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**EMS SKILL**

**CARDIAC EMERGENCY: CARDIOPULMONARY RESUSCITATION**

**INFANT - 1 and 2 RESCUER CPR**

**PERFORMANCE OBJECTIVES**

Assess signs of cardiopulmonary arrest in an infant and perform one (1) and two (2) person cardiopulmonary resuscitation in compliance the 2015 Emergency Cardiac Care (ECC) standards.

**CONDITION**

Assess for signs of cardiopulmonary arrest and perform resuscitative measures as needed for an infant who appears to be unresponsive. Necessary equipment will be adjacent to the manikin or brought to the field setting.

**EQUIPMENT**

Infant CPR manikin, bag- mask- ventilation device, O2 connecting tubing, oxygen source with flow regulator, AED, oropharyngeal airway appropriate for manikin, silicone spray, water-soluble lubricant, 10cc syringe, suction, goggles, masks, gown, gloves, emergency resuscitation tape, 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** |
| ⧫ Establish body substance isolation precautions | • Mandatory personal protective equipment – gloves at all times• Situational - long sleeves, goggles, masks, gown as needed |
| ⧫ 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). **Rescuers must consider the possibility of child abuse in infant cardia arrests**.• Depending on the size of the infant 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 |
| § Approaches the infant and explains the care being delivered and 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 heel of the foot and shout “Are you OK?”*** | • Tap the infant’s shoulder or the heel of the infant’s foot and shout “Are you OK?” * Healthcare providers must call for help upon finding an infant unresponsive while continuing to assess the breathing and pulse. A goal is to get the correct size resuscitative equipment to the scene ASAP.
* AEDs are rarely required during a pediatric resuscitation. Hypoxia and shock states are the most common causes of infant cardiac arrest.

• CPR should not be initiated in children who meet the criteria for: Reference No. 814 or 815. • In a pediatric arrest, it is important to provide oxygenation and ventilation.  |

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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 brachial pulse while simultaneously assessing for breathing:***\*\* Assess for a brachial pulse for no less than 5 seconds but for no longer than 10 seconds******\*\* Assess breathing for up to 10 seconds*** | * The brachial pulse is located on medial aspect of the upper arm, midway between the infant’s elbow and shoulder.
* Care must be taken to avoid placing excessive pressure on the brachial pulse. Pressing too hard may obliterate the pulse in an infant.

 * Assess for the presence of a brachial at the same time as assessing for abdominal rise and fall (breathing) for up to 10 seconds.
* It can be difficult to determine the absence or presence of a pulse in an infant. Therefore if you do not feel a pulse within 10 seconds and the infant is unresponsvie, begin compressions.
* Palpating for the presence of a brachial pulse should be performed on **same side** as the rescuer. **DO NOT** reach across the body. The brachial pulse is found on the medial aspect of the upper arm between the elbow and shoulder.

• An alternative to palpating the brachial pulse is to utilize a stethoscope to auscultate an apical heart rate (each lub-dub= 1 beat) • The infant’s head must be kept in the neutral position. Maximize airway patency by positioning the infant with the neck in a neutral position so that the external ear canal is level with the top of the infant’s shoulder. • Agonal gasps are not breathing but may be present in the 1st several minutes after sudden cardiac arrest.• Gasps may sound like a snort, snore, or groan• If more than 2 rescuers, the 3rd rescuer should open the airway and start ventilations.  |
| ⧫ Place the infant on a hard surface or onto the rescuer’s thigh | * Chest compressions must be performed on a hard/firm surface. If the patient is on a soft surface, place a CPR board under the infant, move the infant to a table, or place the infant on your thigh.
* 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 torso | • Exposing the chest aids with proper hand placement on the chest.  |
| ⧫ Initiate chest compressions*:*- if no pulse - if pulse < 60 beats/minute with poor perfusion***\*\* Start compression cycle - (C-A-B sequence) Begins with compressions:*** • ***Two (2) finger technique*** – ***1 rescuer***  - Location: Place two (2) fingers in the center of the infant’s chest, just below the nipple line - Depth: Compress at least 1/3 of the AP diameter of the chest or about 1 ½ inches  - Rate: at least 100-120/minute - Ratio Cycle: 30 compressions to two (2) ventilations Continued… • ***Two* (2) T*humb-encircling technique*** – ***2 rescuer*** - Location: center of the chest just below nipple line - Depth: about 1/3 the AP diameter (4cm) of chest circumference - Rate: at least 100-120/minute - Ratio cycle: 15 compressions to two (2) ventilation**\*\* *DO NOT compress on or near the xiphoid process******\*\* Allow for full chest recoil******\*\* Use AED to analyze the rhythm as soon as it is available and after every two (2) minutes of CPR. (approximately five (5) cycles), if indicated*** | * **DO NOT DELAY THE INITIATION OF CHEST COMPRESSIONS.**
* If an infant has a pulse rate of less than 60/minute with poor perfusion, CPR must be initiated. Bradycardia in infants 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 infant has a pulse. Unnecessary CPR is less harmful than if CPR is not performed when indicated.* The universal rate for compressions in all cardiac arrest patients is 100 to 120/minute with the exception of the neonate.

 * Techniques for chest compressions when performing CPR:

- **Two (*2) finger technique*** – two (2) finger pads of either index & middle finger or middle & ring finger of one hand on lower 1/2 of sternum.Continued… - ***Two* (*2) thumb-encircling technique*** *(two (2) rescuer CPR)* – Use both thumbs side by side in the center of the chest.* 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.
* Slightly elevate chest so that head and neck remain in neutral position and the neck is not flexed or hyperextended.

• The two (2)-thumb-encircling technique is preferred over the two (2) - finger technique because it produces improved blood flow. * The viability of organs is directly affected by perfusion and

 oxygenation. The longer an infant is without CPR, the greater the damage to vital organs. * Cardiac arrest in an infant is rarely from a cardiac event. Cardiac arrest in an infant is typically respiratory in nature.
* The AED should be used as soon as it is available. Continue CPR while charging.
* Some AED models are designed for both pediatric and adult use. If an attenuator system is not available, use adult pads and AED.
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| **MAY SWITCH TO AED SKILL HERE** |
| **Skill Component** | **Key Concepts** |
| ⧫ Resume chest compressions immediately after a shock had been delivered | * Pulse checks **ARE NOT** performed after a shock has been delivered.
* By 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 (tragus of ear level with top of shoulder)***\*\* Clear/suction airway - if indicated******\*\*Inserts an OP airway - indicated*** | • The use of shoulder padding maintains proper airway and spinal alignment.• The tongue is proportionately large in size to the oropharynx and may cause partial or complete airway obstruction in infants.• The infant’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.• Infants have limited lung expansion and depend more on diaphragm movement to generate a tidal volume.• If suspected trauma, the head and torso should be turned as a unit.• A second rescuer is needed to maintain in-line axial stabilization if spinal motion restriction is required.* The tongue and epiglottis may obstruct the entrance of the trachea due to inspiratory efforts creating negative pressure in the airway.

• The infant’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 with a BMV device:\*\* Place BMV device or pocket mask over infant’s nose and mouth and deliver two (2) breaths with BMV device or pocket mask, each breath over one (1) second while watching for visible chest rise.**\*\* Insert an oral airway *if indicated******\*\* Ventilate at a rate of 12-20/min (one (1) breath every 3-5 seconds******\*\* Ensure adequate chest rise*** ***\*\* Avoid ventilating too rapidly******\*\* Avoid excessive volume*** | * Keep the head in the neutral position. Maximum airway patency by positioning the infant with the neck in a neutral position so that the external ear canal is level with the top of the infant’s shoulder.

• Rescue breathing is one (1) breath every 3-5 seconds (12-20/minute). Give each breath over one (1) second. Hypoxia results in bradycardia. * Use of an NP airway is contraindicated in infants due to the small diameter of the nares and the presence of adenoidal tissue.

• If the airway is open and it is difficult to compress the bag and air leaks around the seal, an airway obstruction is present.• To ventilate, use *only* enough force to produce visible chest rise. Over-inflation causes gastric distention and elevating the diaphragm which will affect tidal volume.Continued…• EMS personnel often deliver ventilations **too** rapidly 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 - increases risk of regurgitation and aspiration in children without an advanced airway  |
|  **Skill Component** | **Key Concepts** |
| ⧫ Switch roles after about two (2) minutes (five (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 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 2 minutes (five (5) cycles of 30:2 or 10 cycles of 15:2) prevents rescuer fatigue.• Switching duties 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 victims is 100 to 120/minute with the exception of the neonate.
* A compression cycle consists of 30 compressions to two (2) ventilations for a single rescuer.

• Five (5) compression cycles of 30:2 should take approximately  Two (2) minutes.* 10 cycles of 15:2 should take approximately two (2) minutes.
* Technique for chest compressions when performing CPR:

- ***Two* *2 finger technique*** – Two (2) finger pads of either index & middle finger or middle & ring finger of one (1) hand on lower 1/2 of sternum - ***Two 2 thumb-encircling technique*** *(2 rescuer CPR)* – Use both thumbs side by side |
| ⧫ 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 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 at least every five (5) minutes after return of spontaneous circulation (ROSC): • Check for: - **R**esponsiveness - **P**ulse  - **B**reathing | • The main considerations post-resuscitation are: - Perform pulse check about every five (5) minutes. - Perform a primary and pertinent secondary assessment every five (5) minutes.* The use of positive pressure ventilation is indicated when a pulse is present but the infant is not breathing adequately.
* Signs of poor perfusion are cool extremities, pallor, mottling, cyanosis, delayed capillary refill and continued decline of level of consciousness.
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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)
 | • If respirations are absent or inadequate the rescuer must open the airway and ventilate the infant to prevent cardiac arrest and hypoxic injury to the brain and other organs.• Hypoxia may result in bradycardia and cardiac arrest.• Infants should be managed with a BMV device and insertion of an oropharyngeal airway.  |
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| **RE-ASSESSMENT****(Ongoing Assessment)** |
| **Skill Component** | **Key Concepts** |
| § Re-assess the patient at least every five (5) minutes or sooner once the obstruction is relieved • Check for: - **R**esponsiveness - **P**ulse  - **B**reathing***\*\*Manage patient condition as indicated.*** | * Infants who are, or were, n cardiac arrest are priority patients and must be re-evaluated at least every five (5) minutes or sooner.
* Evaluating and comparing results from the previous assessment assists with recognizing if the patient is improving, responding to treatment, or if their condition is deteriorating.
* The need for additional treatment is based upon information gained during reassessment.
* 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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| **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 arrest cannot be determined in an unwitnessed arrest. However, documenting when the infant was last seen may be helpful.• It is extremely difficult to assess a brachial pulse during CPR in an infant. • Response to CPR – infant 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 or departmental Patient Care Record form or ePCR.

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Developed: 8/01 Revised: 10/18



CARDIAC EMERGENCY / CARDIOPULMONARY RESUSCITATION

**INFANT - 1 and 2 RESCUER CPR - Supplemental Information**



**DEFINITIONS:**

• *Newborn* - Neonate in the first minutes to hours after birth.

• *Neonate* - Infant in first month after birth (28 days).

• *Infant* – Newborn to one (1) year (0 - 12 months).

**INDICATIONS:**

• Infants who are unresponsive, apneic, and pulseless and/or

• Heart rate is < 60 beats per minute

**CONTRAINDICATIONS:**

• None when above conditions apply.

American Heart Association 2015

**COMPLICATIONS:**

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| • Gastric distention• Rib fractures• Sternal fractures• Separation of ribs from sternum• Laceration of liver or spleen | • Pneumothorax • Hemothorax• Lung and heart contusion• Fat emboli |

**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:**

• Neutral position was once called “the sniffing position.”

* Do not start resuscitation if the patient meets the criteria in Prehospital Care Reference No. 814 or 815.

• If infant meets Reference No. 814 criteria, the infant should be left at the scene and not transported to the hospital.

• Start compression cycle if an infant has no pulse or signs of circulation or if a newborn has a pulse < 60 beats/minute. Even though the newborn or infant has a pulse, the low rate and cardiac output are insufficient to provide for adequate perfusion.

• The viability of organs is directly affected by perfusion and oxygenation and the longer a patient is without CPR, the greater the damage to vital organs.

• Move the infant no more than necessary to ensure an open airway. A second rescuer is needed to maintain in-line axial stabilization if spinal motion restriction is required.

• If the infant is in a prone position with suspected trauma, the patient should be turned using log-roll method to avoid flexion or twisting of the neck or back.

• The recovery position is not recommended for an infant unless the head is adequately supported since the airway may become obstructed. Have suction readily available to prevent airway obstruction by mucus or vomit.

• In infants and children, the most common cause of arrest is an inadequate airway. Complete about two (2) minutes of CPR to remove obstruction or provide 5 cycles 30:2 (for 1 rescuer) or 10 cycles15:2 (for two (2) rescuers) of CPR before leaving the infant to call for EMS personnel.

• Other signs of circulation are: breathing, coughing or movement in response to rescue breaths. This is checked in conjunction with palpating for a pulse.

• An alternative to palpating the brachial pulse is by utilizing a stethoscope to auscultate an apical heart rate (lub-dub = 1 heartbeat)

• Chest compressions must be performed on a hard surface. If on a soft surface place a board under the infant or move the infant to a table, etc.

• CPR cycle begins with compressions and ends with ventilations.

• Use an oropharyngeal airway when providing positive pressure ventilations.



CARDIAC EMERGENCY / CARDIOPULMONARY RESUSCITATION

**INFANT - 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** | **Suction equipment– various sizes** |
| **Nasal cannula** | **Portable oxygen cylinder and oxygen regulator** |
| **Simple face mask – adult, child, and infants** | **Pulse Oximeter** |
| **Non-rebreather – adult, child, and infants** | **Water soluble lubricant** |

**POLICIES:**

* Reference No. 510 – Pediatric Destination
* Reference No. 814 – Determination of Death in the Field
* Reference No. 815 – Honoring Prehospital Do – Not – Resuscitate (DNR) Orders

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