airways – all sizes** | **S Suction equipment– various sizes** |
| **N Nasal cannula** |  **Portable oxygen cylinder and oxygen regulator** |
| **S Simple face mask – adult, child, and infants** | **P Pulse Oximeter** |
|  **Non-rebreather – adult, child, and infants** |  **Water soluble lubricant** |

**POLICIES:**

• Reference No. 502 - Patient Destination

• Reference No. 510 - Pediatric Patient Destination

• Reference No. 814 - Determination/Pronouncement of Death in the Field

• Reference No. 815 - Honoring Prehospital Do-Not-Resuscitate (DNR) Orders

• Reference No. 815.1 - State of California EMS Prehospital Do-Not-Resuscitate (DNR) Form

• Reference No. 815.2 - Physician Orders for Life Sustaining Treatment (POLST) Form



American Heart Association 2015