

*Opšti pregledi /  
General reviews*

CARDIOPULMONARY RESUSCITATION IN  
COVID-19 SUSPECTED PATIENTS –  
A REVIEW OF THE CURRENT  
RECOMMENDATIONS

KARDIOPULMONALNA REANIMACIJA  
KOD COVID-19 SUSPEKTNIH  
PACIJENATA–PREGLED AKTUELNIH  
PREPORUKA

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**Ključne reči**

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**Abstract**

The SARS-COV-2 pandemic has created a need for changes in usual cardiopulmonary resuscitation protocols. The aim of this work was to review the available CPR recommendation in COVID-19 suspected patients. Recommendations for cardiopulmonary resuscitation of these patients require changes in terms of exposure reduction of provider, utilization of oxygenation and ventilation techniques with lower aerosolization risk, as well as utilization of priority model based on considering the appropriateness of initiating and continuing resuscitation. All healthcare workers should use full personal protective equipment and have advanced life support training. Clear guidelines for ensuring timely and effective management of the patients with cardiac arrest with adequate protection of healthcare professionals are crucial in the COVID-19 era. In that way, it is possible to contribute to the preservation of the health care system while providing optimal health care for patients.

**INTRODUCTION**

The World Health Organization has declared COVID-19 a pandemic. <sup>(1)</sup> According to Batut, by March 15, 2021, a total of 520.911 cases of COVID-19 have been registered in the Republic of Serbia while 4.747 people died. <sup>(2)</sup> At the same time, 119 603 761 confirmed COVID-19 cases were reported worldwide, including 2 649 722 deaths, reported to WHO <sup>(3)</sup> The situation caused by the pandemic creates new situations that require changes in the protocols of general cardiopulmonary resuscitation (CPR), <sup>(4)</sup> considering CPR is highly aerosol-generating procedure. <sup>(5,6)</sup>

About 12–19% of COVID-19 positive patients require hospitalization, while 3–6% of patients become critically ill. <sup>(7)</sup> In addition to the usual clinical presentation of respiratory failure induced by COVID-19, there are significant concerns about cardiovascular manifestations caused by this

viral infection. <sup>(8)</sup> In patients with COVID-19 cardiac arrhythmias are commonly observed, and progressive heart failure or cardiac arrest (CA) is common in patients with severe COVID-19. <sup>(9)</sup> Heart failure can be caused or exacerbated by COVID-19 infection, through various mechanisms including myocardial ischemia or infarction, increased oxygen demand, elevations in pulmonary pressures, pulmonary embolism, myocarditis, stress cardiomyopathy, and diffuse cytokine release. <sup>(10,11)</sup> These mechanisms can lead to arrhythmia, cardiogenic shock and CA. <sup>(11,12)</sup>

CPR in patients with CA in the setting of the global Covid-19 pandemic carries a high risk of transmitting the disease to healthcare workers <sup>(13,14,15)</sup> due to exposure to aerosol generating procedures including chest compressions, face mask ventilation and intubation. <sup>(16)</sup>

Consequently, rescuers have a special challenge to continuously balance the immediate needs of the victims with their safety. (7,17,18)

This work aimed to review the available CPR recommendation in COVID-19 suspected patients.

#### *PROVIDER EXPOSURE REDUCTION*

During the evaluation of CA in a patient with suspected or confirmed SARS-CoV-2 infection, in addition to standard measures, special protection is required, including measures against transmission by contact, via respiratory droplets, and concerning aerosol-generating activities. (4,17,19,20) Providers and their colleagues need to be protected from unnecessary exposure. (7)

#### *Strategies:*

To protect themselves from contact with both airborne and droplet particles, all rescuers should put on personal protective equipment before entering the scene. (7) It is recommended the usage of full-body suits or long-sleeve impermeable suits and if they are not available using clinical aprons of plastic or other impermeable material should be considered. The use of double gloves is recommended. Due to the high viral transmission risk during CPR, the use of FFP2 masks, or ideally FFP3 masks is recommended. (1,4) Eye and face protective measures include full-face shield/visor or polycarbonate safety glasses or equivalent. (1)

To reduce exposure it is required to limit the number of people in the resuscitation team to those necessary for patient care. (4,7) All personnel not currently needed should be kept away from the patient and remain protected. (1)

The use of mechanical CPR device instead of manual chest compressions should be considered in centres with experience and availability. (4,7,17)

Clear information on the infectious status of a patient with CA is recommended to each new provider before joining the team and when moving the patient to the Unit of destination. (4,7) All healthcare workers should have advanced life support training. (17)

#### *REDUCING THE RISK OF AEROSOLIZATION*

Intubation with a cuffed endotracheal tube connected to a ventilator with a high-efficiency particulate air (HEPA) filter in the path of exhaled gas and an in-line suction catheter represents a lower risk of aerosolization concerning other types of positive-pressure ventilation. (7,21) To avoid aerosol generation in an intubated and mechanically ventilated patient, the ventilator circuit should not be disconnected when starting CPR. (1)

#### *Strategies:*

Use a HEPA filter to any manual or mechanical ventilation device before ventilating the patient. (1,4,7)

After rhythm assessment and defibrillation of any ventricular arrhythmia, patients with CA should be intubated with a cuff endotracheal tube. (4,7)

Reducing the likelihood of failed intubation attempts by securing provider and access with the best chance of successful intubation as well as pausing chest compressions to intubate. (7)

Using video laryngoscopy if is available, since it can reduce the number of laryngoscopy attempts (4) and keep the rescuer further from the patient's mouth. (1,7)

Before intubation, initial ventilation with a bag-device with HEPA filter and a tight seal or consider passive oxygenation with a nonbreathing facemask (NRFM), covered by a surgical mask should be provided to minimize the risk of virus spread. (7)

Manual ventilation with a supraglottic airway or bag-mask device with a HEPA filter should be considered if intubation is delayed. (4,7)

After closing the circuit, it is necessary to minimize disconnections to reduce aerosolization. (7)

#### *INITIATING AND CONTINUING RESUSCITATION*

Critically ill patients with COVID-19 have a high mortality rate that increases with age and the presence of comorbidities, especially with cardiovascular disease (7,22,23) Careful assessment is required for each patient, their chance of survival, as well as for good long-term outcomes. (1) Therefore, a care priority model is proposed which is based on the patient's survival possibilities, present comorbidities and available resources. (4) It is necessary to consider both benefits to the patient and the safety and exposure of the team. (24)

#### *Strategies:*

Health care systems must establish a guideline for front-line providers to determine the suitability for initiating and discontinuing CPR for patients with COVID-19. (7)

The interim guidelines for extracorporeal membrane oxygenation of COVID-19 patients have been issued by the Extracorporeal Life Support Organization. (25) Still, there is not enough data to uphold extracorporeal cardiopulmonary resuscitation (E-CPR) for COVID-19 patients. (7)

#### *CONCLUSION*

The mortality of patients with COVID-19 is extremely high, which, together with extremely pronounced virulence, creates conditions for overcoming hospital capacities, especially intensive care units of all profiles and emergency services. Healthcare workers are exhausted which further reduces the efficiency of the health care system in providing adequate assistance to anyone who needs it. All this leads to the conclusion that the maximum rationalization of all material resources, including human resources, is necessary to maintain the vitality and smooth functioning of the health care system.

Guidelines for cardiopulmonary resuscitation of a patient with suspected or confirmed SARS-CoV-2 infection require the following changes:

a) Minimizing personnel and persons present during the CPR with the use of full personal protective equipment.

b) The use of techniques that generate the lowest aerosol emissions when providing airway and ventilation. Do not perform a chest massage beforehand, but only perform DC shock as indicated.

c) Select patients for CPR, taking into account the patient's current condition, comorbidity and age of the patient, and decide on this basis whether the patient has a realistic chance of survival.

Only by using these changes in the guidelines, it is possible to preserve the health system and provide optimal health care to patients.

*Abbreviations:*

**CPR**—cardiopulmonary resuscitation  
**CA**—cardiac arrest  
**HEPA**—high-efficiency particulate air

**NRFM**—nonbreathing facemask  
**E-CRP**—extracorporeal cardiopulmonary resuscitation

*Sadržaj*

Pandemija izazvana SARS–COV–2 stvorila je potrebu za promjenama u uobičajenim protokolima za kardiopulmonalnu reanimaciju. Cilj ovog rada bio je pregled dostupnih CPR smernica za COVID–19 suspektne pacijente. Preporuke za kardiopulmonalnu reanimaciju ovih pacijenata zahtevaju promene u pogledu smanjenja ekspozicije zdravstvenog osoblja, korišćenje tehnika oksigenacije i ventilacije sa nižim rizikom aerosolizacije kao i korišćenje modela prioriteta na osnovu razmatranja prikladnosti započinjanja i nastavka reanimacije. Svi zdravstveni radnici treba da koriste kompletnu ličnu zaštitnu opremu i da imaju obuku za napredno održavanje života. U eri COVID–19 pandemije, neophodne su jasne smernice za obezbeđivanje pravovremenog i efikasnog tretmana pacijenata sa srećanim zastojeom, a uz adekvatnu zaštitu zdravstvenih radnika. Na taj način je moguće doprineti očuvanju zdravstvenog sistema uz pružanje optimalne zdravstvene zaštite pacijentima.

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