Advanced Cardiac Life Support (ACLS)/Cardiopulmonary Resuscitation (CPR) guidelines for Undifferentiated Adult Cardiac Arrest Patients presenting to the Emergency Department during the COVID-19 pandemic

The following guidelines have been developed informed by the following:

- The Australian and New Zealand Intensive Care Society (ANZICS) COVID-19 Guidelines Version 1
- Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group
- American Heart Association (AHA) Interim Guidance for Basic and Advanced Life Support in Adults, Children, and Neonates With Suspected or Confirmed COVID-19
- Resuscitation Council UK Statements on COVID-19 (Coronavirus), CPR and Resuscitation
- EM Updates (Reuben Strayer); Available at: https://vimeo.com/402790337
- Input from representatives from Harbor-UCLA Medical Center Department of Emergency Medicine

Introduction

The care of patients with COVID-19 and performance of aerosol-generating procedures (AGP) in this population increases the risk of transmission in the hospital setting. Examples of AGPs include:

- Non-invasive positive pressure ventilation
- High flow oxygen administration (≥ 6 L/min)
- Administration of nebulized or atomized medications
- Cardiopulmonary resuscitation (CPR)
- Tracheal suction in absence of a closed system
- Tracheal extubation
- Laryngoscopy
- Endotracheal intubation
- Bronchoscopy
- Front of neck airway (tracheostomy, cricothyroidotomy)

Particularly challenging during the COVID-19 pandemic is management of the undifferentiated patient requiring resuscitative efforts. Given the high likelihood for aerosolization during intubation, ventilation, and compressions, the following protocol is intended to provide highest quality of care for the undifferentiated patient without excess risk of viral transmission to providers.

General Principles

In a patient known to be COVID-19 positive with severe multisystem organ failure (leading to cardiovascular collapse) or severe acute respiratory distress syndrome (ARDS), CPR is unlikely to result in neurologically favorable outcome and exposes healthcare workers (HCWs) to increased risk of infection. As such, per L.A. County Treatment Protocol 1210, and Reference 814, the transport of cardiac arrest patients should be avoided unless return of spontaneous circulation (ROSC) can be maintained for a minimum of 5 minutes.

However, it is important to note that CPR is likely helpful in COVID-19 patients who suffer a cardiac arrest from a clearly identifiable and reversible cause (such as an electrolyte disturbance or in a peri-intubation arrest). In such cases, CPR is recommended.

In undifferentiated patients, it is reasonable to engage in ACLS with maximal personal protective equipment (PPE) and minimizing AGPs to reduce exposure of healthcare workers. All staff should wear PPE for AGPs when anticipating the arrival of the following patients:

- Critical medical runs
- ROSC patients
- Out-of-hospital cardiac arrests (OHCA).

Staff present in the room during the resuscitation should be minimized to only essential individuals.

Additional general recommendations are as follows:

- If bag valve mask (BVM) ventilation is necessary, placement of a supraglottic airway (SGA) device, such as a laryngeal mask airway (LMA) or King-LTD is recommended as early as possible to facilitate ventilation while minimizing aerosolization of the virus.
    - If an SGA is not immediately available and BVM ventilation is necessary, a two-handed mask seal with a PEEP valve and smaller tidal volumes should be used to allow for appropriate seal maintenance and to prevent aerosolization.
- It is also recommended that providers avoid contact with the patient's mouth (e.g. do not listen for breathing.)
- An Automatic Chest Compression Device (ACCD) should be used for CPR if possible/available to avoid exposure of multiple participants.
- The opening of carts or placement of unnecessary equipment in the patient's room should be avoided during, and for one hour after, AGPs.
- Empiric administration of experimental COVID-19 medications (e.g. hydroxychloroquine, remdesivir) are not recommended during cardiac arrest resuscitation.

<u>Location of Resuscitation and PPE</u>

Resuscitation should be completed in a negative pressure room (all Harbor-UCLA ED Rooms are negative-pressure). Staff presence should be minimized. We recommend <u>five</u> individuals, including a respiratory care practitioner (RCP), two nurses, and two physicians (trainee and attending). An additional nurse (as a recorder), the ED pharmacist, and additional compressors should be available outside the room.

PPE precautions should include:

- N95 mask with Face Shield/Goggles or PAPR/CAPR
- Gown
- Gloves: Consider double gloving prior to entry to room

<u>Procedure for Resuscitation</u>

A suggested stepwise procedure for managing patients in cardiac arrest on presentation (or for anticipated cardiac arrests) is detailed below.

1. Don PPE appropriate for AGPs prior to patient arrival.

2. Prepare intubation equipment, IV supplies, central line equipment, and ACLS drugs prior to patient arrival.
3. Bring the LUCAS device and trauma shears to bedside.
4. If chest compressions are in process or are anticipated, place the LUCAS board on the gurney in advance.
5. Meet EMS in the ambulance bay. Hold ventilations and compressions during transport to the resuscitation bay.
6. On arrival to resuscitation bay, advise EMS to continue compressions and ventilations until the receiving team is prepared for transfer.
7. Ask EMS to pause compressions, move the patient to the gurney, pull the patient to a seated position, remove covers and clothing by cutting up the back of the shirt and pulling shirt pieces forward or sideways, and place defibrillation pads to the back and chest.
8. Lay the patient back onto the LUCAS board, place top, and initiate compressions.
9. Initiate IVs x2 (if not already present)
10. Proceed with ACLS treatment as necessary.
11. Place SGA (LMA or King-LT) if not already in place. Attach the patient directly to the ventilator (if possible) or to a BVM with a viral filter (if available).
    - If a King-LT used, place an OG Tube via port for gastric decompression.
12. Consider central venous line placement.
13. After stabilization, consider removal of the SGA and placement of a definitive airway (i.e. endotracheal intubation)
    - If intubation must be performed during the resuscitation, pause compressions to maximize the chances of first pass success
    - Video laryngoscopy with a screen separate from the insertion blade is the preferred modality for endotracheal intubation to prevent exposure to others

In the setting of a witnessed cardiac arrest, if additional time is required for the team to don PPE, the initial provider (in appropriate PPE) may enter the room to place defibrillation pads (if not already in place), assess for a shockable tachydysrhythmia; and deliver up to 3 shocks. CPR and ACLS care may be initiated when the remaining team members are available.
If a patient is already intubated prior to an arrest, the ventilator can be programmed to deliver breaths in time with CPR *in lieu* of reverting to BVM ventilation. The AHA recommends adjusting the ventilator settings to allow for asynchronous ventilation (in newborns, chest compressions should be timed with ventilation). The following additional steps can be utilized per the AHA:

- Increase the FIO_2 to 1.0
- Change the ventilator mode to Pressure Control Ventilation (Assist Control) and limit pressure as needed to generate adequate chest rise (6 mL/kg ideal body weight is often targeted, 4-6 mL/kg for neonates).
- Adjust the trigger to “Off” to prevent the ventilator from auto-triggering with chest compressions and possibly prevent hyperventilation and air trapping.
- Adjust the respiratory rate to 10/min for adults and pediatrics and 30/min for neonates
- Assess the need to adjust positive end-expiratory pressure level to balance lung volumes and venous return.
- Adjust alarms to prevent alarm fatigue.
- Ensure endotracheal tube/tracheostomy and ventilator circuit security to prevent unplanned extubation.

- If return of spontaneous circulation is achieved, set ventilator settings as appropriate to patients' clinical condition.

If the steps above are not possible/feasible, then BVM ventilation can be performed with a viral filter in place, if available.

For more information, reference the **Resuscitation Council UK Statements on COVID-19 (Coronavirus), CPR and Resuscitation** and the **AHA Interim Guidance for Basic and Advanced Life Support in Adults, Children, and Neonates With Suspected or Confirmed COVID-19.**

Additional Resuscitation Equipment

A **transparent plastic drape** may be considered for placement over the patient's head and neck if CPR is performed outside of a negative pressure room. If this is not available, a towel may be wrapped around the tube covering the nose and mouth. However, in the setting of a negative pressure environment and maximal PPE (N95 and FS/G or CAPR/PAPR), the plastic drape provides minimal additional protection, and may interfere with ventilation and compressions.

Thanks to the following individuals who contributed to this guideline

Emergency Medicine	**ED Nursing**
Ryan Pedigo	
Manpreet Singh	
Shira Schlesinger	
Adedamola Ogunniyi	
Bobby Carey	