Saudi Heart Association, National Heart Center and National Cardiopulmonary Resuscitation Committee taskforce statement on CPR and resuscitation during COVID-19 pandemic

ABSTRACT
Corona virus disease 2019 is a global pandemic, which affects around 2 million individuals with a high death rate that exceeds 90,000 death cases across the globe. The Saudi Heart Association and the national cardiopulmonary resuscitation committee developed a taskforce to discuss the magnitude of clinical situation and CPR management on COVID-19 patients in a prehospital and in-hospital settings. Meanwhile, the taskforce aims to develop a nation-wide clinical guidance to be used by health care workers and untrained laypersons to resuscitate COVID-19 suspected and diagnosed patients.

Key words: Corona virus; COVID-19; cardiopulmonary resuscitation; resuscitation

Introduction
Corona virus disease 2019 (COVID-19) is a global pandemic, which affects around 2 million individuals with a high death rate that exceeds 90,000 death cases across the globe. The Saudi Heart Association (SHA) and the national cardiopulmonary resuscitation (NCPR) committee developed a taskforce to discuss the magnitude of clinical situation and CPR management on COVID-19 patients in a prehospital and in-hospital settings. Meanwhile, the taskforce aims to develop a nation-wide clinical guidance to be used by health care workers and untrained laypersons to resuscitate...
COVID-19 suspected and diagnosed patients. Also, to discuss the principles and governance scheme of life support training courses conducted in the SHA accredited centers in collaboration with the national heart center (NHC) – Saudi Health Council (SHC).

General Recommendations

Prevention
Prevention of disease transmission to health care workers and the community is deemed a priority nowadays. Therefore, protective measures should be aligned with the entire collection of measures that the Saudi government has taken to combat the disease. A wide array of measures include strict quarantine, partial and full curfew, banning Umrah season, freezing public transportation activities, and limiting public mass gathering at sports gym, mosques, and other public places. In addition, the Saudi Center for Disease Prevention and Control (Saudi CDC) issues a couple of guidelines that assist healthcare providers dealing with COVID-19 pandemic situation.

COVID-19 is transmitted by droplets; however, airborne transmission is possible through aerosolization in the setting of high oxygen flow, bronchoscopy, open tracheal suctioning, intubation, extubation, non invasive positive pressure ventilation, endoscopy, cardiopulmonary resuscitation (CPR), and transesophageal echocardiography.[1]

Keeping in mind that some asymptomatic patients may be a source of infection and transmission, all patients with severe emergent cardiovascular or respiratory diseases should be managed as suspected cases of COVID-19.[2] Hence, all training courses delivered by the SHA accredited centers were postponed due to strict quarantine applied by the Saudi government.

Training Courses

Health care institutions who embrace accredited training centers still can run some training sessions for smaller groups of trainees from their own staff members. While conducting these sessions, the training center administration should take the following steps into consideration in order to minimize the risk of infection:

Involvement of infection control prevention department to help setting protocols for infection control in the training sites when a training session is ongoing. To ensure that all trainees are asymptomatic of flu-like illness or upper respiratory tract infection. Symptomatic trainees must be rescheduled to join another training session in the future after they get recovered.

At least 1.5 meter-space distance should be kept between a trainee and another while classes or workshops are running or at food court. Force should do alcohol sanitization between workshops to disinfect equipment and surfaces.

During the basic life support (BLS) courses, there should be no need for active demonstration of mouth to mouth breathing through a barrier at any workshop only the techniques of bag-valve-mask respirator (resuscitator) is allowed.

Online BLS courses that include practical skills demonstration (e-learning module of SHA and the new Arabic and English videos) are preferred at the time of pandemic to cover emergent requirements by health care providers.

Prehospital Cardiopulmonary Resuscitation

The rescuer (layperson or bystanders) should cover the mouth and nose of the victim and avoid delivering breath. They should do only chest compressions as per the guidelines until medical assistance arrives [Figures 1-3]. Rescuer should keep in mind that saliva and vomitus are a source of infection and all secretions should be dealt with caution. The use of external mechanical compression devices is preferred when available.[3] If return of spontaneous circulation (ROSC) has not been achieved after appropriate resuscitation efforts in the field, consider not transferring the victim to the hospital as to lower the risk of additional exposure to the providers.[4]
Emergency medicine service (EMS) personnel should avoid emergency intubation and effort should be planned to do elective intubation in a negative pressure room with strict airborne precaution, full personal protective equipment (PPE), and N95 fitted mask or similar devices. The assisted breathing should be done with a bag-valve-mask device/resuscitator connected to high efficiency particulate air (HEPA) filter. For adults, consider passive oxygenation with non rebreathing mask covered with surgical mask.[4]

**In Hospital Cardiopulmonary Resuscitation**

All efforts should be performed to avoid emergency intubation by planning elective intubation in every sick patient in a negative pressure room with strict airborne precaution, full PPE and N95 mask should be use. If intubation is delayed, consider manual ventilation with a supraglottic airway or a bag-valve-mask device with HEPA filter.[4] Once the patient is intubated with a closed circuit, minimum disconnection should be applied to reduce aerolization.[4]

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**Advance Life Support**

![Algorithm of basic and advance cardiac support of adult COVID-19 patients](image)

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**Figure 2:** Algorithm of basic and advance cardiac support of adult COVID-19 patients
The minimum number of expert staff should participate in the CPR and should enter the room only after wearing full airborne PPEs. The documentary recorder team member should stay outside the room. Rescuer should keep in mind that saliva and vomitus are a source of infection and all secretions should be dealt with caution. The use of external mechanical compression devices is preferred when available [Figures 1-3].

It is reasonable to consider age, comorbidities, and severity of illness in determining the appropriateness of resuscitation and balance the likelihood of success against the risk to rescuers and patients from whom resources are being diverted.\footnote{[4]}

The prognosis of COVID19-related cardiac arrest is extremely poor and therefore considered to be futile by some experts.\footnote{[5]}

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\textbf{Figure 3: Resuscitation of COVID19 pediatric patients (Advance cardiac support)}

DURING CPR
- Ensure high-quality CPR: rate, depth, recoil (may connect to chest compressor device)
- Plan actions before interrupting CPR
- Give oxygen
- Consider advanced airway and capnography
- Continuous chest compressions when advanced airway in place
- Vascular access (intravenous, intraosseous)
- Give epinephrine every 3–5 min
- Amiodarone 5 mg/Kg IV bolus for refractory VF/pulseless VT
- Consider alternative anti arrhythmic drugs for resistant VF/PVT.
- Correct reversible causes
- If no ROSC by 10-15M, consider termination of CPR

REVERSIBLE CAUSES
- Hypoxia
- Hypovolemia
- Hypo- / hyperkalemia / metabolic
- Hypothermia
- Thrombosis - coronary or pulmonary
- Tachyarrhythmia
- Toxins
- Tension pneumothorax

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Unresponsive?
Not breathing or only occasional gasps

Call resuscitation team, PPE with aerosal protection
Limit the number of the team (2 min CPR first. if alone)

\textbf{CPR 30:2. Attach AED or defibrillator pads/monitor, minimize interruptions.}
Ventilate by BVM with filter. Prepare to connect to chest compressor device if available. Prepare to intubate.

\textbf{ASSESS RHYTHM}

**SHOCKABLE** (VF/PULSELESS VT)

Immediate post cardiac arrest treatment
- use ABCDE approach
- controlled oxygenation and ventilation
- Investigations
- treat precipitating cause
- temperature control therapeutic hypothermia

**RETURN OF SPONTANEOUS CIRCULATION**

Immediately resume CPR for 2 min
Minimize interruptions
Epinephrine 0.01mg/kg

1 SHOCK 2-4 J/KG

Immediately resume CPR 30:2 for 2 min.
Minimize interruptions
Intubation by expert. Connect to ventilator with filter - EPINEPHRINE 0.01MG/KG

**NO SHOCK ADVISED**
Initially successful (ROSC achieved) in 13%. Only 2.9% survived for last 30 days, just one patient (0.7%) had a favorable neurological outcome at 30 days.[6]

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Conflicts of interest
There are no conflicts of interest.

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