

**APPENDIX: 30****TITLE: High Performance Resuscitation****REVISED: November 1, 2017**

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**Clinical Indications:**

- Cardiac arrest in a patient > 8 years of age.  
(\* Many of these concepts can be adapted freely to pediatric arrest)

**Contraindications:**

- none

**Notes/Precautions:**

- High Performance CPR can be broken down into 5 major considerations; they are: *Rate, Depth, Recoil, uninterrupted, Ventilation Control*. Focus is on:
  - Minimally interrupted compressions
  - Appropriate depth, rate (target 110/min) and quality of compressions
  - Consider compressor fatigue and change compressors as needed
- small patients and morbidly obese may require modification of the procedure due to size
- This procedure is based on a 3-person crew of providers (if a 4<sup>th</sup> person is available, they should assist with setting-up airway device and rotate into a Compressor position)
- If LUCAS device is available, Position 1 (or appropriate qualified provider who is NOT the Code Commander) becomes the operator of LUCAS
- Cardiac arrest scenes are dynamic, unpredictable and fluid. Providers may have to adapt this protocol to the circumstances at hand while continuing to focus on the primary concepts.

**Procedure:**

1. First arriving providers:
2. Established prior to arriving at patient's side, the following responsibilities:
  - Position 1 (P1)** - patient's right side
    - assesses responsiveness/pulses
    - initiates chest compressions immediately (performs 2 minutes of UNINTERRUPTED chest compressions)
    - alternates chest compressions with Position 2 every 2 minute cycle
    - ventilates BVM when not performing chest compressions
    - assembles, applies & operates LUCAS
  - Position 2 (P2)** patient's left side
    - applies AED/Defibrillator pads
      - perform entire 2 min of uninterrupted CPR prior to initial defibrillation
    - operates AED after each 2 minute cycle of compressions if no ALS present
    - Compressions during AED charging

\* Boise Fire Dept uses Philips AEDs which do not allow compressions during charging. The analyze, charge and shock cycle is < 10 sec.

- alternates chest compressions with Position 1 every 2 minute cycle
- ventilates BVM when not performing chest compressions

**Position 3 (P3)** patient's head

- assembles/checks and applies all equipment for airway and ventilations within their scope of practice (OPA, BVM, Suction, O2, supra-glottic airway(SGA), airway securing device, ETCO2)
- opens/clears airway
- inserts OPA
- assembles and applies BVM
- maintains two-hand BVM mask seal while position 1 or 2 ventilates
- inserts & secures SGA when ready (and appropriately skilled provider)

**Position 4 (P4)** - if available

- rotates and assists and needed
- may function as team leader
- keeps time and record of interventions and CPR

3. ALS Integration (if not initially present):

Establish prior to arriving at patient's side, the following responsibilities:

- **Code Commander** (Paramedic in control of coordinating resuscitation) communicates/interfaces with providers performing CPR and intervention paramedic.  
May be any paramedic, but must not be at Position 1-4  
Organizes/makes all patient treatment decisions  
Sets up & operates monitor/defibrillator  
Apply 4-lead; switch pads from AED after the 2 min shock/no shock evaluation)
- **Intervention Paramedic** (positioned at feet when possible)  
Initiates IV/IO access (if not already established)  
Administers medications at the direction of the code commander  
May place advanced airway as needed
  - In the event that there is only 1 paramedic on-scene, the Code Commander may need to perform some interventions

If using an ALS monitor, may "pre-charge" to defibrillation energy prior to rhythm/pulse check so that you may analyze manually and shock immediately if VF/VT.

**"Calling 180": Calling "180" on the 180<sup>th</sup> compression and then counting down sets the tone for the next pause, notifies all providers to prepare for next changeover, and improves coordination.**

### Physician Pearls

- Design based on three person crew (more is better but the 3 person core model holds – these positions do not change)
- If initially only TWO responders on scene, priorities are AED and compressions (Positions 1 & 2). After applying AED, Position 2 may assemble BVM and oxygen and perform single person ventilations during the first 200 compressions. Positions 1 & 2 then switch as above with the non-compressing position performing single rescuer ventilations with BVM.
  - Two people put the patient in position for CPR (ensure there is sufficient space around the patient)
  - Compressor/CPR Position 1 (right side of patient) begins CPR (100 – 120 compressions/1 minute)
  - Compressor/CPR Position 2 (left side of patient) applies and turns on the AED or monitor and then ventilates when the airway person is ready at 6-10 breaths per minute (once every 10-20 compressions, or 6-10 seconds)
- **Asynchronous ventilations** at 6-10 breaths per minute; **bag through compressions**
  - This may mean “Short” or “upstroke” ventilations due to compression force. This is OK
  - No pauses for ventilations. This is OK.
- Airway position places OPA, BVM mask and ensures the bag is hooked to oxygen (the Airway person is the logical “Team Leader” unless there are four people on scene). This person DOES NOT BAG – Position 1 or 2 does.
  - If paramedic or AEMT is initially present, this is the best role for them as they will perform airway intervention and can see/control the monitor to direct defibrillation as necessary.
  - The *airway position* uses Two Handed C-E or T-E techniques
- At 2 minute rhythm analysis, AED will automatically analyze (no compressions until shock/no shock). Continue compressions while AED is charging\* (\*BFD Philips AED analyzes, charges, and shocks in the same 8 second pause). If ALS crew present, charge defibrillator to appropriate VF/VT initial shock for the device PRIOR TO stopping for rhythm analysis. This allows for continued compressions through the charging and limits time off the chest. The “peri-shock pause” (time without compressions on either side of defibrillation) and specifically the “pre-shock pause” (time without compressions prior to defibrillation) improves outcomes when reduced.
- After shock/no shock P1 or P2 (alternating from prior cycle) **immediately** begins compressions and the other begins ventilations
- Continue as above, switching out personnel when fatigued
- This Pit Crew procedure is based on UNWITNESSED arrest. If arrest is witnessed, positions are the same, but CPR is done only as long as it takes to apply AED and analyze rhythm. Do not delay defibrillation for compressions in a witnessed arrest.
- When ALS Arrives:
  - Check in with the designated Team Leader
  - One Paramedic at the feet: perform IV/IO and meds
  - One Paramedic (“Code Commander”) to apply the defibrillator and direct the resuscitation
  - Neither should interfere with airway management or CPR unless there is a complication or ROSC has been achieved

## Pit Crew Model for Cardiac Arrest Resuscitation

- ALS will work around the established two minute CPR cycles in order to limit compression interruptions and maximize chest compression fraction.
- **De-emphasize the airway and ventilation.** BVM is adequate for initial resuscitation. SGA may be placed as convenient after other priorities completed (compressions and AED/monitor placement).
  - Airway placement is only done while compressions are on going or during planned pulse/rhythm check for less than 10 seconds.
  - **EXCEPTION:** If unable to use BVM or place SGA during resuscitation (CPR), ETT may be attempted without interruption of compressions and should ideally occur after 6 min of resuscitation.

### LUCAS Integration:

Back plate can be placed at the 4 minute rhythm check or any 2 minute check thereafter.

Chest piece should be placed at the appropriate rhythm check 2 minutes after the back plate is placed.